A SYSTEMATIC REVIEW OF THE INDO-AUSTRALIAN ZOSTEROPIDAE (PART III)

by

G. F. MEES

Rijksmuseum van Natuurlijke Historie, Leiden

CONTENTS

INTRODUCTION

This paper completes my revision of the Indo-Australian Zosteropidae, the first part of which was published in 1957, the second in 1961. In the present volume the systematic treatment of the genus *Zosterops* is concluded and all other genera are dealt with. This is followed by sections with additions and corrections to the earlier parts of this revision which, because of the long time that passed since their publication, have become somewhat bulky, and they are followed by chapters in which various problems that have arisen as a result of this study are discussed. Many problems mentioned in this section remain as yet unsolved: where solutions are offered, these remain hypothetical, and in other instances I have been able to pose a problem only, without being able to suggest any solution at all. The section also lacks coherence: it is a loose collection of little bits that have turned up from time to time. Some of the problems discussed touch on branches of zoology with which I cannot claim to be thoroughly familiar, and it was not always possible to obtain the advice of persons having such specialized knowledge. For these reasons I have considered leaving out this section altogether, but have finally decided that it would be better to make some errors, than not to give a discussion at all. Perhaps my mistakes will stimulate others to find out, or to point out, the truth. Finally, there are some registers and an index.

In this last part of my revision, especially when dealing with the subspecies of *Z. lateralis* on the Australian continent, I have come to doubt the wisdom of trying to give life-histories, etc., for each subspecies separately, since many records of habits and food cannot be assigned subspecifically. On the other hand, the majority of species and subspecies in the family are insular in distribution, and in all those instances separate treatment was indeed the most convenient method. For the sake of consistency and uniformity of treatment, I have also followed it in *Z. lateralis,* as far as possible, and with the exceptions mentioned there.

I have seriously considered adding a list of all specimens examined, with mention of the institutions they belong to, and their registered numbers, so that it would be possible to check up on exactly what I have examined. However, labour and expenses would have been considerable as it would have added a minimum of some sixty pages to this volume. To anybody really interested, all my notes and measurements will remain available in the archives of the Rijksmuseum van Natuurlijke Historie.

Though this revision has been largely based on museum material, it is perhaps worth recording that I have field-experience with the following species and subspecies of Zosteropidae: *Zosterops palpebrosa buxtoni, Z. palpebrosa melanura, Z. natalis, Z. flava, Z. lutea lutea, Z. lutea balstoni, Z. lateralis gouldi, Z. lateralis lateralis, Z. lateralis familiaris, Z. tenuirostris, Z. albogularis, Z. pallida virens, Z. senegalensis* subsp., and *Lophozosterops javanica frontalis*. However limited it is, this field-knowledge has been of great help throughout, and my interest in the Zosteropidae, which has led to this revision, was aroused through field observations in Java, where, from 1946 to 1949, I served with the Netherlands Army.

As far as museum-skins are concerned: I have examined material of all species and subspecies here recognised, except *Zosterops japonica daitoensis, Z. atrifrons nehrkorni,* and *Z. conspicillata rotensis.*

Another point has to be mentioned: since this work is not a treatise on geography, I have not attempted to attain uniformity in spelling of geographical names, and in transcription of names from languages not using the Latin alphabet. For example the Japanese word for island has been transcribed as jima, zima, shima, etc., as I found it in publications consulted. Similarly, the Russian name K. A. ВОРОБЬЕВ has been transcribed as Vorobiov and Worobiev. Even in languages which use the Latin alphabet, many geographical names vary from language to language, and from atlas to atlas. In the transcription of Arabian place names, Meinertzhagen (1954, p. 6) experienced similar difficulties.

ACKNOWLEDGEMENTS

Apart from many of the persons already mentioned in parts I and II of this work, I want to acknowledge help with loans, information, etc. from: Professor W. T. Atyeo (University of Nebraska, Lincoln); Commander J. H. Brandt, U. S. N. (Bangkok); Mr. J. H. Calaby (C. S. I. R. O. Wildlife Division, Canberra); Mr. H. T. Condon (South Australian Museum, Adelaide); Dr. R. K. Dell (Dominion Museum, Wellington); Professor A. Fain (Instituut voor Tropische Geneeskunde „Prins

Leopold", Antwerpen); Dr. J. Gaud (Rennes); Mr. R. H. Green (Queen Victoria Museum, Launceston, Tasm.); Miss Elizabeth Hahn (Macleay Museum, Sydney); Mr. W. Hebig (Staatliches Museum für Tierkunde, Dresden); Mr. W. B. Hitchcock (C. S. I. R. O. Wildlife Division, Canberra); Dr. P. Humphrey (United States National Museum, Washington); Prof. A. I. Ivanov (Zoological Institute, Academy of Sciences, Leningrad); Mr. D. W. Lamm (Canberra, now of Tucson, Arizona); Mr. J. van der Land (Rijksmuseum van Natuurlijke Historie, Leiden); Mr. S. G. Lane (Sydney); Mrs. M. K. LeCroy (American Museum of Natural History, New York); Mr. W. H. Loaring (Bickley near Perth, W. A.); Miss M. Lukis (State Library, Perth); Mr. J. L. McKean (C. S. I. R. O. Wildlife Division, Canberra); Dr. G. Mauersberger (Zoologisches Museum, Berlin); Mr. A. Miller (Green Island via Cairns, Queensland); Dr. F. Richardson (Washington State Museum, Seattle); Dr. M. C. Thompson (Museum of Natural History, Lawrence, Kansas); Mr. E. G. Turbott (Canterbury Museum, Christchurch, now of the Auckland Museum); Father J. A. J. Verheijen (Flores).

In particular I want to express my gratitude to the Trustees of the F. M. Chapman Memorial Fund for a grant which enabled me to work in the American Museum of Natural History, New York and the United States National Museum, Washington, from May to July, 1962. Without this financial aid I would not have been able to visit the United States, and completion of this revision would have been very difficult. Other museums visited during a world tour in 1962 were the British Museum (Natural History), London; Canterbury Museum, Christchurch; Dominion Museum, Wellington; Australian Museum, Sydney; and National Museum of Victoria, Melbourne, in all of which I was received with great hospitality.

Naturally, this revision is largely based on published work of others, and this is acknowledged in the usual way by reference in the text, but I want to make special mention of two works that have been of the greatest assistance in preparing this part of my revision. One is R. H. Baker's "Avifauna of Micronesia" (1951), which has greatly facilitated compiling the bibliographies and notes on life-histories of the Zosteropidae from that part of the world. The sport of trying to find references not mentioned by Baker has given me much harmless pleasure. As regards Australian literature, Whittell's "Bibliography of Australian Ornithology" (1954) has been of the greatest use; it is an outstanding work, and without it I would certainly have overlooked many obscure but interesting papers. Bibliography is a most unrewarding occupation, because one tends to get blamed for what one has overlooked, rather than praised for what one has

accomplished. Therefore, I want to say that the thoroughness and completeness of Whittell's work has surprised me, and that I have found but very few papers on Australian ornithology, published before 1950, that were not listed by him.

Finally, I want to thank Mr. R. E. Moreau, who has read the Summary and Conclusions and has given much constructive criticism and advice, most of which I have followed. Of course, he can in no way be held responsible for any remaining errors in facts, interpretation and style, for which I alone am to blame.

SYSTEMATIC PART

Zosterops lateralis group

(species 38 to 42)

To the evolutionist, *Zosterops lateralis* with its various derivatives is by far the most rewarding of all Zosteropidae. This is mainly because of the presence of one character not found in any species outside this group: the greyish back. In other species of the family it is often, because of the multitude of exceedingly similar species, impossible to establish relationships with any degree of certainty. Species derived from *Zosterops lateralis,* however, betray their affinities by their greyish backs.

Historically, the most likely hypothesis explaining presence and distribution of the group is that the ancestral *Zosterops lateralis* originally inhabited Australia, with much the same range as nowadays, and that from there, at different times repeated successful colonisations were made of islands of the Southwest Pacific.

A number of these colonists have differentiated no further than to the subspecific level, but others have attained specific status, which is sometimes proved by their co-existence with a second and even a third invader derived from a common stock. The insular species and subspecies have in common their large size compared with the ancestral forms, but there are few differences in plumage. This suggests that some of the species are of very recent origin. It appears even possible, from plumage characters, to deduce that the giant of the genus, *Z. albogularis* has been derived from the nominate race of *Z. lateralis,* while *Z. strenua* is clearly a derivative of the Australian mainland forms, a point that will be further discussed in the concluding chapters of this paper.

Within the species *Zosterops lateralis,* two races are conspicuous by lacking the important character of the grey back. One is *Z. l. gouldi* of

Western Australia, the other *Z. l. valuensis*. In the last-mentioned subspecies this is clearly a secondary phenomenon: traces of a grey back are still present, and in every other character it agrees with adjacent *Z. l. tropica*. With *Z. l. gouldi* the position is more difficult. It is a well-marked subspecies which clearly has lived in isolation for a long time, even though now there appears to be a connection with *Z. l. halmaturina* in South Australia. Though it is possible that here also the green back was secondarily acquired, the fact that there is not even a trace of grey in the plumage of the back suggests that this is not so. As the grey back is clearly, in the Zosteropidae, an "acquired" character, it is possible that *Z. l. gouldi* became isolated from the eastern stock of ancestral *Z. lateralis* before the latter acquired its grey back. It may be well to point out here that though I refer to the grey back as an "acquired" character, actually it owes its existence to nothing more than a loss of yellow pigment in the feathers of the back; birds in which all yellow pigments have been suppressed become entirely grey (see the discussion of *Z. l. gouldi*).

Species 38. **Zosterops lateralis** (Latham)

Characters. A species which in its many races and populations varies in size from average-sized to very large. It is a thoroughly normal representative of the genus, apart from the notable feature that, excepting two peripheral races, the upper back is grey instead of green; in other words, in this region the yellow pigment is lacking.

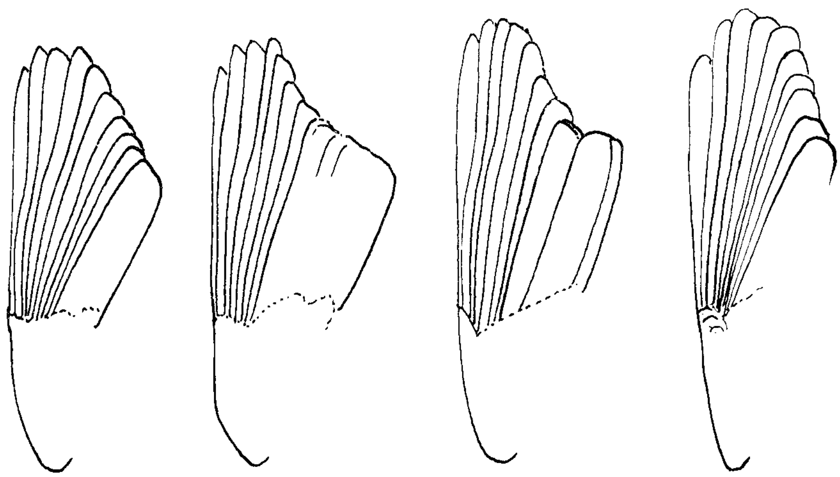
Upper parts. Normally upper surface and sides of the crown, upper wing coverts, lower back and upper tail coverts green, varying from almost as bright as Pyrite Yellow to Warbler Green and Serpentine Green, sometimes with a blackish tinge on the forehead; in one race the whole anterior part of the crown is blackish; forehead and supra loral region of the same colour, but in a few races there may be some yellow just over the bill, the amount of which varies individually; lores and a streak continued under the eye-ring dark dusky to blackish; eye-ring fairly wide to wide, narrowly interrupted in front by the loral streak; upper back usually grey (colour not in Ridgway, perhaps closest to Dark Olive Gray, but not so dark), but in two peripheral races greenish as the remainder of the upper parts; primaries, secondaries, and rectrices blackish brown, all broadly edged with the green colour of head and lower back.

Under parts. Under surface generally pale greyish with or without a yellow throat, and with or without yellow under tail coverts; there is sometimes a trace of yellow on the middle of the belly; flanks varying from pale buffish to Buckthorn Brown.

Unfeathered parts. Iris brownish or hazel, but sometimes described as yellowish, bill blackish or brownish with pale base to mandible, legs brownish to greyish. It is likely that some geographical variation exists in the colours of these parts, but it is difficult to draw conclusions from labels alone.

Measurements are shown in table I.

Structure. Tail comparatively long for an Indo-Australian species (see table I). There is some geographical variation in wing formula: the races of the Australian mainland have a relatively long 2nd primary (usually 6 = 2> 7 or 6> 2> 7), whereas in the forms of the pacific islands one usually finds 6> 7> 2> 8 or at best 6> 2 = 7> 8.



a **b** **c** **d**

Fig. 1. Wings of subspecies of *Zosterops lateralis*, showing differences in wing-formula; a, *Z. l. gouldi* (WAM no. A 1978); b, *Z. l. gouldi* (WAM no. 6882); c, *Z. l. lateralis* (WAM, 10-IV-1904, no number); d, *Z. l. griseonota* (RMNH, cat. no. 1). The 2nd (outer) primary is long in the migratory nominate race, intermediate in the wandering *gouldi*, short in the sedentary *griseonota*.

Distribution (fig. 2). South-western, southern and eastern Australia, Tasmania, New Zealand and surrounding islands, and nearly all Pacific islands east to Fiji, north to the Torres Islands (north of the New Hebrides). Introduced in Tahiti. Though in Australia the species has been found several hundred miles inland, it has not conquered the arid interior.

Ecology. The species has such a wide distribution that it is preferable to deal with the ecology under the different subspecies.

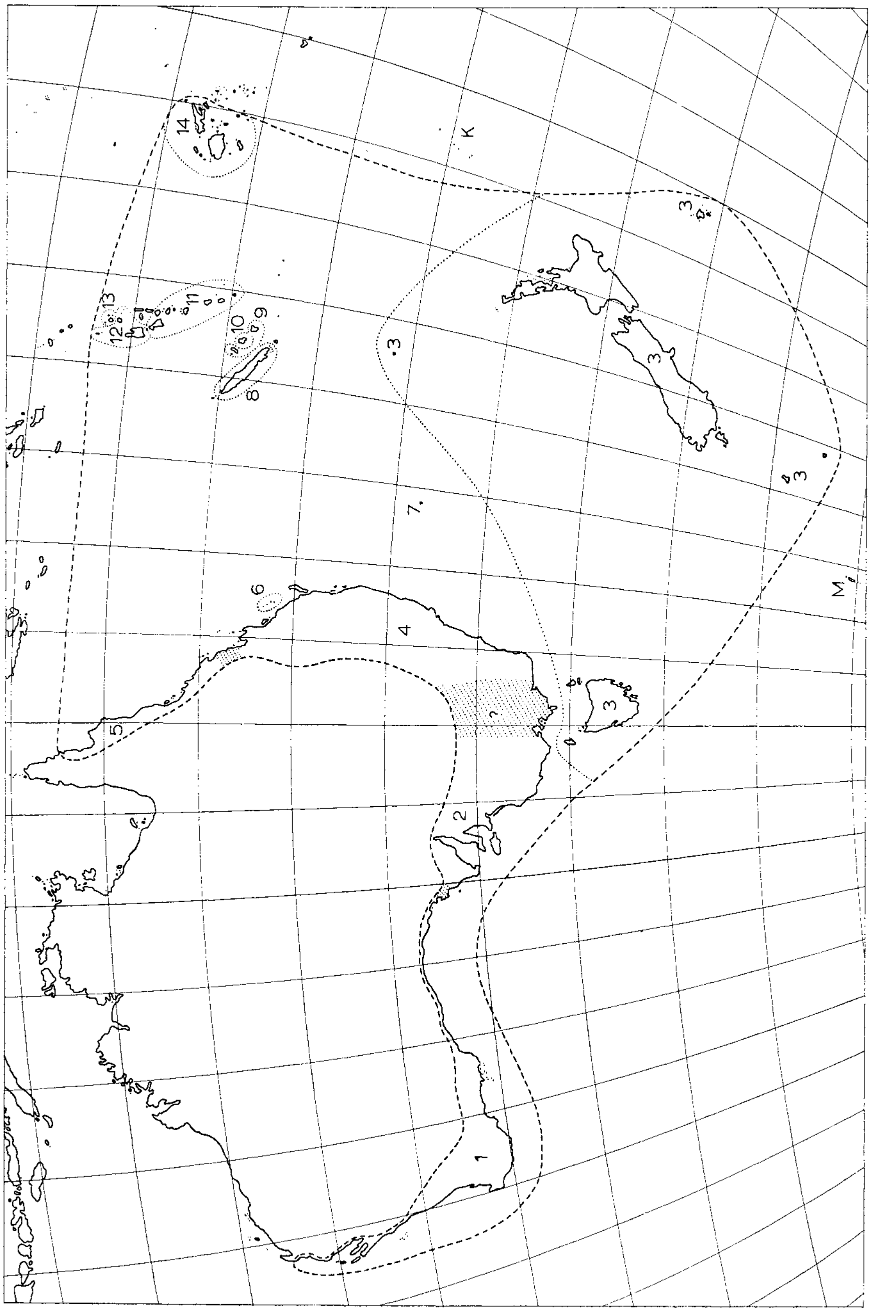


Fig. 2. The distribution of *Zosterops lateralis* and races; 1, *gouldi*; 2, *halmaturina*; 3, *lateralis*; 4, *familiaris*; 5, *ramsayi*; 6, *chlorocephala*; 7, *tephropleura*; 8, *griseonota*; 9, *nigrescens*; 10, *melanops*; 11, *vatensis*; 12, *tropica*; 13, *valuensis*; 14, *flaviceps*; K and M, Kermadec and Macquarie Islands, where the nominate race has been observed as a straggler.

The geographical variation is pronounced and complicated. Much of the kind of variation that occurs: in size, in colour and in wing-formula has already been indicated in the description of the species. The main characters in which variation occurs are:

1. Colour of the back; the majority of forms have grey backs, but at opposite ends of the range of the species, in south-western Australia (*gouldi*) and on Valua, Banks Group, New Hebrides, green-backed races occur.

2. Colour of the throat. Generally bright yellow, but two races, *halmaturina* and the nominate race, in Tasmania, southern Australia, New Zealand and adjacent islands, have only the sides of the throat greenish yellow, its centre being greyish white.

3. Flanks normally pale buffish, but the nominate race has them much darker, Buckthorn Brown.

4. Wing-formula. The races of the Australian mainland, including the one from the Capricorn Islands, off its coast, have a fairly long 2nd primary, normally $2 = 6$ or $6 > 2 > 7$; in the insular races the 2nd primary is relatively shorter, usually $7 > 2 > 8$, but there is some variation (fig. 1).

5. Size. There is a considerable amount of variation in size with as a general trend that the smaller the island, the larger the *Zosterops* occurring on it.

TABLE I

Zosterops lateralis

	number of specimens	wing	tail	av. wing	av. tail	tail: wing index
gouldi	58	53-59	38-47	55.94	41.63	74.40 %
halmaturina	51	55½-61	39-47	58.23	43.73	75.10 %
lateralis (Tasmania)	17	60-63½	42-46	62.09	43.65	70.30 %
lateralis (New Zealand)	36	60-65½	42-50	62.44	45.14	72.25 %
lateralis (Norfolk Island)	25	59-64	39½-46	61.73	42.62	69.03 %
lateralis (Mainland of Australia)	28	59-63	41-49	61.77	44.31	71.71 %
familiaris	35	57-63½	38-44	60.57	40.87	68.30 %
ramsayi	33	55-62	34½-42	58.09	38.60	66.46 %
chlorocephala	4	64-67	46-47	66.00	46.67	70.00 %
tephropleura	15	58-63	41-48	60.33	45.10	74.75 %
griseonota	22	60-66	43½-49	62.80	46.27	73.69 %
nigrescens	33	59-65	43-49	62.71	47.03	74.99 %
melanops	11	61-65	45-50	63.45	47.41	74.71 %
vatensis	44	65½-74	46-56	68.55	50.44	73.59 %
tropica	28	59-66	41½-47	63.46	45.02	70.93 %
valuensis	7	64½-66	44½-47½	65.07	45.93	70.58 %
flaviceps	84	57½-66	37,40-50	61.15	44.15	72.20 %

1. **Zosterops lateralis gouldi** Bonaparte

Z[osterops] gouldi Bonaparte, Consp. Gen. Av. I, 1850, p. 398 — nomen novum for *Zosterops chloronotus* Gould, nec *Dicaeum chloronothos* Vieillot, 1817 = *Zosterops chloronota* (Vieillot).

Zosterops chloronotus Gould, Proc. Zool. Soc. London 8, (1840), July 1841, p. 165 — Western Australia = Perth (see discussion of type).

Zosterops shortridgii Ogilvie-Grant, Ibis (9) 3, 1909, p. 663 — Rabbit Island, Albany.

Zosterops gouldi warreni Mathews, Austral Av. Rec. 3, 1916, p. 62 — Warren River, South-west Australia.

Zosterops australasiae edwini Mathews, Austral Av. Rec. 5, 1923, p. 36 — Carnarvon, West Australia.

Zosterops australasiae, Mathews, 1923, and Auctorum, nec *Sylvia Australasiae* Vieillot, 1817 (cf. Stresemann, 1951, and this revision, pt. II, p. 29-30).

Zosterops chloronotus; Gould in Grey, Journ. two Exp. N.-W. and W. Austr. II, 1841, (Appendix D), p. 417 (western coast of Australia); J. Gilbert, The Enquirer no. 142, 1843 (19 April), p. 3 (South Island, Houtman's Abrolhos); Gould, Birds Austr. IV, 1843, pl. 82 (western coast of Australia); Hartlaub, Verz. Samml. Bremen, 1844, p. 37 (Westl. Neuholland); Reichenbach, Die vollst. Naturg. des In- und Auslandes. Die neuentd. Vögel Neuhollands, 1845, p. 84 (Westküste Australiens); Drapiez, Dict. Sc. Nat. X, 1845, p. 742 (l'Australie); Thienemann, Abb. Vogeleiern, Beschr., 1846, p. 230, Abb. pl. XXIII fig. 14 (im westlichen Neuholland); Gould, Introd. Birds Austr. 8°, 1848, p. 128 (Swan River or Western Australia); E. Verreaux, Cat. d'Ois., 1849, p. 50 (Australie); Reichenbach, Die vollst. Naturg. der Vögel Neuhollands, 1850, p. 309 (no locality); Cabanis, Mus. Heineanum I, 1851, p. 115 (West-Australien); Heermann, Cat. Ool. Coll. Ac. Nat. Sc. Philad., 1853, p. 11 (Australia); Blyth, Zoologist 21, 1863, p. 8329 (Australia); (pt.) Giebel, Thes. Orn. III, 1877, p. 774 (Australia); Taczanowski, Mem. Ac. Imp. St.-Pétersbourg (7) 39, 1891, p. 198 (Australie); Stone & Mathews, Austral Av. Rec. 1, 1913, p. 171 (West Australia); J. Gilbert in Whittell, Emu 41, 1942 (10 April), p. 293 (South Island, Houtman's Abrolhos); J. Gilbert in Wagstaffe & Rutherford, North W. Nat. N.S. 3, 1955 (March), p. 18, 22 (Houtman's Abrolhos).

Zosterops dorsalis; Anonymus, W. Austr., 1842. p. 100 (Western Australia).

Zosterops; J. Gilbert, The Enquirer no. 142, 1843 (19 April), p. 3 (Wallaby Islands); G. R. Gray, Gen. Birds I, 1848, p. 198 (no locality); Whitlock, Emu 20, 1921 (1 Jan.), p. 171 (Dirk Hartog); Sandland, Emu 30, 1931 (1 April), p. 296 (64 m from Moora, 24 m from Sandy Cape); A. H. Chisholm, Emu 49, 1950 (26 April), p. 232 (no locality).

Zosterops Gouldii; Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 94, pl. 463, fig. 3310-11 (Westküste Australiens); Helms, The Producers' Gazette and Settlers' Rec. W. Austr. 5, 1898 (June). p. 427, 430 (Houtman's Abrolhos); Helms, Journ. Dept. Agricult. W. Austr. 5, 1902 (Jan.), p. 51, 54 (Houtman's Abrolhos).

Zosterops Gouldi; Hartlaub, Journ. f. Orn. 13, 1865, p. 5, 6, 7, 19 (Westküste Neuholland's); G. R. Gray, Hand-List Birds I, 1869, p. 163 (W. Australia); Heine & Reichenow, Nomencl. Mus. Hein. Orn., 1890, p. 72 (West-Australien); Broinowski, Birds Austr. IV, 1890, pl. VIII fig. 3 (Western Australia); A. J. Campbell, The Australasian 61, 1896 (28 Nov.), p. 1065 (Western Australia: Cape Leeuwin and Champion Bay district); Ashby, Trans. R. Soc. S. Austr. 25, 1901, p. 135 (Guildford, near Perth); Hall, Journ. Dept. Agricult. W. Austr. 6, 1902 (July-Dec.), p. 72 (Western Australia); Cleland & Johnston, Trans. R. Soc. S. Austr. 34, 1910 (Dec.), p. 111 (Perth); Cleland & Johnston, 2nd Rep. Govt. Bur. Microbiol. [N.S.W.], years 1910 and 1911, 1912 (after 19 Sept.), p. 84 (Perth); Hamilton, Proc. Linn. Soc. N.S.W. 41, 1916, p. 31 (Western Australia); Blakely, Proc. Linn. Soc. N.S.W. 47, 1922, p. 23 (York District).

Zosterops gouldi; Gould, Birds Austr. I, 1865, p. 588 (Swan River); Boucard, Cat. Av., 1876, p. 231 (Australia); A. J. Campbell, Nests Eggs Austr. Birds, 1883, p. 40 (West Australia); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 162 (Perth); Ramsay, Tab. List Austr. Birds, 1888, p. 14 (W. & S.W. Aust.); Tristram, Cat. Coll. Birds, 1889, p. 211 (W. Australia); North, Descr. Cat. Birds, (1889), 1890, p. 234 (West Australia); A. J. Campbell, Proc. R. Soc. Edinburgh 67, 1890, p. 304-320 (West Australia); Lydekker, The R. Nat. Hist. III, 1894-95, p. 444 (Australia); A. J. Campbell & al., Rep. 7th Meeting Australas. Ass. Adv. Sc., 1898, p. 138 (no locality); Nehrkorn, Kat. Eiersamml., 1899, p. 80 (West-Australien); Hall, Key Birds Austr., 1899, p. 38 (Western Australia); Woodward, Guide W. Austr. Mus., 1900, p. 57 (Western Australia); Woodward in Fraser, W. Austr. Year-Book for 1898-99, I, 1900, p. 181 (Western Australia); A. J. Campbell, Nests Eggs Austr. Birds, 1900, p. 350 (West Australia); Finsch, Tierreich 15, 1901, p. 12 (West-Australien); Hall, Ibis (8) 2, 1902 (Jan.), p. 141 (Tor Bay, Albany; Geraldton; Wallabi Group, Abrolhos); Hall, Vict. Nat. 18, 1902 (10 April), p. 175, 176 (Albany); Carter, Emu 1, 1902 (April), p. 126 (Carnarvon); Hall, Ibis (8) 2, 1902 (April), p. 205 (Wallabi Group, Houtman's Abrolhos); Dubois, Syn. Av. I, 1902. p. 706 (Australie W.); Broadbent, Queensl. Geogr. Journ. (n.s.) 17, 1902, p. 82 (Q'ld., W.A.); Woodward in Fraser, W. Austr. Year-Book for 1900-01, I, 1902, p. 217, 232 (Western Australia); Milligan, Emu 2, 1903 (1 Jan.), p. 172 (Greenmount, Darling Range near Perth; South Perth); Milligan, Emu 3, 1903 (1 July), p. 11, 18 (Stirling Range); Carter, Emu 3, 1903 (1 July), p. 38 (Vasse River); Carter, Emu 3, 1903 (1 Oct.), p. 91 (Point Cloates, Gascoyne River); H. E. Hill, Emu 3, 1903 (1 Oct.), p. 106 (Brookton); Milligan, Emu 3, 1903 (1 Oct.), p. 114 (Guildford); Woodward in Fraser, Notes Nat. Hist. W. Austr., 1903, p. 85, 101, 133 (Western Australia: Perth, Bunbury); H. E. Hill, Emu 3, 1904 (2 April), p. 227 (Guildford); Milligan, Journ. Agricult. W. Austr. 10, 1904 (15 July), p. 3-10 (paper on economic importance); Milligan, Emu 4, 1904 (1 July), p. 10 (Wongan Hills); Lawson, Emu 4, 1905 (5 Jan.), p. 131 (Rottnest Island); Lawson, Emu 4, 1905 (5 Jan.), p. 135 (Moore River); Nicholls, Emu 5, 1905 (2 Oct.), p. 79 (Albany); A. G. Campbell, Emu 5, Suppl., 1905 (Oct.), p. 40 (no locality); Fraser, W. Austr. Year-Book for 1902-04, 1906, p. 117, 120 (Western Australia); Hall, Key Birds Austr., 2nd ed., 1906, p. 38 (Western Australia); North, Nests Eggs Birds Austr. II, 1907 (22 July), p. 212-213 (Western Australia); Jackson, Cat. Jacks. Ool. Coll., 1907 (after 12 Nov.), p. 67 (Blackwood River); Hall, Useful Birds Southern Austr., 1907, p. 133 (the western State); Woodward in Fraser, W. Austr. Off. Year Book for 1905, I, 1907 (?), p. 134, 136 (Western Australia); Mathews, Emu 7, Suppl., 1908 (Jan.), p. 89 (W. Australia); Gibson, Emu 8, 1908 (1 Oct.), p. 66 (Abrolhos: common on all the larger islands); Seth-Smith, Avicult. Mag. N. S. 6, 1908, p. 290, 310, 312 (Perth: Zoo and King's Park, Kalgoorlie); Whitlock, Emu 8, 1909 (1 April), p. 188 (no locality); Gibson, Emu 9, 1909 (1 Oct.), p. 74 (between Kalgoorlie and Eucla in the coastal sandhills); Crossman, Emu 9, 1909 (1 Oct.), p. 89 (Cumminin Station); Ogilvie-Grant, Ibis (9) 3, 1909 (Oct.), p. 663 (King River, Dwaladine, Bernier Island, Carnarvon); Sharpe, Hand-List Birds V, 1909, p. 2 (W. Australia); Hull, List Birds Austr., 1909, p. 25 (no locality); Cleland, Emu 9, 1910 (1 April), p. 223 (Perth); Giles, Journ. Nat. Hist. Soc. W. Austr. 3, 1910 (June), p. 23 (Mundaring Weir in the Darling Ranges); Carter, Ibis (9) 4, 1910 (Oct.), p. 650 (extends to Point Cloates); Carter, Emu 10, 1911 (21 Jan.), p. 295 (Broome Hill); Lucas & Le Souëf, Birds Austr., 1911, p. 364 (Western Australia); Cleland, 2nd Rep. Govt. Bur. Microbiol. [N.S.W.], years 1910 and 1911, 1912 (after 19 Sept.), p. 202 (Perth); Lipfert, Rec. W. Austr. Mus. 1, 1912, p. 101 (Bernier Island); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. V, 1912, p. 2 (West Australia); A. J. Campbell & al., Emu 12, Suppl., 1913 (Jan.), p. 84 (W. Australia); Page, Bird Notes N. S. 4, 1913, p. 1 (Western Australia); Orton & Sandland, Emu 13, 1913 (1 Oct.), p. 79 (Moora); Mathews, List Birds Austr., 1913 (Dec.), p. 253 (South-west Australia); Froggatt, Agricult. Gazette N.S.W. 25, 1914 (2 April), p. 291 (Western Australia); H. L. White, Emu 14, 1915 (1 Jan.), p. 151, 153 (foster parent of cuckoos); H. L. White, Emu 15, 1915 (1 July), p. 64 (no locality); W. B. Alexander, Emu 16, 1916 (1 July), p. 33 (Bremer Bay); Carter, Ibis (10) 5, 1917, p. 608 (Dirk Hartog Island and the Peron; Edel Land); Sargent, Ann. Botany 32, 1918 (April), p. 216, 217, 218, 220, 230, 231 (pollination); W. B. Alexander, Journ. R. Soc. W. Austr. 3, 1918, p. 69 (Western Australia); Cleland & al., Dept. Agricult. N. S. W., Sc. Bull. 15, 1918, p. 36, 74 (Perth); A. J. Campbell, Emu 18, 1919 (1 April), p. 263 (no locality); Loaring, Western Mail (Perth) 35, no. 1789 (n.s.), 1920 (8 April), p. 30 (no locality); Hall, Emu 19, 1920 (29 May), p. 283, 287 (no locality); Mathews & Iredale, Austral Av. Rec. 4, 1920 (Dec.), p. 101 (no locality); S. A. White, Emu 20, 1921 (1 Jan.), p. 128 (from Cape Naturaliste in the north to the Margaret River); Ashby, Emu 20, 1921 (1 Jan.), p. 135 (from Perth to Geraldton); Mellor, Emu 20, 1921 (1 Jan.), p. 139 (Murchison River District); W. B. Alexander, Emu 20, 1921 (1 Jan.), p. 167 (near the coast, and also on Rottnest and Garden Islands and some of the smaller islands further south); Whitlock, Emu 20, 1921 (1 Jan.), p. 186 (Dirk Hartog, Peron); Carter, Ibis (11) 3, 1921 (1 Jan.), p. 69 (Carnarvon, Vasse); Froggatt, Some Useful Austr. Birds, 1921, p. 28 (Western Australia); W. B. Alexander, Journ. Linn. Soc. London, Zool. 34, 1922 (16 Feb.), p. 466 (Houtman's Abrolhos); Hull, Emu 21, 1922 (1 April), p. 289 (Mondrain and Woody Islands, Archipelago of Recherche); Sandland & Orton, Emu 22, 1922 (1 Oct.), p. 137 (Moora); Hall, Austr. Bird Maps, 1922, p. 131 (no locality); Carter, Emu 23, 1924 (1 April), p. 313 (Broome Hill); Ashby, Emu 25, 1925 (1 Oct.), p. 113 (Western Australia); D. L. Serventy, Emu 26, 1926 (1 July), p. 68 (Pallinup Estuary); Newman, Journ. Agricult. W. Austr. (2) 6, 1929 (June), p. 223-226 (paper on economic importance); Newman, Dept. Agricult. W. Austr., Leaflet 272, 1929, 4 pp. (reprint of preceding); Whittell, Emu 41, 1941 (6 Oct.), p. 116 (Neu Holland); Stresemann, Emu 51, 1951 (July), p. 70 (no locality); Condon & al., Emu 55, 1955 (Sept.), p. 189 (no locality); Warham, Emu 56, 1956 (May), p. 92 (Pelsart Island, Houtman's Abrolhos); Ford & Stone, Emu 57, 1957 (March), p. 19 (Kellerberrin); Ford, W. Austr. Nat. 6, 1957 (15 Aug.), p. 56 (Coolbellup Lake near Fremantle); V. N. Serventy, Emu 58, 1958 (Jan.), p. 17 (Dumbleyung); Leach, An Austr. Bird Book, 9th ed. (Morrison), 1958 (about Sept.), p. 172 (Mid-W.A.—S.W.A.); Hitchcock & Carrick, C.S.I.R.O. Wildlife Res. 3, 1958 (Dec.), p. 126 (no locality); Cayley, What Bird is That?, 2nd ed., 1958, p. 113, pl. 15 fig. 4 (from Point Cloates through south-western Australia and islands off the coast to Israelite Bay); A. H. Chisholm, Emu 59, 1959 (May), p. 116 (no locality except Australia); Hitchcock & Carrick, C.S.I.R.O. Wildlife Res. 5, 1960 (April), p. 67 (no locality); Storr, Journ. R. Soc. W. Austr. 43, 1960 (1 Sept.), p. 61 (North Island, Houtman Abrolhos); Immelmann, Im unbek. Austr., 1960, p. 17 (Perth); Sedgwick, W. Austr. Nat. 8, 1961 (31 July), p. 30 (no locality = Coolup); Hitchcock, C.S.I.R.O. Wildlife Res. 6, 1961 (Sept.), p. 73 (no locality); Ford, W. Austr. Nat. 8, 1962 (31 Jan.), p. 78 (Green Islets (100 miles north of Fremantle)); D. L. Serventy & Whittell, Birds W. Austr., 3rd ed., 1962 (April), p. 363 (South-West Australia, distribution); Hitchcock, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 4, 1963 (after 23 May), p. 22 (no locality); Hitchcock, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 5, 1963 (after 11 June), p. 20 (no locality); Hitchcock, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 7, 1964, p. 21 (no locality); Dell, W. Austr. Nat. 9, 1965 (10 March), p. 168 (near Mundaring Weir); Ford, Emu 64, 1965 (31 May), p. 201 (Green Is., Cervantes I., Orton Rk: islands between Dongara and Lancelin); McMillan, W. Austr. Nat. 10, 1965 (2 Nov.), p. 24 (Wilson Inlet); Hitchcock, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 11, 1966 (late), p. 29 (no locality); R. Hill, Austr. Birds, 1967, p. 256 (distribution).

Zosterops gouldii; Ramsay, Proc. Linn. Soc. N. S. W. 2, 1877, p. 191 (West Australia); A. J. Campbell, Rep. 2nd Meeting Australas. Ass. Adv. Sc., 1890, p. 493 (Houtman's

Abrolhos); Milligan, Emu 2, 1902 (1 Oct.), p. 73 (Margaret River); A. G. Campbell, Emu 5, 1906 (1 Jan.), p. 140, 143 (Western Australia); D. L. Serventy & Storr, Journ. R. Soc. W. Austr. 42, 1959 (15 Aug.), p. 83 (Rottnest Island); Storr, W. Austr. Nat. 9, 1965 (30 June), p. 194 (Bald Island).

Zosterops westernensis; Ramsay, Proc. Linn. Soc. N. S. W. 3, 1878, p. 39 (West Australia).

zosterops; A. J. Campbell, The Australasian 48, 1890 (12 April), p. 744 (South Western Australia).

Zosterops shortridgei; Mathews, Emu 10, 1910 (1 July), p. 57 (Rabbit Island); Snouckaert, Alauda (2) 3, 1931, p. 25 (Rabbit Island).

Zosterops shortridgii = *Zosterops gouldi*; Carter, Ibis (9) 4, 1910, p. 650 (Rabbit Island); Whitlock, Emu 10, 1911 (1 April), p. 317 (Rabbit Island); Mathews, Austral Av. Rec. 1, 1912 (2 April), p. 52 (Albany).

Zosterops lateralis gouldi; Mathews, Nov. Zool. 18, 1912 (Jan.), p. 386 (West Australia); Stresemann, Emu 51, 1951 (July), p. 70 (no locality); Keast, Gould League Notes (N.S.W.) 24, 1958, p. 10, 11 (south-western Australia); Keast, Some Bush Birds of Austr., 1960, p. 95 (south-western Australia); Keast, Bull. M.C.Z. 123, 1961 (March), p. 387 (southwestern Australia); Mees, W. Austr. Fish. Dept., Fauna Bull. 2, 1962 (Dec.), p. 110 (Bernier Island); L. E. Sedgwick, Emu 64, 1964 (31 Oct.), p. 17 (Stirling Ranges); Anonymus, Austr. Bird Bander 3, 1965 (June), p. 37 (Nedlands and Yokine); Anonymus, Austr. Bird Bander 4, 1966 (March), p. 19 (Narrikup and 12 miles W. of Denmark); Keast, Australia, 1966, p. 39 (Porongorups); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 315 (distribution); Hutchison, Austr. Bird Bander 5, 1967 (Sept.), p. 56 (no locality); Anonymus, Austr. Bird Bander 5, 1967 (Sept.), p. 66 (Tuart Hill and Woodlands); Mees, W. Austr. Nat. 10, 1967 (7 Nov.), p. 149 (no locality).

Zosterops gouldi gouldi; Mathews, Austral Av. Rec. 3, 1916 (7 April), p. 62 (no locality); Mathews, Birds Austr. XI, 1923, p. 160 (Perth district).

Zoslerops Gouldi; Hamilton, Proc. Linn. Soc. N. S. W. 41, 1916, p. 31 (Western Australia).

Zosterops australasiae; Mathews, Austral Av. Rec. 5, 1923 (21 Feb.), p. 36 (King George's Sound, South-west Australia); Mathews, Birds Austr. XI, 1923, p. 156 (King George's Sound, South-west Australia); Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926 (after June), p. 93 (Mid-W.A. (Carnarvon) — S.W.A. (Albany)); Leach, An Austr. Bird Book, 1926, p. 223 (Mid- W.A. — S.W.A.); W. B. Alexander, The Austr. Encycl. II, 1926, p. 464 (south-western Australia); Kinghorn & Fletcher, Emu 27, 1927 (1 Oct.), p. 90 (Mondrain Island, Recherche Archipelago); Sargent, Emu 27, 1928 (1 Jan.), p. 186, 191 (pollination); Ashby & Le Souëf, Emu 27, 1928 (1 April), p. 269 (Nornalup); Hall, Emu 28, 1928 (1 July), p. 59 (coastal sandhills of Eucla Bight); Chenery, S. Austr. Orn. 9, 1928 (1 July), p. 224, 226 (Geraldton, Dirk Hartog Island); Glauert, Journ. R. Soc. W. Austr. 15, 1929, p. 43 (Rottnest Island); Porsch, Biol. Generalis 5, 1929, p. 163 (pollination); Ashby, Trans. R. Soc. S. Austr. 53, 1929 (24 Dec.), p. 60 (Dirk Hartog Island); Ashby, Emu 29, 1930 (1 Jan.), p. 188 (Geraldton); D. L. Serventy, Emu 30, 1930 (1 July), p. 38 (between Mandurah and Bunbury); Pollard, Emu 30, 1930 (1 July), p. 63 (no locality); Jenkins, Emu 31, 1931 (1 July), p. 34 (Northam); Cayley, What Bird is That?, 1931 (Dec.) (reprint 1951), p. 101, pl. XV fig. 4 (from Carnarvon to Albany); Mack, Emu 31, 1932 (1 April), p. 296 (South-west Australia); Kilpatrick, Emu 32, 1932 (1 July), p. 31 (Rottnest Island); A. G. Campbell, Emu 32, 1932 (1 Oct.), p. 92, 93, 94 (S. W. Australia (on map)); Whittell, Emu 32, 1933 (2 Jan.), p. 183, 189 (Bridgetown District); Carnaby, Emu 33, 1933 (2 Oct.), p. 109 (Lake Grace); Lea & J. T. Gray, Emu 35, 1936 (2 Jan.), p. 259 (Geraldton); Whitlock, Emu 37, 1937 (1 Oct.), p. 112 (Norseman District); D. L. Serventy, Emu 37, 1938 (1 April), p. 266 (Rottnest Island), 268 (Garden

Island), 271 (King's Park, Perth); Leach, An Austr. Bird Book, 8th ed. (Barrett), 1939, p. 83 (Mid.- W. A. — S.W.A.); S. R. White, Emu 40, 1940 (Aug.), p. 169 (King's Park, Perth); S. R. White, Emu 40, 1940 (Oct.), p. 236, pl. 46 (between Cottesloe and Waterman's Bay); Whittell, Emu 41, 1942 (Jan.), p. 219 (Western Australia); Whittell, Emu 41, 1942 (April), p. 293, 304 (Houtmans Abrolhos); Francis, S. Austr. Orn. 16, 1942 (Aug.), p. 35 (Western Australia); Mathews, Working List Austr. Birds, 1946, p. 122 (South West Australia); D. L. Serventy, Emu 47, 1947 (11 July), p. 46 (Recherche Archipelago: Woody Island); Eakins, W. Austr. Nat. 1, 1947 (15 Sept.), p. 45 (Claremont); D. L. Serventy, Emu 47, 1948 (31 March), p. 283 (Swan River District); Plumb, Emu 47, 1948 (31 March), p. 292 (Wellard, seventeen miles south of Fremantle); D. L. Serventy, Birds Swan River District, 1948, p. 45 (Swan River District) [repr. from Emu 47, p. 283]; D. L. Serventy & Whittell, Birds W. Austr., 1948 (Nov.), p. 311 (distribution, particulars); Sedgwick, Emu 48, 1949 (Feb.), p. 237 (Murchison River), 241 (Northampton); Tarr, Emu 48, 1949 (May), p. 282 (Long Island, Abrolhos Group); Tarr, Emu 49, 1949 (31 Aug.), p. 49 (Pelsart Island in the Abrolhos); Buller, W. Austr. Nat. 2, 1949 (6 Sept.), p. 48 (Garden Island); A. H. Chisholm, Emu 49, 1950 (26 April), p. 232 (no locality); Buller, W. Austr. Nat. 2, 1950 (17 May), p. 83 (mouth of the Murchison River); E. H. Sedgwick & L. E. Sedgwick, W. Austr. Nat. 2, 1950 (7 July), p. 117 (Esperance: Cape Le Grand to Eleven Mile Beach); D. L. Serventy & Whittell, Birds W. Austr., 2nd ed., 1951 (May), p. 328 (distribution, particulars); V. N. Serventy, W. Austr. Nat. 3, 1951 (14 Sept.), p. 35 (Israelite Bay); V. N. Serventy, Austr. Geogr. Soc. Rep. 1 (2), 1952, p. 21 (Archipelago of the Recherche: Boxer, Sandy Hook, Remark, Long, Mondrain, North Twin Peaks, Middle, Salisbury, Christmas, Thomas, and Woody); Calderwood, W. Austr. Nat. 3, 1952 (15 March), p. 92 (Bassendean); Loaring, W. Austr. Nat. 3, 1952 (15 March), p. 94 (Bickley); Abbott, W. Austr. Govt. Gazette no. 61, 1952 (13 June), p. 4 (in reprint) (Western Australia); Loaring & D. L. Serventy, W. Austr. Nat. 3, 1952 (20 June), p. 114 (Moore River Gorge country); Nice, Wilson Bull. 65, 1953 (June), p. 85, 86 (incubation period); Calderwood, W. Austr. Nat. 4, 1953 (30 June), p. 20 (Garden Island); Ericson, Emu 53, 1953 (Dec.), p. 320, 321 (Bolgart); Docters van Leeuwen, Beaufortia 4, 1954 (Dec.), p. 176 (no locality); Slater, W. Austr. Nat. 4, 1955 (6 May), p. 193 (Kalgoorlie); Makatsch, Der Brutparasitismus in der Vogelwelt, 1955, p. 188 (foster parents of cuckoos); Warham, Emu 55, 1955 (Sept.), p. 168 (Eclipse Island near Albany); Barrett, An Austr. Animal Book, 2nd ed., 1955, p. 219 (Western Australia (from Carnarvon to Albany)); Sedgwick, W. Austr. Nat. 5, 1956 (22 March), p. 69 (Wooroloo); Watson, Fish. Dept. W. Austr., Bull. Hon. Wardens 3, 1956 (July), p. 67 (Carnac Island); Anonymus, W. Austr. Nat. 6, 1957 (15 Aug.), p. 43 (King's Park); Warham, Birds Perth, 1957, p. 48 (photograph), 49 (Perth); Jones, W. Austr. Nat. 6, 1958 (13 June), p. 127 (Windy Harbour); Sporn, W. Austr. Nat. 6, 1958 (28 Aug.), p. 151 (Yunderup); W. B. Alexander & A. H. Chisholm, The Austr. Encycl. VIII, 1958, p. 129 (south-western Australia); Gilliard, Living Birds of the World, 1958, p. 351 (Australia); Watson, W. Austr. Nat. 6, 1959 (18 March), p. 187, 190 (Carnac Island); Robinson, W. Austr. Nat. 7, 1960 (6 July), p. 110 (South-western Australia); Ford in Slater, Birds King's Park, 1960 (late), p. 32, also p. 23 (King's Park); V. N. Serventy, W. Austr. Nat. 7, 1961 (7 June), p. 206 (Bayonet Head, Albany); Sedgwick, W. Austr. Nat. 8, 1962 (22 May), p. 88, 94 (Williams); Grzimeks Tierleben X, 1967 (1 Sept.), p. 104 (Südwestaustralien).

Zosterops gouldi warreni; Mathews, Birds Austr. XI, 1923, p. 160 (Warren River district).

Zosterops gouldi shortridgii; Mathews, Birds Austr. XI, 1923, p. 160 (King George's Sound, probably to Stirling Ranges and inland to Broome Hill, etc.).

Zosterops gouldi edwini; Mathews, Birds Austr. XI, 1923, p. 160 (Carnarvon).

Zosterops gouldiae; Anonymus, S. Austr. Orn. 7, 1924 (1 April), p. 170 (no locality).

Zosterops australasiae australasiae; Mathews, Syst. Av. Australas. II, 1930, p. 711 (South-West Australia); Mathews, List Birds Australas., 1931, p. 375 (South-West Australia); Whittell & D. L. Serventy, Syst. List Birds W. Austr., 1948, p. 90 (Western Australia as far north as Carnarvon (rarely to North-West Cape), and inland to Mingenew, Wongan Hills, Kellerberrin, Lake Grace, Peak Charles, and Norseman).

Zosterops australasiae edwini; Mathews, Syst. Av. Australas. II, 1930, p. 711 (Mid-West Australia); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 20 (Carnarvon, Australie Ouest centrale); Mathews, List Birds Australas., 1931 (after 17 April), p. 376 (Mid-West Australia); Mathews, Working List Austr. Birds, 1946, p. 122 (Mid-West Australia).

Zosterops lateralis australasiae; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 228 (Westliches Australien).

Zosterops lateralis; Morcombe, Austr. Woman's Weekly, 1961 (16 Aug.), p. 55 (no locality = Wongong Valley near Armadale); Storr, Journ. R. Soc. W. Austr. 48, 1965 (12 March), p. 10 (Wallabi Group, Houtman Abrolhos); Storr, Emu 64, 1965 (31 May), p. 178 (Rottnest Island); Storr, Emu 65, 1966 (Jan.), p. 220 (East and West Wallabi including Tattler Island, Pigeon Island and North Island, Houtman Abrolhos); O' Loughlin, Austr. Nat. Hist. 15, 1967 (Dec.), p. 417 (East and West Wallabi, Houtman's Abrolhos).

Subspecific characters. The smallest of the races of *Z. lateralis;* easily distinguished from all other forms (except the much larger *valuensis*) by its uniformly green upper parts.

Upper parts entirely Warbler Green, no grey on the back, forehead and supra loral region of the same colour, or sometimes slightly more yellowish; loral streak dusky grey to black, continued as a black half circle below the eye; eye-ring rather narrow, white, interrupted in front by the loral streak; primaries, secondaries and rectrices brownish black, all with greenish outer edges.

Under parts. Throat and under tail coverts rather bright yellow, flanks pale buffish, remainder of under surface greyish white.

Unfeathered parts. Iris bright brown, in young birds dull brown, bill horny blackish brown, basal two-thirds of mandible greyish white, legs light grey (Mees).

Measurements. Wing 32 ♂, 53-59 (55.81); 24 ♀, 53-59 (55.94); 58 specimens, 53-59 (55.94); tail 34 ♂, 38-45 (41.74); 25 ♀, 38-47 (41.28); 61 specimens 38-47 (41.63), tarsus 56 specimens 15¾-18 (17.05), entire culmen 56 specimens 11-13¾ (12.56), exposed culmen 56 specimens, 8¾-11 (9.73), culmen from anterior point of nostril 56 specimens, 6-8 (7.27).

Structurally this subspecies agrees with the other continental Australian races in that it has a fairly long second primary, $5>6 = 2>7$ or $6>2>7$, occasionally even $5>2>6$.

Weights. ♂ im. 8.6, ♀ im. 9.7 g. These two weights of immature birds are not nearly enough, but they indicate that this small subspecies, as was to be expected, is lighter than all other races of *Z. lateralis*.

Distribution (fig. 3). South-western Australia, extending along the west coast as far north as Point Cloates, and all along the south coast into South Australia. While the species is well known to occur at Carnarvon, the inclusion of Point Cloates in its range has been based exclusively on Carter's (1903) statement that he had seen it once or twice at Point Cloates, but no material seems to exist, and these observations were made over sixty years ago. On 10 August 1959, I observed a presumed pair in the coastal dunes of Point Cloates, of which I collected the female (WAM no. A 8384); the specimen had large gonads which suggests that it was about to breed. On 15 May 1960, I noted a small flock (about 7 individuals) at Maud's Landing, 30 miles south of Point Cloates, and in December 1962 I found the species very common in the coastal dunes at Point Quobba. There is no evidence of the species' occurrence anywhere inland north of Geraldton, though it is common near the mouth of the Gascoyne River (Carter, 1903; also my own observations) and the Murchison River (Mellor, 1921; Buller, 1950).

According to Serventy & Whittell (1962), it ranges inland to the line Geraldton, Mingenew, Wongan Hills, Kellerberrin (irregular), Lake Grace, Peak Charles, Norseman and Newman Rock. Ford & Stone (1957) mention it as occurring at Kellerberrin throughout the year and breeding. My own observations hardly extend this range: in the Wongan Hills *Z. l. gouldi* is fairly common, and I know it from Kondut and Mt. Dillon. In the neighbourhood of Lake Grace, I have observations from Kuender, Harrismith and Jitarning. Crossman (1909) mentioned is as an uncommon visitor at Cumminin (south of Bruce Rock). Inland from the normal range is an apparently isolated colony at Kalgoorlie, which town according to Slater (1955) has been colonised only about 1943, though I note that previously Seth-Smith (1908) recorded it from there. Dr. D. L. Serventy has told me that he doubts Seth-Smith's observation and during many visits to the wheatbelt area, I have never seen the species far inland. A visitor from abroad not aware of the details of distribution of Western Australian birds is likely to make errors of identification and perhaps confusion with *Melithreptus brevirostris*, which is common inland and often moves about in flocks in the tree-crowns in silvereye-fashion, may have occurred. Until recently this race was not known from farther east than Israelite Bay (V. N. Serventy, 1951), for Gibson's (1909) and Hall's (1928) notes on observations between Kalgoorlie and Eucla in the coastal sandhills are too vague to be of use. In December 1961 it has, however, been collected at Eyre and Eucla. A specimen from Streaky Bay, South Australia, is intermediate between the races *gouldi* and *halmaturina* and proves that *gouldi* ranges into South

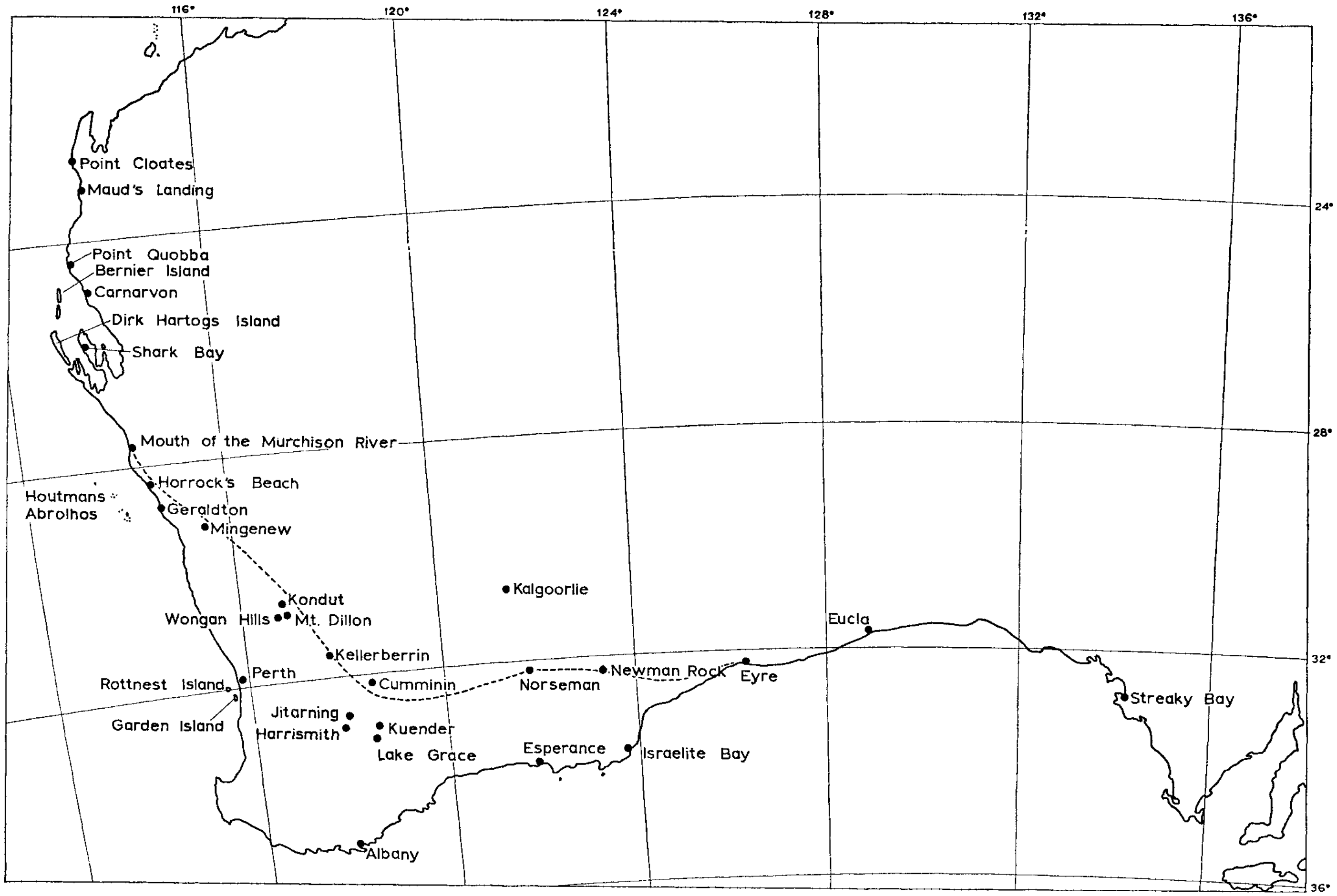


Fig. 3. The distribution of *Zosterops lateralis gouldi*; the broken line indicates the approximate limits of the breeding distribution inland, with an isolated colony in Kalgoorlie. Below the broken line the species is generally distributed, but only a few localities are shown.

Australia. This specimen will be further discussed below. The birds inhabit nearly all offshore islands, including Bernier Island (perhaps a visitor only — Lipfert, 1912), Dirk Hartog, Houtman's Abrolhos, Green Islets, Rottnest, Carnac, Garden Island, Bald Island, Archipelago of the Recherche.

First collector. Probably John Gilbert on or before 17 May, 1839 (see below under Type). It is not unlikely that L. Preiss actually obtained *Z. l. gouldi* earlier, as he arrived in Western Australia several months before Gilbert, and apparently collected a large number of birds. The specimen in the Museum Heineanum listed by Cabanis (1851) and Heine & Reichenow (1890) may have been collected by him.

Figures. Gould (1843), plate 82 (coloured plate on natural size); Broinowski (1890), plate VIII fig. 3 (coloured, not very good); Mathews (1923), plate 506 top figure (coloured plate on natural size by Grönvold); Newman (1929), plate 1 (rather poor photograph of mounted birds); Cayley (1931, 1958), plate XV fig. 4 (coloured, small); S. R. White (1940), plate 46 (good photograph); Morcombe (1961) (large colour photograph of bird attending nest with young). Small coloured figures appear in the books of Leach and Barrett, and other illustrations in various popular magazines. One example is a photograph accompanied by a poem by C. G. Hamilton in Gould League Notes (W. Austr.), 1940, p. 19.

Type. Stone & Mathews (1913) regarded a specimen in the Academy of Natural Sciences of Philadelphia as the, or a, type, but this was not followed up by de Schauensee (1957) who, apparently, could not verify this claim. In the British Museum is a female from Perth, collected on 17 May 1839, BM no. 81.5.1.642. The specimen bears an original label, with on it further the notes: "irides wood brown". This is certainly one of the types; observe also that the unusual colour description: "irides wood brown" was repeated by Gould (1841) in the original description. Because of the former habit of mounting specimens, and destroying original labels, it will be difficult to trace any other cotypes that might still exist.

As the only known type-specimen is from Perth, and as there is no proof that there was material from other localities amongst the type-material, Perth is the type-locality of *Z. l. gouldi.* Mathews (1913), without explanation, restricted the type-locality, originally given as Western Australia, to King George Sound; he adhered to this in his later publications except in volume XI of his „Birds of Australia" where the type locality is listed as "Perth(?)".

The type of *warreni* is AMNH no. 700844 (specimen examined).

Moult. Birds collected in February (1), March (1), April (2), September (1), and October (1), are moulting remiges and sometimes also rectrices; birds collected in April (1), and October (2) show tail moult only. Birds collected in February (2), March (1), April (1), May (3), July (2), August (3), September (11), October (7), November (9) and December (5) are not in moult. The main moult probably takes place in late summer and autumn (February-April). October-birds with growing tail-feathers may have been juveniles.

Nidification. As is to be expected with a bird that ranges over 12½ degrees of latitude, from 22° 30′ S to 35° S, from the tropics to the temperate region, there is no uniform breeding season. In the near-tropical part of its range breeding is at its height in winter, from June to September (Whitlock, 1921; Carter, 1921); near Perth and in the south-west of Western Australia breeding does not commence until August and lasts until December, with a peak in September and October. Near Moora, Sandland (1931) recorded a nest with slightly-incubated eggs on 23 November as the latest he ever found in that area. W. B. Alexander (1922) has mentioned a nest with one egg from the Houtman's Abrolhos, found on 23 November 1894. As late as 22 January 1961 I saw a family-party in my garden in Perth, of which the young were still being fed. In the extreme south the peak period is apparently in November (Whittell, 1933); there are several clutches, taken in the second half of November, in the National Museum of Victoria (H. L. White Collection), and even one clutch of three eggs from the Blackwood River, taken on 10 January 1897.

Whitlock (1937) has mentioned nests with eggs and young near Norseman in July 1904, which seems very early for a locality that far south. Though as a field-ornithologist Whitlock was unsurpassed, his paper was written over thirty years after his stay at Norseman and Lake Dundas and recollection might have become a bit dim after such a long interval. Therefore I asked Mr. McEvey to see if there are any eggs from Lake Dundas in the H. L. White collection, for which Whitlock collected at the time, but the reply was negative. I also asked Miss Lukis, Librarian of the Battye Library, Perth, to look for references in Whitlock's field note-books kept in that library. She found references to four young in a nest in a camel bush on 18 September 1904, and young a week old on 20 August 1905, but no mention of the species in July. As the two nest-finds mentioned in the note-books have been specifically recorded in Whitlock's paper, while the July records are only given in general terms: "I found both eggs and young in the nest in July, 1904", I regard it as justified to reject the latter as based on doubtful recollection. The record of young on August 20, on the other hand, can be accepted as an interesting early breeding-case so far south as laying must have commenced about the first of August.

Nests and eggs are of the usual type; the eggs are always pale blue; Serventy & Whittell (1962) mention for 13 eggs from Perth measurements of 15.6-17.8 × 12.0-12.8 mm. The clutch-size is two or three, occasionally four (Gould, 1843; Whitlock, 1937), and once a nest with six eggs has been recorded (Tarr, 1949), but that would be exceptional, and perhaps not natural.

The following notes are based on comments and diary notes made in 1928, put at my disposal by Mr. W. H. Loaring of Bickley. Both sexes assist in building the nest, incubating the eggs, and feeding the young. There is no proof that more than one successful brood can be raised in a season, but it is likely that this does occur. If a pair loses a clutch or part of a clutch, replacements can soon be produced.

Nest 1. 7 Sept. birds still building. 8 Sept. 16.30 hrs first egg. 9 Sept. 11.00 second egg, both eggs cold. 20 Sept. 17.30 no young. 21 Sept. 7.30 two young hatched, they were dry and there was no egg shell to be found.

Nest 2. 17 Sept. birds began building. 4 Oct. 13.30 bird on nest, 17.30 first egg. 5 Oct. 12.00 second egg, cold. 15 Oct. 9.00 eggs not hatched, 17.45 young. 26 Oct. young looking perky, skin bare round eyes. 29 Oct. morning, young had fledged, were being fed not far from the nest.

Nest 3. 17 Sept. nest in advanced state of construction. 25 Sept., evening, nest empty. 28 Sept. 15.25 two eggs, warm. 29 Sept. incubating. 3 Oct. the two eggs gone from the nest, broken on the ground. 7 Oct. a bird sitting on the nest in the morning, but no egg at 18.00. 10 Oct. 13.30 and 17.20 one egg. 11 Oct. 8.15 and 17.30 two eggs. 12 Oct. 8.15 bird incubating three eggs. 14 Oct. only two eggs left, one has disappeared, bird incubating. 22 Oct. 17.30 eggs not hatched. 23 Oct. 9.00 two young. 25 Oct. young show flight feathers, curve shoulders, curve flanks, streak centre back, black in their skins: a streak down the nape and the one branching from the throat round the sides of the breast fainter, though more pronounced at the sides of the breast; tail feathers showing faintly. 26 Oct. evening, young with wing quills 3 mm through the skin; curve on wings, on flanks, streak centre backs, round sides of breast very black in skin; more faintly on tails and on throat before dividing to go round sides of breast, on base of head and nape. 29 Oct. morning; wing quills and other feathers beginning to show through and of streaks; eyes still closed. 30 Oct. eyes showing crack; wing quills 3 mm through sheathes; feathers on backs, sides of breast and flanks are tipping through also. 1 Nov. young had eyes open, feathers rapidly covering them, but those on heads not yet through sheathes; quite bare round eyes. Bird sometimes brooding. 2 Nov. feathers growing rapidly. 3 Nov. feathers still growing very rapidly; most of those on the heads are through the sheathes, but the areas round the eye are still bare. 4 Nov. young had left nest at 14.00. 5 Nov. young heard and one seen near nest; eyes still bare; parents about.

Nest 4. 27 Sept. no eggs. 28 Sept. 16.15 first egg. 29 Sept. 18.00 second egg. 30 Sept. still two eggs only, no bird seen. 1 Oct. bird incubating. 9 Oct. 17.30 eggs not hatched. 10 Oct. 17.15 young hatched. 19 Oct. young still in nest. 21 Oct. bird brooding. 22 Oct. young calling a lot in the morning; at 18.00 both young dead.

From these notes an incubation period of 10½ to 11½ days may be deduced, and a fledging period of 12½ to 13½ days. It is also of interest to see that, after a clutch had been lost, the same nest was used again (nest 3).

Habits, etc. In habits and behaviour *Z. l. gouldi* is a thoroughly typical member of its genus, and only because I have observed it frequently myself, are some notes given. Normally (except when nesting) it goes about in flocks, feeding in trees and shrubs. The behaviour of birds in search of food is strongly reminiscent of that of titmice: they look round continuously, while busily moving about on twigs and leaves, and are not afraid to hang upside down occasionally.

On many occasions I have also seen individuals work on the ground: probably this is not unusual for members of the genus, but it has rarely been recorded (cf. this revision, part I, p. 49); the birds move about with hops of from five to ten centimetres in length. I have seen them on the forest floor, but also on open country and even on open stony hillsides, searching for food between the stones.

Several times I saw individuals cling to the bark of trees, apparently searching for food and pecking in crevices of the bark; they would move up in short jumps, sometimes accompanied by a bit of wing fluttering, in exactly the same way as *Parus major* does occasionally climb rough-barked trees.

In hot and dry weather the birds are very fond of drinking and bathing and may come down to water in large flocks; I have seen more than fifty individuals together at water.

The food consists of insects, nectar, and a variety of berries and fruit. Vegetable matter consumed includes flesh of the seeds of *Macrozamia reidlei* (Loaring, 1952) and berries of *Lycium campanulatum* (Sargent, 1928, p. 192). On Rottnest Island the blackish berries of *Solanum simile* constitute a major food item (personal observation; also Serventy & Storr, 1959; Storr, 1965). Watson (1959) mentioned feeding on seeds of *Acacia* and grasses. At Boranup, in March 1963, I saw flocks of hundreds feeding on the berries of *Rhagodia baccata,* a shrub that forms a dense undergrowth of the Karri forest.

It is interesting to note that very soon after settlement of Western Australia by Europeans, the bird became known as the "Grape-eater white eye" (Anon., 1842). Later Woodward in Fraser (1903) gave some much-quoted figures about the annual destruction of the birds in fruit-growing districts. Nevertheless even in those days they found also their defenders, who expressed the opinion that the birds do more good by controlling insect pests, than harm to orchards. Several papers were devoted to their economic significance, for example by Milligan (1904) and Newman (1929). Newman proposed a simple method of keeping silvereyes away by placing a butcher-bird *Cracticus torquatus* in a threatened orchard. Silvereyes are apparently so afraid of butcher-birds that they will not venture near [1]). I do not think that this method has ever been tried on a large scale, perhaps mainly because of the difficulty of procuring captive butcher-birds, and the destruction of silvereyes — or greenies, under which name they are better known in Western Australia — continues without, apparently, affecting their numbers.

Mulberries, *Morus nigra,* are another favourite food. In the fruiting season (January-February) the big mulberry tree in the garden of my parents-in-law at Busselton was literally swarming with them. Apparently all soft fruits are eaten.

The role the birds play in pollination of ornithophilous flowers is apparently quite important; this aspect of their biology has been studied by Sargent (1918, 1928). The list of flowers visited, given by Sargent is short, and can be extended considerably, but there is little point in doing so. An exception I want to make for *Xanthorrhoea preissii*: one would not at first sight expect the long flower stalks to be attractive to birds, but there is an ample honey production, and in King's Park, Perth, I have repeatedly observed *Z. l. gouldi* visit the flowers, sometimes as many as five individuals would cling to one stalk. *Erythrina* (an introduced species) is also visited, and was already listed by Sargent: I only want to point out that the flowers of this tree are almost certainly not pollinated because the birds invariably reach from outside through the bases of the petals to reach the nectar, thus avoiding contact with pistils and stamens. The native flower *Anigozanthos flavida* is treated in a similar manner (V. N. Serventy, 1961).

The insect food includes scales, aphides, thrips, leaf hoppers, plant bugs, small caterpillars and various flies (Newman, 1929).

The habitat of *Z. lateralis gouldi* is practically every type of vegetation, parks and woodland, gardens with flowering trees and shrubs, and it is especially common in scrub and *Acacia* thickets in the coastal sand-dunes

1) This fear is not without reason for on one occasion, in November 1960 at Wembley, I saw a butcher-bird with a *Zosterops* in his bill.

and on offshore islands which offer a similar habitat. On the other hand it does not range far into the drier interior, and outside the south-west of Western Australia it is confined to the coastal area.

In a previous part of this revision (pt. II, p. 129) I commented on the apparently complete ecological separation between *Z. lutea balstoni* and *Z. lateralis gouldi* in the area where the ranges of these two species overlap, and the same was mentioned by Serventy & Whittell (1948, 1951, 1962). Though the ecological difference is very pronounced, further observations suggest that it is not quite as dramatic as that, for during a subsequent visit to Carnarvon, in December 1962, I observed both species in the same patch of mangrove. The ecological situation is that *Z. lutea balstoni* as a breeding-bird is confined to mangrove, though ranging well out of it for feeding purposes (cf. p. 291), and that *Z. lateralis gouldi* inhabits various coastal habitats, mainly bushes and scrub, but also mangrove. There is no evidence at all that the two species would influence each other's ecology.

Z. l. gouldi, as far as known, is not migratory, but flocks do move about a bit, and in that way an outlying station as Kalgoorlie must have been colonized. As I have mentioned before (Mees, 1962), the fact that all ecologically suitable islands, up to thirty miles out from the coast, are inhabited by the subspecies, also speaks for its great wandering ability. The very few ringing results hitherto obtained have not yet brought out anything of much interest, the longest distance recovery to date appears to be of a bird ringed 8 miles west of Narricup, W. A. on 9-III-1965 and found dead 12 miles west of Denmark on 16-IX-1965, 28 miles WSW (Anon., 1966).

Lutinos, birds lacking the melanins and phaeomelanins, but retaining the yellow pigments, have been recorded twice in recent years (Jones, 1958; Sporn, 1958). In the preceding part of this revision (part II, 1961, p. 18, footnote) I wrote: "Though there is, as far as I can judge, nothing inherently impossible in a specimen naturally lacking carotenoid though having melanins, I have never seen such a thing. . . .". By a curious co-incidence I received the day after returning the proofs of the paper quoted, in April 1961, a specimen of *Z. l. gouldi* showing exactly this aberration. The bird had been shot on 17 April 1961 in a vineyard near Albany and by injection with formalin could be preserved as a mummy. The bird lacks every trace of yellow; it is smooth grey above, with blackish remiges and rectrices, a white eye-ring, and whitish below with buffy flanks. Also there is little doubt that the type specimen of *Zosterops bowiae* represented a similar aberration in one of the eastern Australian races of *Z. lateralis.* I know of no record of an albino in *Z. l. gouldi,* but as albinos occur rarely in practically all species of animals, it is likely that they also appear occasionally. It would be interesting to know the frequency of occurrence of these various plumage aberrations. They must be very rare indeed, for though during a five years' residence in Western Australia I must have observed many thousands of individuals of *Z. l. gouldi,* I never saw a bird in abnormal plumage; this puts the rate of incidence of these freaks at a tiny fraction of one per cent at most.

Z. l. gouldi is known as a host of several species of cuckoos. Eggs of *Chalcites basalis* (cf. H. L. White, 1915; Calderwood, 1952), *Chalcites lucidus plagosus* (cf. H. L. White, 1915), and of *Cacomantis pyrrhophanus prionurus* (cf. Ford, 1957) have been found in their nests. It strikes me that there is no mention in literature of any successful "broods" of cuckoos with *Z. l. gouldi,* I know of no records of a well grown young cuckoo being found in a nest or a fledgling being attended to. On the other hand one of the few records of eggs concerned one of *Chalcites basalis* left behind deep in the lining of a nest after young silvereyes had fledged from it (Calderwood, 1952). To all appearances therefore cuckoos parasitize silvereyes with no more than indifferent success.

Voice. The vocabulary of *Z. l. gouldi* is quite extensive; there are several different kinds of call-notes and two or perhaps three types of song. While I realise that no description can be satisfactory without being accompanied by mechanical records, I shall try to give some idea of the various calls and songs.

The contact-call. The birds being gregarious most of the year, this is the most common call; it is uttered more or less continuously by members of a flock when moving through the foliage, or when flying from tree to tree. That it serves the purpose of maintaining contact seems beyond question. There is quite a lot of variation in this call, it can be longer or shorter, loud or more or less muttered; basically it may be described as: "...pēēĕh .... pēēĕh ....pēēĕh ....".

The searching-call. When a bird has lost contact with its flock, it utters a plaintive high pitched and rather penetrating, long-drawn call: "pyēēĕw .... pyēēĕw...". While under some circumstances it is not too different from the contact-call, its plaintive quality and the deliberate way it is uttered, make it unmistakable. It is likely that this same call or its homologon is what has been described from other species as the "lost-chicken call".

Call of alarm and agitation. A very different, much lower, loud, and fairly short call which is adequately described as: "sìhrr .... sìhrr...". I heard this from individuals scolding round a butcher-bird (*Cracticus torquatus*) which had just caught one of their number, but it is uttered under various circumstances of agitation.

Call of fledglings. From fledglings still being attended to by their parents, I heard a double call which somewhat reminded me of the "sawing" of a Great Tit (*Parus major*): "sēē-sìrr — sēē-sìrr ...".

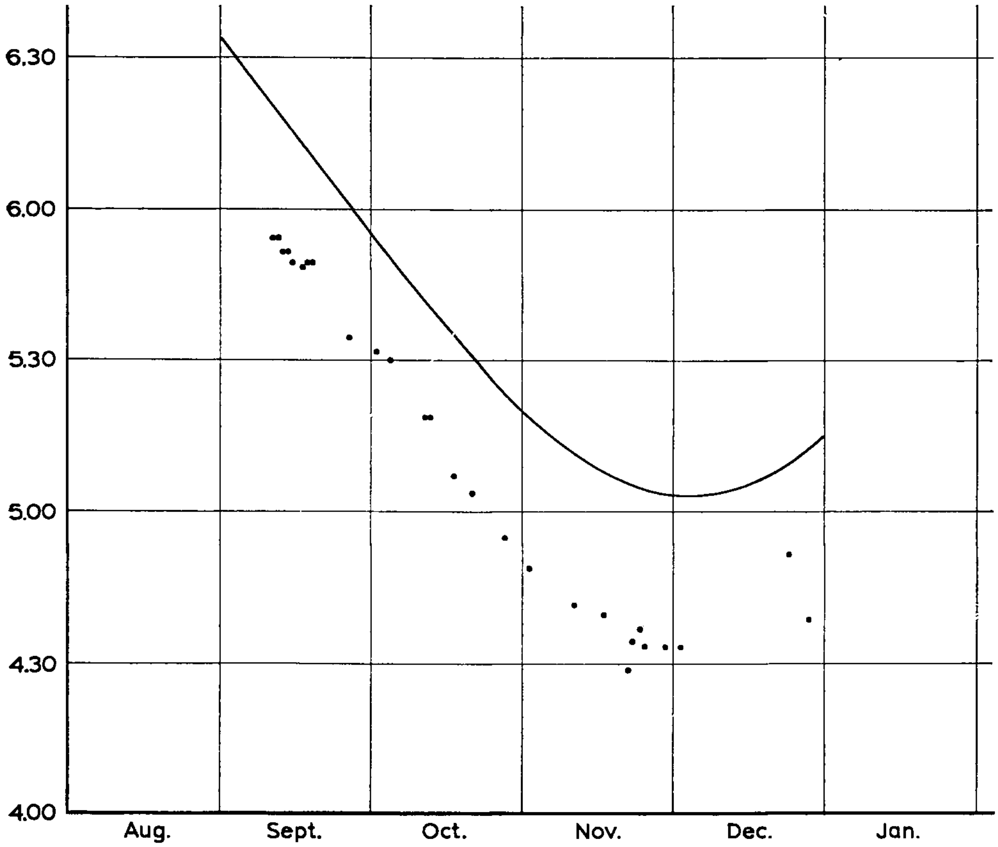


Fig. 4. Graph showing times of sunrise and commencement of song of *Zosterops lateralis gouldi* in my garden in Perth in 1960. Horizontal, date; vertical, time. The line indicates the time of sunrise, the dots represent times of commencement of song.

Ordinary song. The ordinary loud song, usually delivered from a tree-top, is powerful for a bird of such small size. The songnotes much resemble the louder variety of contact-call, and the student of evolution of birdsong might find here an interesting field of research as it is a defensible hypothesis that this song has evolved from the call. The song is delivered in bouts of from 4 to 7 seconds, with intervals of from 2 to 4 seconds: "tyee lee dyee lee ... tyee lee dyee lee tyee lee djulee .... tyee tyĕ yee ye tyee dee delee lae lee .... tjah lee dye lee dyee lee lee dyee dye dyeel ... tyee tyee tyĕ deel ...".

While basically this song is simple, it is not as monotonous as it might seem to be, as the bird manages to bring in quite a bit of minor variation. As I do not mind giving a subjective judgement, it may also be mentioned that the song has a quality of happiness equalled by but few other birds.

Though very occasionally this song may be heard at any time of the year, it is definitely connected with spring and the breeding season. In Perth the birds come into regular song in the second half of August, and it lasts until the middle of December. Towards the end of December it becomes very irregular, and during the summer months it is heard exceptionally. Towards the end of April and early May there is a slight revival on clear autumn days, followed by almost complete silence in June.

The best song is in the early mornings, when it starts about twenty minutes before sunrise early in the season, and half an hour before sunrise later on, and continues for 15 to 20 minutes. The graph (fig. 4) shows the times of sunrise and of beginning of song in my garden in Perth in 1960. It goes without saying that in a bird with such an extensive geographical range, the periods of song at, say, Carnarvan and Albany, might be substantially different.

The subdued song is of an entirely different type; it is not uttered from an exposed place, but the songster is usually more or less concealed in the foliage. This song is a continuous flow, a combination of the songs and calls of various kinds of birds, including those of *Z. l. gouldi* itself, delivered as a continuous, varied, but soft, stream of notes, very pleasing to the ear. I have heard this song in autumn and winter from birds which, with an abundant food-supply at hand, might be assumed to feel contented. It is doubtless this song of which Loaring (1920) admired the imitative powers.

It is possible, as indicated above, that there is a third type of song, not so loud as the first, louder than the second, and differing from both in that the same strophe is repeated every time: "teer tēē tēē tee tee tee teerr tēē". The contact-call motive so prominent in the ordinary song is entirely absent, and from the subdued song it differs in being slightly louder, less varied, and repeating without imitations. I heard this last type of song only once, on 31 December 1961, east of Highbury, in the morning-twilight, when a number of birds were delivering it from low scrub in a kind of chorus. Though at the time I made fairly extensive notes, I am not quite satisfied that this really is a distinct type of song, as I have not heard it again and after some time it becomes difficult to recall what exactly one has heard.

Loaring (1920) has drawn attention to the excellent imitative powers of

Z. l. gouldi; he heard it imitate song and calls of *Barnardius zonarius, Pachycephala pectoralis, Cracticus torquatus,* etc.

Discussion. The nomenclature of this subspecies (the case of the name *gouldi* against *australasiae*) has been dealt with in a previous part of this revision (pt. II, p. 20-31). As the bibliography shows, a great majority of authors have treated this bird as a separate species, under the names *Z. australasiae* or *Z. gouldi,* rather than as a subspecies of *Z. lateralis,* though the close affinity between these forms has been generally recognized. Serventy & Whittell (1962) have even drawn attention to differences in moult. On the other hand the song of *Z. l. gouldi* is similar to that of the eastern subspecies (personal observation). From the purely practical point of view little can be said against binary treating a well-differentiated form, identifiable in the field, and geographically isolated from its relatives, but there is now evidence that, in fact, *Z. l. gouldi* and *Z. l. halmaturina* are in contact. The British Museum expedition collected a *Zosterops* three miles south-east of Streaky Bay, South Australia: ♂ ad., 10-XII-1962, now in the National Museum of Victoria, which appears to be intermediate between both forms. Its measurements are: wing 56½, tail 44 (in moult), tarsus 16. The throat and under tail coverts are yellow as in *gouldi,* but the back is grey, though perhaps tinged slightly more greenish than in true *halmaturina.* Though, unfortunately, this is a very poor skin, it is in plumage characters exactly intermediate between the two races. The additional evidence that the two forms interbreed where they come in contact, supports the view that they are best treated as one species.

On purely geographical grounds, *edwini* is the only of the names proposed subsequent to *gouldi* that is not a priori unlikely to be valid, and Ashby (1921) claimed that: "the birds at Geraldton are smaller and brighter in tint than birds observed at Perth". Mathews's (1923) diagnosis of *edwini* reads: "Differs from *Z. a. australasiae* Vieillot [= *Z. l. gouldi*] in being slightly smaller and altogether lighter green above, with a lighter yellow throat and paler breast and abdomen". Comparison of specimens from the northern, central and southern parts of the range did not reveal any difference in colour. As far as size is concerned: I compared measurements of birds from north of Geraldton with those from south of Perth, and did not find a clear difference. Admittedly some of the southern birds are larger than any I have examined from the northern part of the range, but this is probably only because the northern series was shorter, as the minima agree well. Therefore *edwini* is clearly a synonym of *gouldi,* a conclusion previously arrived at by Mack (1932) and all subsequent authors who have studied these birds.

SUBSPECIES OF SOUTH-EASTERN AUSTRALIA
(*lateralis, halmaturina, familiaris,* and intermediate populations)

Mainly because up till recently it has not been realized that the nominate race is migratory, the nomenclature of the races inhabiting south-eastern Australia has become extremely confused. Keast (1958) has solved many of the problems, and as far as the number of subspecies and their respective ranges are concerned, I agree entirely with him. I differ, however, in opinion as regards nomenclature. Keast has applied the name *Z. l. tasmanica* to birds inhabiting Tasmania, and regarded the resident populations of New South Wales as belonging to the nominate race. My views on the subspecific identity of the various names proposed are given here in chronological sequence.

The name *Sylvia lateralis* Latham (1801) was given with the diagnosis: "S. griseo-caerulescens subtus albida, alis uropygio rectricibusque lateralibus viridibus, loris nigris" and "Habitat in *Nova Hollandia,* parva species magnitudine *Troglodytis*: latera corporis ferruginea". This Latin diagnosis has been adapted from the description of the Rusty-Sided Warbler, which reads as follows: "Size of a *Wren*: bill dusky: legs pale: the greater part of the head and wings, lower part of the back, and all except the two middle tail feathers green: hind part of the neck, the beginning of the back, and the two middle tail feathers blue grey; under parts of the body whitish, but the sides of it are ferruginous: between the bill and eye a narrow streak of black". As place of occurrence is given "found with the last", and as the preceding species is stated to inhabit New South Wales, that is also the type locality of *Sylvia lateralis.*

As the Tasmanian race does have rusty flanks, while in the resident race of New South Wales these parts are at most buffish, and as Latham failed to mention a yellow throat, which is such a conspicuous character of the resident New South Wales birds, Latham's description definitely applies to the Tasmanian race, which, therefore, is the nominate race and should be known as *Zosterops lateralis lateralis.*

Chronologically the next name is *Zosterops dorsalis* Vigors & Horsfield (1826 or 1827). The description reads as follows: "Dorsalis. Zost. flavescenti-viridis, dorso cinereo, strigâ ante subtusque oculos nigrâ; subtus flavescenti-albidus, gutture pallidè, abdominis lateribus ferrugineo tinctis".

The description clearly applies to the nominate race; moreover, the type specimen is preserved in the British Museum, where it was examined for me by Mr. Galbraith who reports that without doubt it is referable to the Tasmanian race. I have thought for a while that the name *dorsalis* might be used for the resident race of New South Wales as Vigors & Horsfield mention that Mr. Caley, the collector of the type specimen, found the species nesting in a Mulberry tree in his garden in Parramatta, but as the whole description was based on the extant holotype, about the identity of which there is no doubt, this is impossible.

The next name to be considered is *Dacnis westernensis* Quoy & Gaimard (1830) from Western Port, Victoria. It was described as: „Dacnis, rostro conico, acutissimo, palpebris albis; gulâ genisque flavis; capite, uropygio et alis virescentibus; dorso cinereo; abdomine flavo". There is nothing in this description that would prevent its being used for the resident birds of eastern Victoria and New South Wales, but the locality Western Port is a most unfortunate one for a race of the species, as birds from that area are almost exactly intermediate between the race *halmaturina* and the eastern Australian race, while according to Keast, also birds similar to the nominate race may be found breeding in the area. Also, the description might equally well apply to yellow-throated individuals of the nominate race. I have written to the museum in Paris for information on the type material, and received from Dr. Jouanin (in litt., 15-I-1963) the following reply: "...malgré de soigneuses recherches, je n'ai retrouvé dans les collections du Muséum de Paris aucun spécimen de *Zosterops* australien provenant de Quoy et Gaimard, ni dans les oiseaux montés, ni dans les oiseaux en peau. J'en ai été fort surpris, car je croyais bien que nous avions tous les spécimens de Quoy et Gaimard, mais même les catalogues anciens ne font pas mention de ces *Zosterops*. Je crois donc que le type de *Dacnis westernensis* doit être considéré comme perdu".

In view of the foregoing, it appears justified to dispose of the name *D. westernensis*, coming from such an awkward type-locality, by synonymizing it with the nominate race. Of previous authors at least Ashby (1925) has also applied it to Tasmanian type birds. The "Astrolabe" arrived at Western Port on 11th November, 1826, remaining a week: perhaps not too late in the season for migrants of the nominate race.

A considerable interval followed, in which no new names were given in the critical area, and only *Zosterops bowiae* Horne (1907) needs serious consideration. This name, however, was based on an aberrant bird or "sport" lacking all yellow pigment. While this in itself would not invalidate the name, it would be impossible to ascertain the subspecific identity of such a specimen, even if it had been preserved, which is not the case. The bird was obtained at Morang, to the NNW of Melbourne, where the resident population is closer to *halmaturina* than to the eastern race. Horne did not give a date, but in the description, published in the Emu of July 1st, 1907, he stated that it had been captured "last month". This may mean that the bird was obtained in May, at a time that Tasmanian migrants might reasonably be expected to occur in Victoria, and therefore the name might be synonymized either with *Z. l. halmaturina* or with the nominate race.

The names *tasmanica, investigator* and *norfolkensis,* bestowed by Mathews, are all referable to the nominate race.

Finally there is *Zosterops lateralis cornwalli* Mathews from Mackay. I have examined the type specimen and one other topotypical individual, and these birds are intermediate between *Z. l. ramsayi* and the subspecies from south-eastern Australia, though perhaps closer to the former. Since the type locality is from an area of intergradation between two subspecies, I have regarded it as preferable to synonymize *cornwalli* with *ramsayi* and to describe the population from south-eastern Australia as a new subspecies.

Bibliography of the eastern Australian races

The three races of south-eastern Australia have been indisentanglably confused in literature. Moreover there is a great number of publications which deal with the species rather than with the races. It would be impossible and misleading to try and assign each reference to one particular subspecies, especially as it has only recently been recognized that the nominate race is a regular winter visitor in the ranges of the two other subspecies. On the other hand, from Tasmania, New Zealand, and surrounding islands only the nominate race is known. Therefore I have here combined all general references to the species, and all references to the mainland of south-eastern Australia. Specific references to Tasmania, New Zealand, etc., however, are given in the separate bibliography of *Z. l. lateralis.* Similarly records from South Australia and the adjacent parts of New South Wales and Victoria (upper Murray) have been brought under *halmaturina;* this was done before I became aware that the nominate race also winters in South Australia, and anyway, on the basis of specimens it looks as if nominate *lateralis* is only an uncommon visitor in the range of *halmaturina.*

Zosterops bowiae Horne, Emu 7, 1907, p. 36 — Morang (Victoria).

Sylvia annulosa var. *β*; Swainson, Zool. Ill. III, 1822-23, pl. 165 (New Holland).

Zosterops dorsalis; Lesson, Manuel d'Orn. I, 1828, p. 286 (les environs de Sydney et de Paramatta à la Nouvelle-Hollande); Lesson, Dict. Sc. Nat. LX, Ed. Levrault & Le Normant, 1830, p. 555 (la Nouvelle-Hollande); Swainson, Nat. Hist. Class. Birds II, 1837, p. 246 (no locality); Lesson, Rev. Zool. Soc. Cuv. 3, 1840, p. 135 (Nouvelle-Galle du Sud); MacLeay, Ann. Mag. Nat. Hist. 8, 1842, p. 324 (Sydney); Gould, Birds Austr. IV, 1843, pl. 81 (Van Diemen's Land, New South Wales and South Australia); Gould in Strzelecki, Phys. Descr. N. S. W. and Van Diemen's

Land, 1845, p. 321 (New South Wales, Van Diemen's Land and Islands in Bass's Straits); Drapiez, Dict. Sc. Nat. X, 1845, p. 742 (Sydney et Paramatta à la Nouvelle-Hollande); Reichenbach, Die vollst. Naturgeschichte des In- und Auslandes. Die neuentd. Vögel Neuhollands, 1845, p. 83 (van Diemensland, Neu-Süd-Wales und Süd-Australien); Gould in Eyre, Journ. Exp. Central Austr. I, 1845, p. 442 (Southern Australia); Gould, Introd. Birds Austr., 8°, 1848, p. 128 (South-eastern Australia or N. S. Wales, South Australia, Van Diemen's Land); E. Verreaux, Cat. d'Ois., 1849, p. 50 (Australie); Reichenbach, Die vollst. Naturg. der Vögel Neuhollands, 1850, p. 309 (no locality); Lichtenstein, Nomencl. Av. Mus. Zool. Berol., 1854, p. 33 (Neuholland); Gould, Birds Austr., Suppl., 1859, p. 97 (Australia); Hartlaub, Journ. f. Orn. 13, 1865 (Jan.), p. 19 (Van Diemensland, Neu-Südwales und Südaustralien); Ramsay, Proc. Zool. Soc. London, 1865 (23 May), p. 464 (near Sydney); Ramsay Ann. Mag. Nat. Hist. (3) 16, 1865 (Oct.), p. 294 (near Sydney); Crowley, Cat. Birds' Eggs, 1883, p. 16 (no locality); Chalmers Mitchell, Proc. Zool. Soc. London, 1911, p. 437 (no locality); Campbell & al., Emu 12, Suppl., 1913 (Jan.), p. 84 (Queensland, New South Wales, Victoria, S. Australia, Tasmania, (New Zealand)); Chandler, Emu 13, 1913 (1 July), p. 43 (Kow Plains, Victoria); A. J. Campbell, Emu 13, 1913 (1 Oct.), p. 71 (no locality); Agnew, Emu 13, 1913 (1 Oct.), p. 96 (Peel Island, Moreton Bay); S. A. White, Emu 14, 1915 (1 Jan.), p. 142 (Mallacoota); Cheney, Emu 14, 1915 (1 April), p. 211 (Wangaratta District, Victoria); Purnell, Emu 15, 1915 (1 July), p. 43 (Anglesea, Vict.); Lawrence & Littlejohns, Emu 15, 1916 (1 Jan.), p. 166 (Ferntree Gully, Vict.); Hull, Emu 15, 1916 (1 April), p. 213 (N. S. W. islands: Brush Island); Hopson, Emu 15, 1916 (1 April), p. 261 (Barrington tops, N. S. W.); Ford, Emu 17, 1918 (1 April), p. 222 (Tanjil River and Ranges, Victoria); Cleland & al., Dept. Agricult. N. S. W. Sc. Bull. 15, 1918 (July), p. 104 (no locality, probably = Hawkesbury, N. S. W.); F. E. Wilson, Vict. Nat. 35, 1918 (Nov.), p. 112 (Nhill District); S. A. White, Emu 19, 1920 (1 Jan.), p. 219 (Bunya Mountains, Q.); Cleland, Emu 19, 1920 (1 Jan.), p. 230, 233 (Stradbroke Island); Barrett, Emu 19, 1920 (1 April), p. 294 (Wilson's Promontory, Vict.); A. S. Le Souëf & Macpherson, Emu 20, 1920 (1 Oct.), p. 89 (Sydney); Macgillivray, Emu 20, 1920 (1 Oct.), p. 93 (Broken Hill, upper part of Darling River, N.S.W.); Cleland, Proc. Linn. Soc. N. S. W. 47, 1922 (16 June), p. 139 (Blue Mts. N. S. W.: Mittagong to Bulliv; Bulliv to Wombeyan Caves; Wombeyan Caves to Taralga; Adelaide to Mt. Compass, via Willunga; Strathalbyn to Wellington; Wellington to Milang, Finniss and Giolwa; Renmark district, Berri to Renmark); Littlejohns, Emu 21, 1921 (3 Oct.), p. 143, pl. XXVIII (Oakleigh); A. H. Chisholm, Mateship with Birds, 1922, p. 196, also p. 22 (no locality = Victoria); Cleland, Trans. R. Soc. S. Austr. 46, 1922 (22 Dec.), p. 89 (no locality); Hall, Austr. Bird Maps, 1922, p. 131 (Gippsland); E. C. Chisholm, Austr. Zool. 3, 1923 (9 March), p. 67 (District of Marrangaroo, County of Cook, N. S. W.); Favaloro, Emu 25, 1926 (11 Feb.), p. 174 (Melbourne Botanical Garden); Berland, Enc. Entomol. (A) 16: Arachnides, 1932, p. 196 (Australie); McKeown, Proc. R. Zool. Soc. N. S. W. 1942-43, 1943 (23 Aug.), p. 17 (Sidney).

Gasterops; Shuckard in Swainson & Shuckard, Hist. and Nat. Arrangement of Insects, 1840, (1841?), p. 382 (vicinity of Sydney).

Zosterops; Shuckard, Ann. Mag. Nat. Hist. 8, 1842, p. 435, 438 (no locality = Elizabeth Bay near Sydney); Rainbow, Proc. Linn. Soc. N. S. W. (2) 10, 1895, p. 472 (no locality = Sydney); Aflalo, Sketch Nat. Hist. Austr., 1896, p. 136 (Australia); Stead, Zoologist (4) 3, 1899, p. 414 (no locality = Sydney); Dennis, Emu 3, 1903, p. 117 (Kolora, Vict.); Hall, Ibis (8) 4, 1904, p. 219 (Melbourne); A. H. Chisholm, Emu 9, 1910, p. 163 (Maryborough, Vict.); Morse, Emu 18, 1918, p. 71 (Moree, Vict.); S. A. White, Emu 19, 1920, p. 225 (Stradbroke Island); Jones, Emu 28, 1929, p. 253 (Canberra); Miller, Emu 32, 1933, p. 179 (Victoria).

Zosterops lateralis; G. R. Gray, Ann. Mag. Nat. Hist. 11, 1843 (March), p. 193 (no locality); Strickland, Ann. Mag. Nat. Hist. 11, 1843 (May), p. 336 (no locality);

Reichenbach, Handb. spec. Orn., Merop., 1852, p. 94, Taf. 463, fig. 3308-9 (Van Diemensland, Neu-Süd-Wales und Südaustralien); Schlegel, Handl. Dierk. I, 1857, p. 274 (Tasmanië en het zuidelijke Australië); Pelzeln, Novara Exp., Zool. I, 1865, p. 67 (Neu-Holland); Hutton, Cat. Birds N. Z., 1871, p. 6 (New Zealand: both islands, Chatham Islands, Australia, Tasmania); Schlegel, De Diergaarden, Vogels, 1872, p. 129 (Tasmanië en het Zuidelijke Australië); Brehm & Finsch, Gefangene Vögel I (2), 1876, p. 286 (Van Diemensland, Neu-Süd-Wales und Südaustralien, Neu-seeland); Gadow, Proc. Zool. Soc. London, 1883 (20 Feb.), p. 69, pl. XVI, fig. 2 (no locality); Martin, Ill. Naturg. Thiere I, 2, Vögel, Leipzig, 1884, p. 321 (Vandiemensland und südliches Australien, Nordinsel Neuseelands); Russ, Handb. Vogelliebh. I, 1887, p. 315 (Australien); K. A. Hodgson, Gefied. Welt 26, 1897 (2 Dec.), p. 382 (Australien); Evans, Cambridge Nat. Hist. IX, Birds, 1899, p. 568 (no locality); Finsch, Tierreich 15, 1901, p. 39 (Australien, Tasmanien, Neu-Seeland, Chatham-Inseln); van Oort, Mus. Hist. Nat. Pays-Bas 10 (1), 1907, p. 261 (Sans indication d'origine); North, Nests Eggs Birds Austr. II, 1907 (22 July), p. 209-212 (Southern Queensland, New South Wales, Victoria, South Australia, Tasmania, New Zealand, Norfolk Island); Nehrkorn, Kat. Eiersamml., 2nd. ed., 1910 (2 Aug.), p. 270 (Australien, Neu-Seeland); Chalmers Mitchell, Proc. Zool. Soc. London, 1911, p. 473 (no locality); Bahr, Ibis (9) 6, 1912, p. 286 (Sydney); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. V, 1912, p. 6 (Sydney; Canterbury, N. S. W.; Dobroyd, N. S. W.; Roseville; Melbourne; Mouth of Yarra R., Vict.; Ballarat Forest, Vict.; South Austr.; Tasmania; Christchurch, N. Z.); Ashby, S. Austr. Orn. 2, 1916 (1 Jan.), p. 109 (Illawarra district, N. S. W.); Mathews & Iredale, Austral Av. Rec. 4, 1920 (16 Dec.), p. 101 (no locality); Edwards, Emu 21, 1921 (19 July), p. 48 (Bunga, between Bermagui and Tathra, south coast N. S. W.); Russell, Emu 21, 1921 (1 Oct.), p. 141 (Barunah Plains and District, W. Victoria); R. T. Littlejohns, Emu 21, 1921 (3 Oct.), p. 143, pl. XXVIII (Melbourne); S. A. White, Emu 21, 1922 (14 Jan.), p. 221 (Wallis Lake); Lea, S. Austr. Orn. 6, 1922 (1 Jan.), p. 126 (no locality); Barrett, Emu 21, 1922 (1 April), p. 258 (Canberra); Norton, Emu 22, 1922 (1 July), p. 44 (Boree, New England Plateau, 3500', 50 miles south of Armidale); Morse, Emu 22, 1922 (1 July), p. 34 (Moree District, inland N. S W.); D'Ombrain, Emu 22, 1922 (1 Oct.), p. 124 (Comara on road to Armidale); Wolstenholme, Emu 22, 1922 (1 Oct.), p. 147 (Wahroonga-Sydney); E. C. Chisholm, Austr. Zool. 3, 1924 (9 May), p. 211 (Katoomba, N. S. W.); E. C. Chisholm, Emu 24, 1924 (1 Oct.), p. 105 (Tumbarumba, N. S. W.); Kinghorn, Emu 24, 1924 (1 Oct.), p. 140 (Upper Colo, 20 m from Richmond, N. S. W.); Kinghorn, Austr. Mus. Mag. 2, 1924, p. 79, phot. (no locality); (pt.) Ashby, Emu 25, 1925 (1 Oct.), p. 113 (N. S. W., S. Queensland); E. C. Chisholm, Austr. Zool. 4, 1925 (10 Nov.), p. 69 (Conboyne Plateau); E. C. Chisholm, Emu 25, 1926 (11 Feb.), p. 220 (Sydney); MacGillivray, Emu 25, 1926 (5 May), p. 230 (mainland opposite Capricorn Group); E. C. Chisholm, Emu 25, 1926 (5 May), p. 279 (no locality = N. S. W.); Cohn, Emu 25, 1926 (5 May), p. 285 (Melbourne, Bendigo, Vict.); *Cayley, Sydney Mail, 1926 (16 June), p. 19 (presumably N. S. W.); (pt) Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926 (after June), p. 93 (E.Q., N. S. W.); W. B. A[lexander], The Austr. Encycl. II, 1926, p. 464 (south-eastern Australia and Tasmania; New Zealand, Chatham Islands); De Warren, Emu 28, 1928 (1 Oct.), p. 118 (Macleay River, N. S. W.); Wolstenholme, Emu 28, 1929 (1 Jan.), p. 189 (Sydney); Chisholm & Cayley, Emu 28, 1929 (1 April), p. 250 (Port Stephens, N. S. W.: Cabbage Tree and Schnapper Islands); Porsch, Biol. Generalis 5, 1929, p. 160-163 (pollination, etc.); Coles, Bull. B. O. C. 49, 1929, p. 107 (N. S. W.); A. S. Le Souëf, Emu 29, 1930 (1 Jan.), p. 192 (Sydney); Morse & Sullivan, Emu 30, 1930 (1 July), p. 13 (45 m S. E. of Mornee, N. S. W.); H. E. & H. M. Hordern, Emu 31, 1931 (1 July), p. 26 (Port Stephens, N. S. W.); Sullivan, Emu 31, 1931 (1 Oct.), p. 133 (N. W. N. S. W. = round Moree); Moller, Biol. Generalis 7, 1931, p. 101, 130, 134, 135 (no locality): (pt.) Cayley, What Bird is

That?, 1931 (Dec.), p. 100, pl. XV fig. 3 (eastern Queensland, New South Wales); Mack, Emu 31, 1932 (1 April), p. 292 (distribution); E. C. Chisholm, Emu 32, 1932 (1 July), p. 6 (Camden Haven, N. S. W.); Gannon, Emu 32, 1932 (1 July), p. 14 (Sydney Botanical Gardens); E. C. Chisholm, Emu 32, 1932 (1 July), p. 59 (New South Wales); A. G. Campbell, Emu 32, 1932 (1 Oct.), p. 91-94 (S. E. Australia); A. H. Chisholm, Ibis (13) 2, 1932 (10 Oct.), p. 622 (eastern Australia); Norris, Austr. Nat. 8, 1932 (Dec.), p. 161, 162 (Engadine Creek); A. H. Chisholm, Nature Fantasy in Austr., 1932, p. 191 (no locality = near Sydney); Groebbels, Der Vogel I, 1932, p. 330 (no locality); Fuhrmann, Les Ténias des Ois., 1932, p. 326 (Nouvelle-Zélande, Australie); Mack, Emu 32, 1933, (2 Jan.), p. 229 (Abbotsford, N. S. W.); E. C. Chisholm, Emu 32, 1933 (1 April), p. 248 (Victoria); D'Ombrain, Emu 33, 1933 (2 Oct.), p. 134 (Roseville, Sydney); E. C. Chisholm, Emu 34, 1934 (2 July), p. 21 (Comboyne, N. S. W., 170 m from Sydney); Barker, Queensl. Nat. 9, 1934 (Aug.), p. 42 (Mt. Edwards near Brisbane); Hindwood, Emu 34, 1935 (2 Jan.), p. 187 (Sydney); Gilbert, Emu 34, 1935 (2 Jan.), p. 206 (Waterfall, S. of Sydney); Marshall, Emu 35, 1935 (1 July), p. 46 (McPherson Ranges, boundary N. S. W. and Q. near Murwillumbah); Barker, Queensl. Nat. 9, 1935 (Aug.), p. 83 (Numinbah Valley, Brisbane); Bryant, Emu 35, 1936 (2 Jan.), p. 227 (Marlo, Victoria); Lea & J. T. Gray, Emu 35, 1936 (2 Jan.), p. 256 (P. Lincoln, S. A.; Flinders Island, Bass Strait; Imbil, Qld.; Adelaide, S. A.; Wedge Island, S. A.; Yorke Pensinsula, S. A.; Tasmania; Albert Hill, S. A.; Blackwood, S. A.; Clarence River, N. S. W.; Kinchina, S. A.; Encounter Bay, S. A.); Barker, Queensl. Nat. 9, 1936 (April), p. 114 (Enoggera Water Reserve); Barker, Queensl. Nat. 10, 1936 (Sept.), p. 12 (Upper Albert River, Lamington National Park); Hyem, Emu 36, 1937 (1 April) p. 268 ("Mernot", Barrington, N. S. W.); Sharland, Emu 36, 1937 (1 April), p. 313, pl. 43 (Sydney); P. A. Gilbert, Emu 37, 1937 (1 July), p. 31 (around Sydney); McNamara, Emu 37, 1937 (1 Oct.), p. 102 (Cordeaux River, N. S. W.); A. H .Chisholm, Ibis (14) 1, 1937, p. 706 (Australia); E. C. Chisholm, Emu 37, 1938 (1 April), p. 311 (Barellan, N. S. W.); P. A. Gilbert, Emu 38, 1939 (1 April), p. 513 (no locality = near Lakema, N. S. W.): Leach, An Austr. Bird Book, 8th ed. (Barrett), 1939, p. 83 (S. A., N. S. W., V., S. A. — Kangaroo I., T., N. Z., Chatham Is.); E. C. Chisholm, Emu 39, 1940 (1 April), p. 271 (Peak Hill District, N. S. W.); Jack, Queensl. Nat. 11, 1941 (Aug.), p. 131 (Glasshouse Mountains); Jones, Emu 42, 1942 (July), p. 12 (Kulkyne N. Forest, N. W. Vict.); Mayr, Systematics and the Origin of Species, 1942 (after July), p. 158 (Australian mainland): Keast, Emu 42, 1943 (Jan.), p. 139 (Port Kembla, N. S. W.); Mathews, List Birds A. C. T., Commonwealth Forestry Bureau, Leaflet No. 53, 1943 (after July), p. 7 (Australian Capital Territory); Keast, Emu 43, 1944 (Jan.), p. 184 (Tweed River District; Numinbah); McGill, Emu 44, 1944 (July), p. 60 (Moree District, N. S. W.); A. H. Chisholm, Emu 44, 1945 (12 Jan.), p. 194 (from the Darling Downs to the Burdekin); Barrett, Austr. Bird Life, 1945, p. 182 (Eastern and South Australia, Tasmania, New Zealand, Chatham Island); Wheeler, Emu 45, 1946 (April), p. 287 (Wattle Park, Melbourne): Filmer, Queensl. Nat. 13, 1946 (Aug.), p. 38 (Victoria Park, Brisbane); Lawrence, Proc. Linn. Soc. N. S. W. 71, 1946 (5 Nov.), p. 4 (no locality = Sydney); Rausch & Morgan, Trans. Am. Microsc. Soc. 66, 1947 (April), p. 203, 209 (Australia); Lack, Darwin's Finches, 1947 (after August), p. 144 (Australia); Shanks, Emu 49, 1949 (31 Oct.), p. 139 (Upper King River District, Vict.); Harley, Queensl. Nat. 14, 1950 (Sept.), p. 29 (Samford Creek about 14 m W. of Brisbane); Lamm & Calaby, Emu 50, 1950 (Oct.), p. 117 (Murrumbidgee, A. C. T.); Anonymus, Wild Life 13, 1951 (Jan.), p. 97 (no locality = Victoria); Hindwood & McGill, Emu 50, 1951 (April), p. 234 (Derra Derra, 16 miles west of Bingara, about 150 miles west of the coast and some 300 miles north of Sydney); Mayr, Proc. Xth Int. Orn. Congr. 1950, 1951, p. 107 (Australia and New Zealand); Wardle & McLeod, Zool. of Tapeworms, 1952, p. 516

(Australia); Fleming & al., Checklist N. Z. Birds, 1953 (June), p. 65 (Tasmania and eastern Australia, South Island of New Zealand, North Island, Chatham Islands, Norfolk Island and the Snares. Auckland and Campbell and Macquarie Islands, Kermadec Islands); Hartshorne, Emu 53, 1953 (June), p. 125 (Canberra); Binns, Emu 53, 1953 (Sept.), p. 221 (Terang, S. Vict.); Erickson, Emu 53, 1953 (Dec.), p. 320 (no locality); Keast, 14th Int. Zool. Congr. Copenhagen, 1953 (no locality = near Sydney); Mayr in Huxley, Hardy & Ford, Evolution as a Process, 1954, p. 174 (Australia, New Zealand); Humphries & Lane, Emu 54, 1954 (June), p. 134 (Brush Island, 15 m S. of Ulladulla, N. S. W.); Whittell, Lit. Austr. Birds, Hist. Austr. Orn., 1954 (Aug.), p. 85 (Western Port); Barrett, Wild Life Austr. and New Guinea, 1954, p. 160, 226 (Australia, New Zealand); Cooper, Mem. Nat. Mus. Vict. 19, 1955 (March), p. 161 (Macquarie Marshes, N. S. W.); McGill & Lane, Emu 55, 1955 (March), p. 66 (Mt. Keira, N. S. W.); Watson, Emu 55, 1955 (Sept.), p. 245 (Laverton Saltworks, Vict.); McGill & Lane, Birds Illawarra Distr., 1955 (after Sept.), p. 15 (Illawarra District); Barrett, An Austr. Animal Book, 2nd ed., 1955, p. 219 (New Zealand as well as eastern and southern Australia, and Tasmania); Lord, Emu 56, 1956 (1 May), p. 123 (Murphy's Creek, S. Queensland); Carrick & Turnbull, C.S.I.R.O. Wildlife Res. 1, 1956 (Sept.), p. 33 (no locality); Carrick & Turnbull, C.S.I.R.O. Wildlife Res. 1, 1956 (Dec.), p. 120 (no locality); Keast, XIV Int. Congr. Zool. Copenhagen, (1953), 1956, p. 314 (Sydney); A. & S. Bell, Some Common Austr. Birds, 1956, p. 14-15, col. fig. (Australia); Anonymus, Gould League Notes (N. S. W.) 24, 1958 (May), p. 9 (Grafton); A. H. C[hisholm], The Austr. Encycl. II, [1958?], p. 5 (Australia and New Zealand); Keast, Emu 58, 1958 (28 July), p. 201, 202, 204 (no locality = N. S. W.); E. Bradley & J. Bradley, Emu 58, 1958 (22 Sept.), p. 316 (no locality = Sydney); Leach, An Austr. Bird Book, 9th ed. (Morrisson), 1958 (about Sept.), p. 172 (S. Q., N. S. W., V., S. A. — Kangaroo I., T., N. Z., Chatham Is.); Hindwood & McGill, Birds Sydney, 1958, p. 87 (Sydney); Gilliard, Living Birds of the World, 1958, p. 350 (no locality); Hitchcock & Carrick, C.S.I.R.O. Wildlife Res. 3, 1958 (Dec.), p. 126 (no locality); Cayley, What Bird is That?, 2nd ed., 1958, p. 112, pl. 15 fig. 3 (from the Pascoe River (Qld.) through eastern Australia to southern South Australia, as far west as Eyre Peninsula); Lowe, Austr. Bird Watcher 1, 1959 (March), p. 23 (Kangaroo Lake, Vict.); Cooper, Emu 59, 1959 (31 March), p. 60 (Melbourne); Wheeler, Emu 59, 1959 (Nov.), p. 247 (Noosa Heads, Qld.); Van Tyne & Berger, Fundamentals of Orn., 1959, p. 541 fig. 157 (no locality); Paramonov, Pacific Sc. 14, 1960 (Jan.), p. 77 (Lord Howe Island, introduced); Warham, Emu 60, 1960 (March), p. 6 (Carnarvon Ranges, Queensland); Hitchcock & Carrick, C.S.I.R.O. Wildlife Res. 5, 1960 (April), p. 67 (no locality); McGill, Emu 60, 1960 (20 May), p. 111 (no locality = New South Wales); Hindwood, Austr. Wild Life 3, 1960 (July), p. 15 (Centennial Park, Sydney); M. J. Mackerras & I. M. Mackerras, Austr. Journ. Zool. 8, 1960 (Aug.), p. 230, 251 (Sydney, Adelaide, Eidsvold); McGill, Hand List Birds N. S. W., 1960 (Nov.), p. 46 (New South Wales); McGill, Proc. R. Zool. Soc. N. S. W. for 1958-59, 1961 (28 Feb.), p. 45 (Sydney); Hitchcock, C.S.I.R.O. Wildlife Res. 6, 1961 (Sept.), p. 57, 59, 73, 85 (Lane Cove, N.S.W.; Rosevears, Tasm.; Canberra, A.C.T.); Burnett, Check List Birds Clarence Valley, 1961 (Sept.), p. 16 (Clarence Valley, N. S. W.); Croucher, Austr. Nat. 12 (2), 1961 (Sept.), p. 19 (North Brighton, N.S.W.); Morgan, Robinson & Ashton, Austr. Bird Watcher 1, 1961 (Dec.), p. 166 (no locality); Lawrence, Austr. Bird Watcher 1, 1961 (Dec.), p. 179 (Croydon, Vict.); Chapman, Emu 61, 1962 (April), p. 315 (recovery in Brisbane of a bird banded at Kulmura 30 m from Sydney); Jasper, Emu 62, 1962 (31 Oct.), p. 177 (Kenthurst, N.S.W.); Gwynn, Bird Bander 1, 1962 (Oct.), p. 5-7 (Eastern Australia, Tasmania); Lane, Bird Bander 1, 1962 (Oct.), p. 11 (Sydney), 12 (various localities); Walker, Bird Bander 1, 1962 (Dec.), p. 26-29 (Turramurra); Lane, Bird Bander 1, 1962 (Dec.), p. 29-33 (Sydney District); Anonymus, Bird Bander 1, 1962 (Dec.), p. 40 (various localities); (pt.) Anonymus, Bird Bander 1, 1963 (March), p. 72 (banded Uriarra Crossing, A.C.T. recovered Bathurst); Anonymous, Bird Bander 1, 1963 (March), p. 74 (Sydney); Jack, List Birds Brisbane, 1963 (before 3 June), p. 31 (Brisbane); Hyett & Gottsch, Austr. Bird Watcher 2, 1963 (Dec.), p. 54 (Quail Island, Vict.); McKean, Austr. Bird Watcher 2, 1963 (Dec.), p. 60 (no locality); Wilson, Bird Bander 1, 1963 (Dec.), p. 162, also p. 164 (Lake George, N.S.W.); Haines, Austr. Bird Bander 2, 1964 (March), p. 12 (Haberfield (Sydney)); Anonymus, Austr. Bird Bander 2, 1964 (March), p. 27 (banded Narrabundah, A.C.T., recovered Captains Flat, N.S.W., 26 miles S.E.); Jasper, Emu 63, 1964 (30 June), p. 413 (Kenthurst, N.S.W.); (pt.) Anonymus, Austr. Bird Bander 2, 1964 (June), p. 64 (banded Sutherland, N.S.W., recovered Lake George, N.S.W.); Walker, Austr. Bird Bander 2, 1964 (Sept.), p. 79-81 (Turramurra, N. S. W.); Anonymus, Austr. Bird Bander 2, 1964 (Sept.), p. 84 (various localities in South Australia and New South Wales); Domrow, Acarologia 6, 1964 (Oct.), p. 608 (Brisbane); Hore-Lacy, Emu 64, 1964 (31 Oct.), p. 32 (You Yangs, Vict.); Hitchcock, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 7, 1964 (late), p. 3, 4, 5, 21, 35, 36 (various localities in Tasmania, Victoria, and New South Wales); Robertson, Austr. Bird Bander 2, 1964 (Dec.), p. 107 (Queensland = Wellington Point); Anonymous, Austr. Bird Bander 2, 1964 (Dec.), p. 116 (various localities in N.S.W., Vict. and S.A.); Lane, Austr. Bird Bander 3, 1965 (March), p. 14 (North Ryde, N.S.W.); Anonymus, Austr. Bird Bander 3, 1965 (March), p. 19 (various localities in N. S. W., Vict. and S. A.); Gosper Emu 64, 1965 (31 March), p. 128 (Grafton); McEvey, Emu 65, 1965 (30 Aug.), p. 39 (Rutherglen District, N. E. Vict.); Hindwood, Austr. Zool. 13, 1965 (Aug.), p. 88 (New South Wales); McKean, Austr. Bird Bander 3, 1965 (Sept.), p. 43-44 (Canberra, A.C.T.); Anonymus, Austr. Bird Bander 3, 1965 (Sept.), p. 60 (Lane Cove, N.S.W.; Beachport and Glencoe, S. A.); Elks, Queensl. Bird Notes 1 (5), 1965 (Oct.), p. 7 (Dawson River near Cracow); Kikkawa, Hore-Lacy & Brereton, Emu 65, 1965 (29 Oct.), p. 142 (New England National Park); Anonymus, Austr. Bird Bander 3, 1965 (Dec.), p. 77 (various localities in N. S. W.); Wilson, Lane & McKean, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 8, 1965, p. 13 (no locality); S. & D. Wilson, Austr. Bird Bander 4, 1966 (March), p. 7 (Lake George, A.C.T.); Anonymus, Austr. Bird Bander 4, 1966 (March), p. 19 (various localities in N.S.W., Vict., S.A. and Tasmania); McEvey, Birds Vict. (repr. from Vict. Year Book no. 80), 1966 (before 6 June), p. 21 (Victoria); (pt.) Anonymus, Austr. Bird Bander 4, 1966 (June), p. 41 (various localities in N.S.W.); (pt.) Anonymus, Austr. Bird Bander 4, 1966 (Sept.), p. 64 (North Ryde, N.S.W., Port Fairy and Heywood, Vict.); Liddy, Emu 66, 1966 (Oct.), p. 99 (Hastings Point, N.S.W.); Marchant, Emu 66, 1966 (Oct.), p. 156 (no locality); Wheeler, Emu 66, 1966 (Oct.), p. 168, 180 (Mt. Beauty, Vict.); Liddy, Austr. Bird Bander 4, 1966 (Dec.), p. 71-73 (various localities in eastern Australia and Tasmania); Anonymus, Austr. Bird Bander 4, 1966 (Dec.), p. 82 (various localities in eastern Australia and Tasmania); Hitchcock, C.S.I.R.O. Div. Wildlife Res., Techn. Pap. 11, 1966 (late), p. 5, 6, 11, 29, 42, 63 (many localities in eastern Australia); Anonymus, Austr. Bird Bander 5, 1967 (March), p. 17 (Caloundra-Brisbane, Qld., and Willaroo-Glenelg River, Vict.); Wheeler, Handl. Birds Vict., 1967 (before June), p. 65 (Victoria, all districts); (pt.) Anonymus, Austr. Bird Bander 5, 1967 (June), p. 40 (Grafton and Birchwood, N.S.W.); Skead, Sunbirds S. Afr., 1967 (late), p. 283 (Australia, Tasmania, New Zealand); Anonymus, Austr. Bird Bander 5, 1967 (Dec.), p. 90 (Yanakie, Wilson's Promontory, Vict.—Totham near Casino, N.S.W.)

Zosterops westernensis; Hartlaub, Verz. Samml. Bremen, 1844, p. 37 (Neuholland); Reichenbach, Handb. spec. Orn., Merop., "1851", 1852, p. 93, Taf. 462, fig. 3302 (Hafen Western auf Neuholland); Hartlaub, Journ. f. Orn. 13, 1865, p. 20 (Port Western); G. R. Gray, Hand-List Birds I, 1869, p. 161 (New S. Wales); Boucard, Cat. Av., 1876, p. 231 (Australia); Giebel, Thes. Orn. III, 1877, p. 777 (Australia); Finsch, Proc. Zool. Soc. London for 1877, 1878, p. 734 (Australia); Finsch, Zool. Challenger Exp., Zool. II, (8), 1880, p. 48 (Australia); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 155 (Australia); Broadbent, Proc. R. Soc. Queensl. 5, 1888, p. 25 (Upper Fitzroy River, Berserker Mountains, Springsure; not at Barcaldine); North, Proc. Linn. Soc. N.S.W. (2) 3, 1889, p. 1777 (County of Cumberland, N.S.W.); (pt.) North, Descr. Cat. Birds, [1889], 1890, p. 234 (Port Denison, Wide Bay District, Dawson River, Richmond and Clarence Rivers' Districts, New South Wales, Interior, Victoria and South Australia); Broadbent, Queensl. Geogr. Journ. (n. s.) 17, 1902, p. 82 (Q'ld., N.S.W., Vic., S.A., Tas.); (pt.) Page, Bird Notes N. S. 4, 1913 (Jan.), p. 1 (Aust.); Bonnet, Bull. Soc. Zool. France 49, 1924, p. 179 (Australie); Ashby, Emu 25, 1925 (1 Oct.), p. 113 ("type from Western Port, Victoria").

Zosterops caerulescens; Thienemann, Abh. Vogeleiern, Beschr., 1846, p. 230, Abb., pl. XXIII fig. 15 (das südliche und östliche Neuholland); Blyth, Cat. Birds Mus. As. Soc., 1849, p. 220 (N. S. Wales, S. Australia, V. D. Land); G. R. Gray, Hand-List Birds I, 1869, p. 161 (New S. Wales); Ramsay, Proc. Zool. Soc. London, 1875, p. 598 (Queensland); Ridgway, Proc. U. S. Nat. Mus. 4, 1882 (10 March), p. 320 (no locality); Crowley, Cat. Birds' Eggs, 1883, p. 16 (no locality); Anonymus [= Dixon], Vict. Nat. 1, 1884 (about June), p. 47 (Victoria); Forbes-Leith & A. J. Campbell, Vict. Nat. 1, 1884 (about Aug.), p. 68 (Victoria); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 152 (Australia, New Zealand, Chatham Islands); Broadbent, Proc. R. Soc. Queensl. 2, 1886 (June), p. 124 (Chinchilla District); A. N[ewton], Encycl. Brit., 9th ed. XXIV, 1888, p. 824 (eastern part of Australia, New Zealand); North, Proc. Linn. Soc. N.S.W. (2) 3, 1889, p. 1777 (County of Cumberland, N.S.W.); Cox & Hamilton, Proc. Linn. Soc. N.S.W. (2) 4, 1889 (20 Sept.), p. 415 (Mudgee District); Tristram, Cat. Coll. Birds, 1889, p. 210 (N. S. Wales, S. Australia, New Zealand); (pt.) North, Descr. Cat. Birds, (1889), 1890, p. 233 (Port Denison, Wide Bay District, Dawson River, Richmond and Clarence Rivers' Districts, New South Wales, Interior, Victoria and South Australia); Anonymus, Vict. Nat. 7, 1891 (March), p. 178 (Yarra Falls); Hartert, Kat. Vogelsamml. Mus. Senckenb., 1891, p. 31 (Neusüdwales); Anonymus, Vict. Nat. 8, 1892 (April), p. 194 (Grampians); Purnell & al., Geelong Nat. 3 (3), 1894 (March), p. 10, 14 (Otway Forest); A. J. Campbell, Geelong Nat. 3 (4), 1894 (June), p. 13 (Victoria); North, Proc. Linn. Soc. N.S.W. (2) 10, 1896 (31 Jan.), p. 472 (Ashfield and other localities); North, Rec. Austr. Mus. 2, 1896 (Jan.), p. 98-100 (Sydney and Table Cape, Tasmania); Newton & Gadow, Dictionary Birds IV, 1896, p. 1057 (eastern part of Australia, New Zealand, Chatham Islands); Anonymus [North] in Austr. Mus. Rep. for 1895, 1896, p. 16 (no locality); Anonymus [North] in Austr. Mus. Rep. for 1896, 1897, p. 18 (no locality); Mulder, Geelong Nat. 6, 1898 (June), p. 50 (Geelong and Cape Otway District); Billinghurst, Wombat 4, 1898 (Nov.), p. 16 (Castlemaine); Hawker, Ibis (7) 5, 1899, p. 67 (Australia); Anonymus, Austr. Mus. Rep. for 1898, 1899, p. 25 (no locality); H. E. Hill, Wombat 5, 1902 (March), p. 27 (Bendigo District); Mathews, Emu 7, Suppl., 1908 (Jan.), p. 89 (Queensland, New South Wales, Victoria, S. Australia, Tasmania (New Zealand, Chatham Is., & c.)); Seth-Smith, Avicult. Mag. N.S. 6, 1908 (Aug.), p. 290 (Eastern States); Seth-Smith, Avicult. Mag. N.S. 7, 1909 (July), p. 258 (Sydney); Waite in Chilton, Subantarctic Isl. N.Z. II, 1909, p. 553 (Australia, New Zealand, Snares, Auckland, Campbell and Chatham Islands); Hull, List Birds Austr., 1909, p. 25 (no locality); Weatherill, Queensl. Nat. 1, 1910 (30 July), p. 156 (Glass House Mountain District); Johnston, Journ. R. Soc. N.S.W. 44, 1910 (12 Sept.), p. 109 (N.S.W.); Weatherill, Queensl. Nat. 1, 1911 (31 Jan.), p. 188 (between Terror's Creek on Mt. Mee about 24 or 30 miles respectively N.N.W. of Brisbane); Lucas & Le Souëf, Birds Austr., 1911, p. 364 (Tasmania, South Australia, and all the Eastern States, New Zealand, and Chatham Islands); van Name in Webster's Dict. Engl. Language, 1911, p. 2329 (Australia and New Zealand); Cleland & Johnston, Journ. R. Soc. N.S.W. 45, 1912 (26 June), p. 415, 440 (Adelaide; Eidsvold, Q; Sydney); Johnston, Mem. Queensl. Mus. 1, 1912 (27 Nov.), p. 214, 215 (Sydney); Cleland, Austral

Av. Rec. 2, 1913 (2 Aug.), p. 4 (Australia); Johnston, Proc. R. Soc. Queensl. 28, 1916, p. 52 (S.Q. = South Queensland); T. P. Austin, Austr. Zool. 1, 1918 (May 20), p. 137 (Cobbora Dictrict, N.S.W.).

Zosterops coerulescens; Gould, Birds Austr. I, 1865, p. 587 (Tasmania, New South Wales, and South Australia); Boucard, Cat. Av., 1876, p. 230 (Australia, N. Zealandia); (pt.) Ramsay, Proc. Linn. Soc. N.S.W. 2, 1877, p. 191 (Port Denison, Wide Bay District, Rich. & Clar. R. Dist., N.S. Wales, Victoria, South Australia, Tasmania); Giebel, Thes. Orn. III, 1877, p. 775 (Australia, Nov. Zealandia); A. J. Campbell, Nests Eggs Austr. Birds, 1883, p. 40 (Australia, except North and West, and Tasmania); Broinowski, Birds Austr. IV, 1890, pl. VIII fig. 1 (New South Wales, South Australia and Tasmania); Gabriel, Vict. Nat. 9, 1893 (Feb.), p. 151, 156 (Benjeroop, near Lake Charm, on Bendigo-Swan Hill line); H. E. Hill, Wombat 1, 1896 (April), p. 74 (St. George valley, Vict.); Billinghurst, Wombat 1, 1896 (July), p. 120 (Castlemaine, Vict.); Anonymus, Vict. Nat. 14, 1897 (7 Oct.), p. 82 (no locality = Victoria); Hall, Vict. Nat. 14, 1898 (6 Jan.), p. 128 (Box Hill District); A. J. Campbell, Vict. Nat. 14, 1898 (10 March), p. 151 (no locality); North & Keartland, Trans, R. Soc. S. Austr. 22, 1898 (Dec.), p. 182 (eastern and southern Australia); A. J. Campbell & al., Rep. 7th Meeting Australas. Ass. Adv. Sc., Sydney, 1898, p. 138 (no locality); A. G. Campbell, Vict. Nat. 16, 1899 (6 July), p. 51 (Burnley); Brittlebank, Vict. Nat. 16, 1899 (10 Aug.), p. 60 (Myrniong); Hall, Key Birds Austr., 1899, p. 38 (distribution); Nehrkorn, Cat. Eiersamml., 1899, p. 79 (Australien, Neu-Seeland); Hall, Insectivorous Birds Vict., 1900, p. 126 (Victoria); *Keartland, Handb. Melbourne (Austr. Ass. Adv. Sc.), 1900, p. 105 (Melbourne District); A. J. Campbell, Nests Eggs Austr. Birds, 1900, p. 347 (Queensland, New South Wales, Victoria, South Australia and Tasmania (including islands in Bass Strait)); Froggatt, Agricult. Gazette N.S.W. 11, 1901 (June), p. 448 (Victoria and New South Wales); Finn, List Birds Indian Mus., 1901, p. 76 (New Zealand, Melbourne, Australia); Broadbent, Queensl. Geogr. Journ. (n.s.) 17, 1902, p. 82 (Q'ld., N.S.W., Vic., S.A., Tas.); A. G. Campbell, Emu 2, 1902 (1 July), p. 15 (N. E. Victoria); Hill, Emu 2, 1903 (1 Jan.), p. 165 (Geelong and Otway Districts: St. George); Vroland, Emu 2, 1903 (1 April), p. 228 (Strathbogie, Victoria); Barnard, Vict. Nat. 20, 1903 (5 Nov.), p. 88 (no locality); A. G. Campbell, Emu 4, 1905 (5 Jan.), p. 113, 116 (South-Central and South-Eastern Victoria, Tasmania); Mellor, Emu 4, 1905 (1 April), p. 160 (N.S.W. National Park, 20 m south of Sydney); A. G. Campbell, Emu 4, 1905 (1 April), p. 165 (Upper Yarra); Mellor, Emu 5, 1905 (1 July), p. 6 (Tuggerah Lake, N.S.W.); French, Journ. Dept. Agricult. Vict. 3, 1905 (8 July), p. 366 (Victoria, New South Wales, Queensland, Tasmania and South Australia); A. G. Campbell, Emu 5, Suppl., 1905 (Oct.), p. 40 (no locality); Hardy, Vict. Nat. 22, 1906 (8 Feb.), p. 174 (between Healesville and Buxton (Vict.)); Hardy, Vict. Nat. 22, 1906 (5 April), p. 200 (Wilson's Promontory); Pawsey, Emu 6, 1906 (1 Oct.), p. 70 (Stawell District); A. G. Campbell, Emu 6, 1906 (1 Oct.), p. 72 (Grampians, Victoria); Anonymus (= Hutton & Waite), Guide Coll. Canterb. Mus., 3rd ed., 1906 (after June), p. 181 (Eastern Australia, Tasmania, New Zealand, Chatham Islands, Auckland Islands, and Campbell Island); Mattingley, Emu 6, 1907 (1 April), p. 192 (Mud Island near Melbourne); Mattingley, Vict. Nat. 24, 1907 (May), p. 9, 11 (Mud Island, Port Phillip); Batey, Emu 7, 1907 (1 July), p. 10 (Jackson's Creek, 20 m N.W. of Melbourne); H. E. Hill, Emu 7, 1907 (1 July), p. 18 (Ararat District, Vict.); Cole, Vict. Nat. 24, 1907 (Sept.), p. 91 (Hawthorn near Melbourne); Jackson, Cat. Jacks. Ool. Coll. 1907, p. 67 (various localities in N.S.W.); Hall, Useful Birds Southern Austr. 1907, p. 132 (eastern Australia); Mellor, Emu 7, 1908 (1 April), p. 185 (Tweed River District, N.S.W); Tryon, Queensl. Nat. 1, 1908 (30 June), p. 41 (no locality, probably near Brisbane); H. W. Ford, Emu 8, 1908 (1 July), p. 26 (Marong, Bendigo District); A. H. Chisholm, Emu 8, 1908 (1 July), p. 35-36 (Maryborough, Vict.); A. H. Chisholm, Emu 8, 1908 (1 July), p. 38 (Maryborough, Vict.); Tryon, Queensl. Nat. 1, 1908 (Sept.), p. 57 (Sankey's Scrub near Brisbane);

Hull, Emu 8, 1908 (1 Oct.), p. 84 (Montague Island, N.S.W.); Leach, Education Gazette and Teachers' Aid, 1908 (16 Dec.), Suppl., p. 18 (Victoria); St. John, Vict. Nat. 25, 1909 (Jan.), p. 151 (Wilson's Promontory); G. F. Hill, Emu 8, 1909 (1 April), p. 223 (Inverloch, Vict.); Gabriel, Vict. Nat. 26, 1909 (June), p. 19 (Stony Point, Western Port); Musson, Agricult. Gazette N.S.W. 20, 1909 (2 Aug.), p. 730 (Hawkesbury College, N.S.W.); Leach, Descr. List Birds Vict., Circular of Information No. 12, Nature-Study, 1909, p. 52 (Victoria); Barker, Queensl. Nat. 1, 1910 (31 March), p. 121 (Gold Creek Reserve 12 miles from Brisbane); Batey, Emu 9, 1910 (1 April), p. 242 (Drouin, Gippsland); Ingle, Emu 10, 1910 (1 Oct.), p. 124 (South Gippsland); Barker, Queensl. Nat. 1, 1910 (30 Nov.), p. 164 (Northgate); Mellor, Emu 10, 1910 (1 Dec.), p. 211 (Blackalls near Brisbane); Cleland & Johnston, Trans. R. Soc. S. Austr. 34, 1910 (Dec.), p. 105, 112 (Sydney); Cleland, Emu 11, 1911 (2 Oct.), p. 89 (Middle Harbour, Sydney); Leach, An Austr. Bird Book, 1911, p. 155 (Victoria, E.A., S.A., T., N.Z., Chatham Is.); Kelly, Vict. Nat. 28, 1912 (Feb.), p. 193 (Healesville); Cleland & Johnston, Journ. R. Soc. N.S.W. 45, 1912 (26 June), p. 415, 418, 440 (Sydney, Adelaide, Eidsvold, Q.); Cleland, Emu 12, 1912 (1 July), p. 14 (Queensland and Sydney); Johnston, Emu 12, 1912 (1 Oct.), p. 110 (N.S.W., S.Q., S.A.); Cleland & Johnston, 2nd Rep. Govt. Bur. Microbiol., years 1910 and 1911, 1912 (after 19 Sept.), p. 76, 85 (Sydney, Adelaide); Johnston, id., p. 131 (New South Wales); Cleland, id., p. 202 (Middle Harbour, Sydney; Neutral Bay, Sydney; Mt. Lofty, Adelaide; Queensland); Leach, An Austr. Bird Book, 2nd ed., 1912, p. 155, fig. 334 (E.A., S.A., T., N.Z., Chatham Is.); Page, Bird Notes N.S. 4, 1913 (Jan.) p. 1 (Aust., N. Zealand, Chatham Islands); D. G. Stead, Austr. Nat. 3, 1914 (Jan.), p. 10 (between Jenolan Caves and Titania (Duckmaloi River)); Froggatt, Agricult. Gazette N.S.W. 25, 1914 (2 April), p. 291, pl. (around the Australian coast from South Australia to Queensland; Bendigo; Murray; Tasmania; New Zealand); Joshua, Vict. Nat. 31, 1914 (May), p. 9 (Phillip Island); Cleland, Third Rep. Govt. Bur. Microbiol., year 1912, 1914 (after 13 Aug.), p. 131 (no locality = N.S.W.); Cleland, id., p. 184 (Sydney; Ourimbah; Flinder's Island, Bass Straits); H. L. White, Emu 14, 1915 (1 Jan.), p. 171 (Belltrees, Scone, N.S.W.); Cleland, Trans. R. Soc. S. Austr. 39, 1915 (Dec.), p. 37 (Ourimbah, Flinders Island [= Flinders Island, Bass Strait]); França, Jorn. Sc. Mat. Fís. e Nat. Lisboa (3) 1, 1917 (Jan.), p. 43 (Australie); Bergtold, A study of the Incubation Periods of Birds, 1917, p. 101 (no locality); Steel, Austr. Nat. 4, 1918 (2 April), p. 31 (Chatswood); Cleland & al., Dept. Agricult. N.S.W., Sc. Bull. 15, 1918 (July), p. 12, 13, 18, 19, 20, 21, 36, 74 (Richmond, Sydney, Mt. Irvine, Ourimbah, Queensland, Flinders I., Mt. Lofty, S.A.); H. L. White, Emu 18, 1919 (1 April), p. 305-306 (Scone, N.S.W.); Hamilton, Proc. Linn. Soc. N.S.W. 44, 1919 (17 Dec), p 496 (Australia); Littlejohns & Lawrence, Birds of our Bush, [1920], p. 208, also p. 180 (no locality = Victoria); A. J. Campbell, Emu 20, 1921 (1 Jan.), p. 149 (no locality = near Sydney); Froggatt, Some Useful Austr. Birds, 1921, p. 28, pl. (from South Australia to Queensland, Tasmania, New Zealand); Blakely, Proc. Linn. Soc. N.S.W. 47, 1922 (16 June), p. 21, 22, 23 (Hornsby district and along Oakey Creek, 20 miles S.W. of Orange, N.S.W.); Blakely, Proc. Linn. Soc. N.S.W. 48, 1923 (15 June), p. 144 (Bowan Park near Cudal); Blakely, Proc. Linn. Soc. N.S.W. 50, 1925 (1 July), p. 18 (Sydney district); Audas, The Austr. Bushland, 1950, p. 575 (no locality).

Zosterops Coerulescens; A. J. Campbell, The Australasian 61, 1896 (28 Nov.), p. 1065, fig. (Eastern Australia and Tasmania, New Zealand; Benjeroop, Lower Murray).

Zosterops bowiae; Mathews, Emu 7, Suppl., 1908 (Jan.), p. 90 (Victoria (Morang)); Leach, Education Gazette and Teachers' Aid, 1908 (16 Dec.), Suppl., p. 18 (Morang (Victoria)); Hull, List Birds Austr. 1909, p. 25 (no locality); Sharpe, Hand-List Birds V, 1909, p. 632 (Victoria); Leach, Descr. List Birds Vict., Circular of Information, No. 12, Nature Study, 1909, p. 52 (Victoria); Leach, An Austr. Bird Book, 1911, p. 155 (Marong); Mathews, Nov. Zool. 18, 1912 (Jan.), p. 384 (Victoria (Morang));

Leach, An Austr. Bird Book, 2nd ed., 1912, p. 155 (Marong); Snouckaert, Alauda (2) 3, 1931, p. 25 (Victoria); Leach, An Austr. Bird Book, 8th ed. (Barrett), 1939, p. 84 (Marong).

Zosterops sanguinolenta; Barker, Queensl. Nat. 1, 1910 (30 Nov.), p. 167 (Enoggera, Qld.).

Zosterops lateralis lateralis; Mathews, Nov. Zool. 18, 1912 (Jan.), p. 385 (New South Wales); H. L. White, Emu 14, 1915 (1 Jan.), p. 151 (Australia); Mathews, Birds Austr. XI, 1923 (27 Dec.), p. 153 (New South Wales, (?) Victoria, (?) South Australia); Low, List Vertebr. Anim. Zool. Soc. London II, Birds, 1929, p. 174 (Eastern Australia, Cape York to Kangaroo Island, South Australia and Tasmania); Mathews, Syst. Av. Australas. II, 1930, p. 708 (New South Wales and South Queensland): Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 228 (Oestliches Australien ... bis zur Kängeruh-Insel, Südaustralien, Tasmanien, Chatham-Insel, Neuseeland); Mathews, List Birds Australas., 1931, p. 374 (New South Wales and South Queensland); Keast, Gould League Notes (N.S.W.) 24, 1958, p. 11 (coastal New South Wales); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959, p. 226, 227 (Australia).

Zosterops lateralis westernensis; Mathews, Nov. Zool. 18, 1912 (Jan.), p. 385 (Victoria, South Australia); Belcher, Birds Geelong, 1914, p. 316-318 (District of Geelong); Lendon, S. Austr. Orn. 4, 1919 (1 April), p. 50 (Sherbrooke and Marysville, Vict.); Mathews, Syst. Av. Australas. II, 1930, p. 709 (Victoria); Mathews, List Birds Australas., 1931, p. 374 (Victoria).

Zosterops lateralis bowiae; Mathews, Austral Av. Rec. 2, 1915 (28 Jan.), p. 136 (no locality).

Zosterops dorsalis westernensis; Mathews, Birds Austr. XI, 1923, p. 153 (Victoria, South Australia).

Zosterops albiventris; Wolstenholme, Emu 24, 1925, p. 249 (Byfield and Yeppoon).

Zosterops lateralis vegeta; MacGillivray, Emu 25, 1926 (5 May), p. 230 (mainland opposite Capricorn Group).

Zosterops halmaturina; Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926 (after June), p. 93 (N.S.W., Vic.-S.A., T., N.Z., Chatham I.); Howe, Emu 27, 1928 (1 April), p. 264 (Victoria); De Warren, Emu 28, 1928 (1 Oct.), p. 118 (Macleay River, N.S.W.); Bryant, Emu 29, 1929 (1 Oct.), p. 112 (Mud Island, Port Phillip Bay); Hanks, Emu 29, 1930 (1 April), p. 295 (Wyperfield N.P., Vict.); Bryant, Emu 29, 1930 (1 April), p. 300 (Wilson's Promontory, Vict.); Sharland, Emu 30, 1930 (1 Oct.), p. 89 (Dandenong Ranges near Melbourne); Beck, Emu 30, 1930 (1 Oct.), p. 130 (St. Arnaud, Vict.); Payne, Emu 30, 1931 (1 Jan.), p. 232 (Creswick, Vict.); Cayley, What Bird is That?, 1931 (Dec.), p. 100, pl. XV fig. 2 (New South Wales, Victoria, South Australia, and Tasmania; also occurs in New Zealand and Chatham Island); Bryant, Emu 31, 1932 (1 Jan.), p. 212 (Wyperfeld); Bridgewater, Emu 31, 1932 (1 April), p. 284 (Mansfield, Vict.); Dickison, Emu 31, 1932 (1 April), p. 307, pl. 56 (Victoria); Bright & Taysom, Emu 32, 1932 (1 July), p. 48 (Lake Cooper, Vict.); Chenery, S. Austr. Orn. 11, 1932 (1 July), p. 197 (Wentworth, N.S.W.); Barker, Queensl. Nat. 8, 1933 (Sept.), p. 77 (Caloundra); Lansell, Emu 33, 1933 (2 Oct.), p. 126 (Moulamein, N.S.W.); W. B. Alexander in Regan (editor), Nat. Hist., 1936, p. 575 (south eastern Australia, Tasmania, New Zealand, Chatham Islands); McNamara, Austr. Nat. 11, 1948 (May), p. 206 (Illawarra, 10 m W. of Wollongong, N.S.W.); E. A. R. Lord, Queensl. Nat. 14, 1950 (Sept.), p. 24 (Murphy's Creek, about 60 m west of Brisbane); Cayley, What Bird is That?, 2nd ed., 1958, p. 112, pl. 15 fig. 2 (South-eastern Australia, Tasmania and Kangaroo Island); J. M. Forster, Vict. Nat. 81, 1964 (Sept.). p. 148 (summit of Mt. Buller, Vict.); R. Hill, Austr. Birds, 1967, p. 256 (distribution).

Zosterops halmaturina = lateralis; Wigan, Emu 32, 1932 (1 Oct.), p. 103 (Melbourne).

Zosterops coecrulescens; Yamaguti, Syst. Helminth. II. Cestodes of Vertebrates, 1959, p. 279 (near Sydney).

Zosterops Westernensis; Gaud, Nat. Hist. Rennell Isl. IV, 1962, p. 31 (Australie).

2. **Zosterops lateralis halmaturina** A. G. Campbell

Zosterops halmaturina A. G. Campbell, Emu 5, 1906 (1 Jan.), p. 143 — Kangaroo Island.

[*Zosterops westernensis*] *flindersensis* Ashby, Emu 25, 1925 (1 Oct.), p. 117 — Flinders Island, South Australia.

Zosterops caerulescens; F. G. Waterhouse in Harcus, S. Austr., 1876, p. 291 (South Australia); Mellor, Proc. R. Geogr. Soc. Australas.: S. Austr. Br. 10, (1907-8), 1909, p. 187 (the mainland = South Australia); S. A. White, Rec. A.O.U. Exp. Eyre's Peninsula, 1910, p. 55 (Warunda Creek, some 28 miles from Port Lincoln).

Zosterops coerulescens; Morgan, Trans. R. Soc. S. Austr. 21, 1897 (July), p. 23 (neighbourhood of Laura, S.A.); Chenery, Emu 2, 1903 (1 Jan.), p. 168 (between Port Augusta (S.A.) and Yardea Telegraph Station, Gawler Ranges); S. A. White, Emu 8, 1909 (1 Jan.), p. 161-162 (Fulham); Hall, Emu 9, 1910 (1 Jan.), p. 129 (Mortlock, Eyre Peninsula); S. A. White, Emu 11, 1911 (1 July), p. 35 (Yorke Peninsula, S.A.); S. A. White, Emu 12, 1912 (1 July), p. 2 (Port Lincoln, S.A.); Mellor, Emu 12, 1913 (1 Jan.), p. 186, 190 (Port Germain, S.A.); Sutton, S. Austr. Orn. 4, 1919 (1 Oct.), p. 96 (no locality = S.A.).

Zosterops cerulescens; Johncock, Trans. R. Soc. S. Austr. 27, 1903 (Dec.), p. 254 (Morphett Vale, S.A.).

Zosterops halmaturina; Hall, Key Birds Austr., 2nd ed., 1906, p. 113 (Kangaroo Island, S.A.); Mathews, Emu 7, Suppl., 1908 (Jan.), p. 90 (S. Australia, Kangaroo Is.); Mellor, Proc. R. Geogr. Soc. Australas.: S. Austr. Br. 10, (1907-8), 1909, p. 187, 189 (Kingscote, and central portion of the northern district of Kangaroo Island); Hull, List Birds Austr., 1909, p. 25 (no locality); Lucas & Le Souëf, Birds Austr., 1911, p. 364 (Kangaroo Island); Mellor, Emu 12, 1912 (1 July), p. 40 (Kangaroo Island Reserve); A. J. Campbell & al., Emu 12, Suppl., 1913 (Jan.), p. 84 (S. Australia (Kangaroo Island)); S. A. White, Emu 12, 1913 (1 April), p. 270 (Kangaroo Island); S. A. White, Emu 13, 1913 (1 July), p. 56 (no locality); Milligan, Emu 13, 1913 (1 July), p. 57 (no locality); S. A. White, Emu 13, 1913 (1 Oct.), p. 103 (King Island [errore! meant is Kangaroo Island, correction in Emu 13, 1914, p. 194]); S. A. White, Emu 14, 1915 (1 Jan.), p. 143 (Kangaroo Island); Hall, Emu 19, 1920 (1 April), p. 283, 287 (Kangaroo Island); Cleland, S. Austr. Orn. 8, 1926 (1 July), p. 238 (Kangaroo Island); Morgan, S. Austr. Orn. 8, 1926 (1 July), p. 240 (Kangaroo Island); Sutton, S. Austr. Orn. 8, 1926 (1 July), p. 277 (Kangaroo Island); Sutton, S. Austr. Orn. 9, 1927 (1 Jan.), p. 23 (Robe district, S.E. S. A.); Newell, S. Austr. Orn. 9, 1927 (1 Jan.), p. 32 (Hindmarsh Island, S. A.); Sutton, S. Austr. Orn. 9, 1927 (1 April), p. 64 (South Australia); Morgan, S. Austr. Orn. 9, 1927 (1 July), p. 103 (Rocky Point, Nepean Bay, Kangaroo Island); Sullivan, S. Austr. Orn. 9, 1927 (1 July), p. 108 (Murat Bay, West Coast, S. A.); Sullivan, S. Austr. Orn. 9, 1928 (1 Jan.), p. 167 (West Coast: Denial Bay); Sutton, S. Austr. Nat. 9, 1928 (Feb.), p. 39 (Nat. Park, S. A.); Parsons, S. Austr. Orn. 9, 1928 (1 April), p. 204 (S.E. S. A., Robe); Souter, S. Austr. Orn. 9, 1928 (1 July), p. 232 (Maitland, Yorke Peninsula); McGilp, S. Austr. Orn. 9, 1928 (1 July), p. 238 (One Tree Hill District); Sullivan, S. Austr. Orn. 9, 1928 (July), p. 248 (very common in coastal scrub around Warrnambool, Western District, Vict.); Leach, Emu 28, 1928 (1 Oct.), p. 96 (C.N. Victoria); Boehm, S. Austr. Orn. 9, 1928 (1 Oct.), p. 265 (Sutherland and Mount Mary Districts, S. A.); Harvey, S. Austr. Orn. 9, 1928 (Oct.), p. 269 (Coombe, S. A. (142 m. S.E. of Adelaide between Tintinara and Keith)); Cleland, S. Austr. Orn. 9, 1928 (1 Oct.), p. 270 (Fullarton); Morgan, S. Austr. Orn. 9, 1928 (1 Oct.), p. 272 (Rocky Point, Kangaroo Island); Sutton, S. Austr. Orn. 10, 1929 (1 April), p. 69 (S.E. S. A.: Kingston, Konetta, Lake Hawdon, Robe); Boehm, S. Austr. Orn. 10, 1929 (1 April), p. 72 (near Sutherlands, S. A.); Morgan, S. Austr. Orn. 10, 1929 (1 July), p. 87

(Gleeson's Landing, Yorke Peninsula); Sutton, S. Austr. Orn. 10, 1929 (1 July), p. 101 (Reedy Island, mouth of Murray); Cleland, S. Austr. Orn. 10, 1929 (1 Oct.), p. 128 (Laura to Adelaide); Morgan, S. Austr. Orn. 10, 1929 (1 Oct.), p. 132 (Glenelg, Kangaroo Island); Sutton, S. Austr. Orn. 10, 1930 (1 Jan.), p. 183 (Sugarloaf Park 14 m. S.E. of Meningie); Sutton, S. Austr. Orn. 10, 1930 (1 Jan.), p. 188 (Salt Creek, Coorong); Hanks, Emu 29, 1930 (1 April), p. 251 (Salt Creek, Coorong, S.A.: nesting); Sutton, S. Austr. Orn. 10, 1930 (1 July), p. 251 (Murray Mouth: Panmurung Point); Sutton, S. Austr. Orn. 11, 1931 (1 Jan.), p. 32 (Reedy Island No. 2. Lake Alexandrina and the Coorong); Sutton, S. Austr. Orn. 11, 1931 (1 July), p. 91 (Bool Lagoon, S.E. S. A.); Mellor, S. Austr. Orn. 11, 1931 (1 Oct.), p. 106 (apparently Lockleys); Sutton, S. Austr. Orn. 11, 1931 (1 Oct.), p. 118 (Deep Creek, Lakes and Coorong); Sutton, S. Austr. Orn. 11, 1932 (1 April), p. 182 (Lake Alexandrina and Coorong); Cleland, S. Austr. Orn. 11, 1932 (1 Oct.), p. 231 (Beaumont, S. A.); Sutton, S. Austr. Orn. 12, 1933 (1 Jan.), p. 17 (Salt Creek and the Coorong); Brummitt, S. Austr. Orn. 12, 1933 (1 April), p. 60 (Robe); Brummitt, S. Austr. Orn. 12, 1933 (1 July), p. 96 (Mannum); Boehm, S. Austr. Orn. 12, 1934 (1 Jan.), p. 166 (Sandleton, S. A.); Boehm, S. Austr. Orn. 12, 1934 (1 Jan.), p. 159 (Sutherlands and Mount Mary District, S. A.); Brummitt, S. Austr. Orn. 12, 1934 (1 April), p. 203 (Baudin Rocks in Guichen Bay); Ashby, S. Austr. Orn. 12, 1934 (1 April), p. 215 (Blackwood); Lashmar, S. Austr. Orn. 13, 1935 (1 Jan.), p. 8 (Kangaroo Island); Viner Smith, S. Austr. Orn. 13, 1935 (1 April), p. 46 (Chowilla, 14 m. N.E. of Renmark on the Murray); Hood, S. Austr. Orn. 13, 1935 (1 Oct.), p. 116 (Bool Lagoon, S.E. S. A.); Brown, S. Austr. Orn. 13, 1936 (1 April), p. 171 (Torrens Gorge); Lashmar, S. Austr. Orn. 13, 1936 (1 July), p. 203 (Eastern portion of Kangaroo Island); Condon & Rix, S. Austr. Orn. 13, 1936 (1 July), p. 217 (Buckland Park, 20 m. N.W. of Adelaide); Perryman, S. Austr. Orn. 13, 1936 (1 Oct.), p. 232 (South Neptune Island); Cleland, S. Austr. Orn. 13, 1936 (1 Oct.), p. 239 (no locality); Sutton, S. Austr. Nat. 17, 1936, p. 62 (National Park, S. A.); Perryman, S. Austr. Orn. 14, 1937 (1 Jan.), p. 18 (Althorpe Islands); Hitchcock & Brown, S. Austr. Orn. 14, 1937 (1 Jan.), p. 23 (Mannum on the Murray); Brandon, S. Austr. Orn. 14, 1937 (1 Jan.), p. 30 (Langhorne's Creek 35 m. S.E. of Adelaide); Lashmar, S. Austr. Orn. 14, 1937 (1 July), p. 62 (Kangaroo Island); Boehm, S. Austr. Orn. 14, 1937 (1 Oct.), p. 95 (Sutherlands and Mount Mary Districts, S. A.); Sutton, S. Austr. Orn. 14, 1937 (1 Oct.), p. 109 (South Australia); J. T. Gray, S. Austr. Orn. 14, 1938 (1 Jan.), p. 132 (Orroroo); Terrill, S. Austr. Orn. 14, 1938 (1 Jan.) p. 132, 133 (Clarendon Ridge); Finlayson, S. Austr. Orn. 14, 1938 (1 April), p. 145 (Flinders Island); Boehm, S. Austr. Orn. 14, 1938 (1 April), p. 162 (Greenock and Tanunda, S. A.); Rix, S. Austr. Orn. 14, 1938 (1 April), p. 169 (Eastern Kangaroo Island); Brandon, S. Austr. Orn. 14, 1938 (1 July), p. 194 (Berri, River Murray, S. A.); Condon, S. Austr. Orn. 14, 1938 (1 July), p. 188, 192 (Reevesby Island, Sir Joseph Banks Group, S. A.); Jarman, S. Austr. Orn. 15, 1939 (1 Jan.), p. 15 (incubation period); Boehm, S. Austr. Orn. 15, 1939 (1 July), p. 44 (Morgan and Cadell Districts, S. A.); Symon, S. Austr. Orn. 15, 1940 (Jan.), p. 72 (Fleurieu Peninsula); Jarman, S. Austr. Orn. 15, 1940 (Jan.), p. 78 (Southern Yorke Peninsula); Souter, S. Austr. Orn. 16, 1942 (Aug.), p. 29 (Mid-Yorke Peninsula); Joan Cleland, S. Austr. Orn. 16, 1942 (Aug.), p. 32 (Kangaroo Island: Rocky River, Stunsail Boom, Sou'-West and Breakneck Rivers, Cape du Couedie, American River, and Kingscote); Lashmar, S. Austr. Orn. 16, 1942 (Dec.), p. 39 (Kangaroo Isl.); Rix, S. Austr. Orn. 16, 1942 (Dec.), p. 40 (Happy Valley District); Rix, S. Austr. Orn. 16, 1943 (Sept.), p. 74 (between Mt. Lofty Ranges and the River Murray); Ey, S. Austr. Orn. 17, 1944 (Dec.), p. 36 (Millicent District); Rix, S. Austr. Orn. 17, 1945 (June), p. 71 (between Meningie and Salt Creek, Coorong); Francis, S. Austr. Orn. 17, 1946 (Jan.), p. 87 (Blue Lake, near Mt. Gambier, S.E. S. A.), p. 88 (Corny Point and Marion Bay, Yorke Peninsula); Anonymus, S. Austr. Orn. 18, 1946 (March), p. 1 (Happy Valley, S. A.); Condon, S. Austr. Orn. 18, 1946 (June), p. 19 (South Australia); Finlayson, S. Austr. Orn. 18, 1946 (Nov.), p. 22 (Thistle Island off Eyre Peninsula); Symon, S. Austr. Orn. 18, 1946 (Nov.), p. 25 (Willunga); Storr, S. Austr. Orn. 18, 1947 (Jan.), p. 36 (Southern Eyre Peninsula); Terrrill & Rix, S. Austr. Orn. 19, 1950 (1 March), p. 93 (distribution in S. A.); Ragless, S. Austr. Orn. 22, 1958 (1 Sept.), p. 76 (Clarendon, 15 miles south-east of Adelaide); Daley, S. Austr. Nat. 37, 1963 (June), p. 59 (an unspecified locality apparently between Adelaide and Innamincka).

Zosterops; Mellor, Proc. R. Geogr. Soc. Australias.: S. Austr. Br. 10, (1907-8), 1909, p. 191 (Neptune Islands); S. A. White, Emu 16, 1916, p. 6 (Wedge Island); Cleland, Trans. R. Soc. S. Austr. 47, 1923, p. 119, 120 (Pearson Islands, S.A.); Cleland, S. Austr. Nat. 27, 1953 (March), p. 37 (Pearson Island).

Zosterops lateralis halmaturina; Mathews, Nov. Zool. 18, 1912 (Jan.), p. 385 (Kangaroo Island); McGilp, S. Austr. Orn. 5, 1920 (1 Jan.), p. 28 (Kangaroo Island); Mathews, Syst. Av. Australas. II, 1930, p. 709 (Kangaroo Island); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 19 (Ile Cangarou); Mathews, List Birds Australas., 1931 (after 17 April), p. 375 (Kangaroo Island); Condon, S. Austr. Orn. 23, 1962 (Oct.), p. 136 (distribution in S. A.); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 316 (distribution).

Zosterops dorsalis; S. A. White, Emu 13, 1913 (1 July), p. 31 (Gawler Ranges, S. A.); S. A. White, Emu 13, 1914 (1 Jan.), p. 129 (Lower Murray); H. W. Bryant, Emu 19, 1919 (1 July), p. 63 (Nariel, Upper Murray); Hall, Austr. Bird Maps, 1922, p. 79 (Darling River; Upper reaches).

Zosterops lateralis westernensis; Morgan, S. Austr. Orn. 1 (3), 1914 (1 July), p. 14 (Adelaide); F. R. Zietz, S. Austr. Orn. 1 (4), 1914 (Oct.), p. 29 (Kingswood); Anonymus, S. Austr. Orn. 2, 1915 (July), p. 62-64 (all the southern parts of South Australia and Victoria, extending north about as far as Port Augusta); Anonymus, S. Austr. Orn. 2, 1915 (July), p. 67 (Adelaide and the Parklands); Morgan, S. Austr. Orn. 2, 1916 (1 April), p. 150 (S. A.: Pondalowie Bay and Wedge Island (St. Vincent and Spencer Gulfs)); S. A. White, Emu 16, 1916 (1 July), p. 14 (Althorpe Islands, Pondalowie Bay, Wedge Island, S. A.); S. A. White, Emu 16, 1916 (2 Oct.), p. 76 (Althorpe Island, Cape Yorke and Pondalowie Bay); Morgan, S. Austr. Orn. 3, 1918 (1 Jan.), p. 136 (Port Broughton); Morgan, S. Austr. Orn. 4, 1919 (1 Jan.), p. 18 (South-eastern part of South Australia: all along the coast); Morgan, S. Austr. Orn. 4, 1919 (1 Oct.), p. 92 (South-East of South Australia); S. A. White, S. Austr. Orn. 4, 1919 (1 Oct.), p. 113 (Reeds Beds District [near Adelaide]); S. A .White, S. Austr. Orn. 5, 1920 (1 Oct.), p. 106 (Reedbeds, Adelaide plains).

Zosterops lateralis; Chenery & Morgan, S. Austr. Orn. 5, 1920 (1 July), p. 75 (Rivers Murray and Darling and district of Wentworth); Parsons, S. Austr. Orn. 6, 1921 (1 Jan.), p. 22 (no locality = South Australia); McGilp, Emu 22, 1923 (1 April), p. 285 (Lake Frome District, S. A.); Sutton, S. Austr. Orn. 7, 1923 (1 April), p. 60 (S.E. S.A.: Lake Bonney, Robe, Kingston); McKeown, Emu 23, 1923 (1 July), p. 47 (Murrumbidgee Irrigation Areas); Sutton, S. Austr. Orn. 7, 1923 (1 Oct.), p. 105 (S. A.); Cleland, Trans. R. Soc. S. Austr. 47, 1923 (22 Dec.), p. 124 (Pearson Islands, S. A.); Lea, Trans. R. Soc. S. Austr. 47, 1923 (22 Dec.), p. 361 (Pearson Island); Sutton, S. Austr. Orn. 7, 1924 (1 Jan.), p. 153 (Eyre Peninsula: Mt. Hope, Elliston, Lake Greenly, Wangary, Kellidie Bay, Port Lincoln, and near Cowell); Anonymus, S. Austr. Orn. 7, 1924 (1 April), p. 170 (Flinders Island); Cleland, S. Austr. Orn. 7, 1924 (1 April), p. 182 (Encounter Bay District); Nicholls, Emu 24, 1924 (1 July), p. 59 (Mungeranie and surrounding districts, Central Australia = East of Lake Eyre); Sutton, S. Austr. Orn. 8, 1925 (March), p. 62 (Mt. Lofty Ranges at Adelaide and Bridgewater); Sutton, S. Austr. Orn. 8, 1925 (1 July), p. 75 (between Mitcham and Goolwa); McGilp, Emu 25, 1925 (1 July), p. 19 (Adelaide); Cleland, S. Austr. Orn.

8, 1925 (1 Oct.), p. 128 (Mount Gambier); Cleland, S. Austr. Orn. 8, 1926 (1 Jan.), p. 142 (Elliston, Eyre Peninsula); Emerson & Gannon, Emu 33, 1934 (2 April), p. 312 (Murrumbidgee Irr. Area, in the mallee); Condon, S. Austr. Orn. 16, 1942 (May), p. 23 (Port MacDonnell, S. A.); Lashmar, S. Austr. Orn. 18, 1946 (Nov.), p. 29 (eastern portion of Kangaroo Island); Finlayson, S. Austr. Orn. 18, 1948 (Jan.), p. 73 (Greenby Island, S. A.); Glover, S. Austr. Orn. 19, 1949 (2 May), p. 33 (Waikerie); Fuller, S. Austr. Orn. 19, 1949 (2 May), p. 41 (Gawler); Mitchell & Behrndt, Rec. S. Austr. Mus. 9, 1949 (31 May), p. 173 (Greenby Islands); Condon, S. Austr. Orn. 20, 1951 (20 Aug.), p. 59 (South Australia); Storr, Lendon & McKechnie, S. Austr. Orn. 20, 1952 (13 June), p. 71 (Port McDonnell to Salt Creek, S. E. S. A.); Cleland, S. Austr. Orn. 20, 1952 (13 June), p. 72-75 (no locality = South Australia); Glover, S. Austr. Nat. 28, 1953 (Sept.), p. 16 (Botanic Garden, Botanic Park, Adelaide); Jeffery, S. Austr. Orn. 21, 1954 (25 June), p. 33 (Port Noarlunga); Schodde & Glover, S. Austr. Orn. 21, 1955 (29 July), p. 71 (Moorook, S. A.); Schodde, S. Austr. Orn. 22, 1956 (1 March), p. 5 (Burra Creek near Florieton, Sutherlands); McGilp, S. Austr. Orn. 22, 1956 (1 March), p. 12 (South Australia); Jeffery, S. Austr. Orn. 22, 1957 (18 Oct.), p. 51 (Rocky River area, Kangaroo Island); Boehm, Emu 57, 1957 (Dec.), p. 319 (Mt. Mary Plains, South Australia, North West Bend of the Murray River); Officer, Emu 58, 1958 (15 Dec.), p. 389 (Portland, Victoria); Schodde, S. Austr. Nat. 34, 1959 (Sept.), p. 14 (Southern Flinders Range); Wheeler, Emu 60, 1960 (Nov.), p. 279 (Kangaroo Island); Hobbs, Emu 61, 1961 (20 March), p. 50 (along the Murray River from Barooga to Wentworth; Mildura; Gulpa Forest); D. B. Mack, S. Austr. Orn. 23, 1961 (Aug.), p. 77 (Upper Murray, S. A.); Beruldsen, Emu 63, 1963 (30 Nov.), p. 230 (Lake Alexandrina, S. A.; (pt.) Anonymus, Austr. Bird Bander 2, 1964 (June), p. 64 (banded Joanna, S. A., recovered Rendelsham, S. A., banded Wooleys Lake, Beachport, S. A., recovered Coonawarra, S. A.); Jenkin & Waterman, S. Austr. Orn. 24, 1965 (Jan.), p. 48 (Eyre Peninsula); D. B. Mack, S. Austr. Orn. 24, 1965 (Jan.), p. 51 (Beachport); (pt.) Anonymus, Austr. Bird Bander 4, 1966 (June), p. 41 (Joanna, S. A.); (pt.) Anonymus, Austr. Bird Bander 4, 1966 (Sept.), p. 64 (various localities in South Australia); Daley, Blayloch & McNamara, S. Austr. Nat. 41, 1966 (Sept.), p. 19 (Manning Reserve, S. A.); Cooper, Birds of a Salt-Field, 1966, p. 55 (Dry Creek near Adelaide).

Zosterops dorsalis halmaturina; Mathews, Birds Austr. XI, 1923, p. 153 (Kangaroo Island).

Zosterops zateralis; Mellor, S. Austr. Orn. 8, 1925 (1 July), p. 95 (Lockley).

Zosterops westernensis halmaturina; Ashby, Emu 25, 1925 (1 Oct.), p. 116 (Kangaroo Island).

Zosterops halmaturinus; Morgan & al., S. Austr. Orn. 8, 1926 (1 April), p. 210 (Ornata, Kimba in N. E. Eyre Peninsula).

Zosterops westernensis flindersensis; Mathews, Birds Austr. XII, 1927, p. 430 (Flinders Island, Bass Straits) [locality erroneous!].

Zosterops lateralis flindersensis; Mathews, Syst. Av. Australas. II, 1930, p. 709 (Flinders Island, Bass Straits); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 19 (Ile Flinders dans le détroit de Bass); Mathews, List Birds Australas., 1931 (after 17 April), p. 374 (Flinders Island, Bass Straits) [locality erroneous!].

Xosterops lateralis; Mahony, Proc. R. Soc. Vict. 50, 1938 (23 May), p. 304 (Sir Joseph Banks Group); Wood Jones, Condon, Mack, Rutter & Tubb, Proc. R. Soc. Vict. 50, 1938, p. 413 (Sir Joseph Banks Islands).

Zosterops lateralis lateralis; Hindwood, Emu 39, 1940 (1 Jan.), p. 230 (Murrumbidgee Irr. Area, N. S. W.).

Zosterips lateralis; Waterman, S. Austr. Orn. 24, 1963 (Oct.), p. 18 (near Tintinara).

Subspecific characters. Near to the nominate race, but flanks paler in colour; breast light grey; size smaller. As in the nominate race, yellow on the throat is absent or incompletely developed. The greyish breast and the absence of both bright yellow and dark flanks, make this the dullest of all subspecies.

Unfeathered parts. Iris hazel, bill brown (McGillivray); iris greyish brown, bill dark brown, grey or grey-brown (Condon); iris light brown, bill grey brown, base of mandible blue white, legs grey brown (Hoy).

Measurements. Wing 29 ♂, 56-61 (58.38); 18 ♀, 55½-60 (57.78); 51 specimens, 55½-61 (58.23); tail 29 ♂ 39.47 (43.83); 18 ♀, 42-46 (43.47); 51 specimens 39-47 (43.73); tarsus 51 specimens 16-18½ (16.87); entire culmen 49 specimens 11½-14 (12.42); exposed culmen 50 specimens 8½-10½ (9.71); culmen from anterior point of nostril 51 specimens 6¼-8 (7.13).

The measurements have been taken from material collected in South Australia, and some specimens from the Murray Valley in adjacent New South Wales and extreme north-western Victoria. Specimens from the remainder of western Victoria, though phenotypically belonging to *halmaturina*, have been excluded.

Structure. Usually the wing formula is 5>2>6, but sometimes 2 = 6 or even 6>2>7.

Weights. ♂ 11, 11, 12, 12; ♀ 9, 11, 11, 12 g (all from Burnside, S. A., leg. Condon). According to Morgan (1919): 1 ♂ 8.9 g; Sutton (1937): ♂ 9, 11; ♀ 9 g.

Distribution (fig. 5). South-eastern South Australia, the adjacent south-western part of New South Wales, and the western half of Victoria. In South Australia occurring on the Eyre Peninsula as far west as Streaky Bay where hybridization with *Z. l. gouldi* occurs (see under that subspecies), eastwards as far north as the Gawler Ranges, where S. A. White (1913) found it very scarce, Wilcherry, and over the head of Spencer Gulf to Wilmington, Orroroo, Sutherlands, and along the Murray River into Victoria and New South Wales. In New South Wales along the Murray and some of its tributaries, and the Murrumbidgee Irrigation Area (where it has followed irrigation). There is a record from as far inland as Broken Hill by McGillivray (1920) who regarded its occurrence so far inland as due to exceptional climatologic circumstances; I have examined this bird, ♀, 26-VI-1920, S. Austr. Mus. no. B 21714; it has a wing-length of 63 mm which appears too long for *halmaturina*, and since it was collected in mid-winter it might have come from anywhere, perhaps from eastern Victoria or Canberra, where birds resembling *halmaturina*, but larger, occur. In

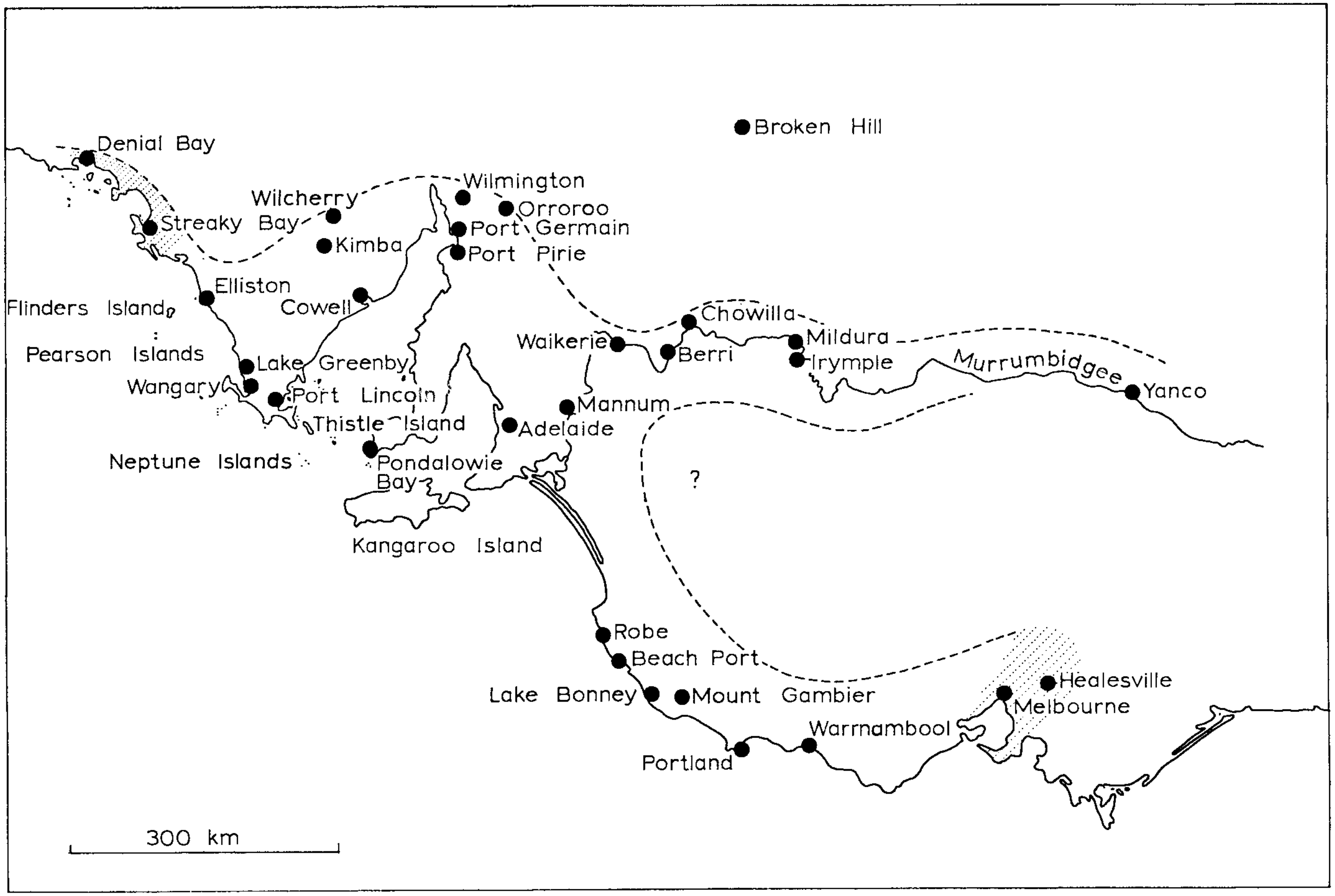


Fig. 5. The distribution of *Zosterops lateralis halmaturina*; the broken lines indicate the approximate limits of breeding distribution inland, but the situation in north-western Victoria and New South Wales is by no means clear. Dotted areas indicate intergradation with *Z. l. gouldi* and *Z. l. familiaris*. The record from Broken Hill pertains to a straggler belonging to a different subspecies.

Victoria generally distributed, except perhaps in the north-western mallee areas; eastwards to Melbourne. There is a broad zone of intergradation between this subspecies and *familiaris,* the line of equilibrium seems to be just east of Melbourne.

Besides on the mainland, the subspecies is known from the islands off South Australia: Kangaroo Island, Flinders Island (this island should not be confused with Flinders Island in the Bass Strait), and all smaller islands that have been ornithologically explored.

First collector. Unknown to me.

Figure. Perhaps Cayley's (1931) plate XV, fig. 2 is taken from a South Australian bird as it shows rather pale flanks.

Type. The two cotypes are in the H. L. White Collection, in the National Museum of Victoria, nos 3062 (♂) and 3063 (♀); the male bird has in pencil the note: "Type, A.G.C." (types examined).

Moult. Specimens collected in March (2), April (6), May (4), June (7), July (1), August (9), September (4), October (2), November (5), and December (5) do not show moult. One specimen collected in June and one collected in July show tailmoult; one specimen from April moults secondaries, and one December bird primaries.

Nidification. Published records (Sutton, 1930, 1933; Lashmer, 1937, 1942; Wood Jones & al., 1938; Storr, 1947) indicate a main breeding season during the last four months of the year. Joan Cleland's (1932) record of a bird sitting on a nest with two fresh eggs on 26 June 1932, at Beaumont, S. A., must be exceptional. Another early nest, containing two eggs on 9 August was found on Kangaroo Island by Lashmer (1937). Condon (1938) mentioned that on Reevesby Island, in December 1936, the breeding season was past.

The normal clutch-size is two or three, and an incubation period of 12 days has once been recorded (Jarman, 1939). Eggs and nest are typical.

Habits, etc. Ecologically *Z. l. halmaturina* does not differ from the preceding subspecies.

The food consists of fruit and berries, nectar, and small insects. F. R. Zietz (1914) especially mentioned berries of the pepper tree, *Schinus molle.* Cleland (1952, 1953) listed *Myoporum insulare,* and recorded how *Rhamnus* seeds are dispersed. Lea & Gray (1936) examined more than fifty stomachs of *Z. lateralis,* 45 of which South Australian. These contained spiders and insects (Coleoptera and Hymenoptera), and vegetable matter from which seeds and berries were identified as follows: *Schinus molle, Threlkeldia diffusa, Leucopogon richeii, Myoporum, Rhagodia* and

Chenopodium. The Hymenoptera included ants, *Pheidole* and *Camponotus nigriceps*.

Morgan (1914) noted a preference for rose aphides; see also Officer (1958).

There is no evidence that this subspecies is migratory to any extent, but there is an interesting recovery of a bird ringed (ring no. 011-38165) near Blewitt Springs, S. A. on 5-X-1963, retrapped and released at Antechamber Bay near Penneshaw, Kangaroo Island, on 18-III-1966, 56 miles SW. The interest of this record lies not in the moderate distance it has moved from its place of ringing, but in the proof it provides that there is movement from the mainland to Kangaroo Island, and that the seven or eight miles of the Blackstairs Passage do not form a serious barrier. The fact that this subspecies, like *Z. l. gouldi* in Western Australia, inhabits all offshore islands points to a degree of mobility, which is confirmed by the recovery mentioned above. Some additional ringing records are given on p. 75-78.

This subspecies has been found parasitized by the cuckoo *Chalcites basalis* (Keith Ashby, 1934; McGilp, 1956), but appears to be no more than an infrequent host, and I know of no instance in which a young cuckoo was successfully reared.

Patton (1963) recorded a case of virus infection, causing large nodules on the feet.

Voice. A serious study of the vocabulary of this race has never been made, but there is no reason to assume that it differs in any way from that of other Australian subspecies, and this is confirmed by such notes as are available.

Sutton (1919) recorded the morning call. A sweet little song was mentioned by Mellor (1925), and Cleland (1928) described an observation of a singing bird as follows: "In addition to the usual low and sweet canary-like notes this bird from time to time gave forth a series of notes louder than usual, clearly imitative of those of a Blackbird *(Turdus merula)*. So like were they that I had to move my position several times to reconvince myself that there was not a Blackbird singing across the road, the notes being of a strength suggestive of a Blackbird that distance away. As the bird was only ten feet away, moving about in the hedge, the radius I was on from it as centre was a short one, so that a few yards' alteration in my position gave a different direction for the sound". As imitation has but rarely been recorded in Zosteropidae, it appeared worth while to quote Cleland's careful description in full. See also my notes given under *Z. albogularis*.

Discussion. Condon (1951) has examined the type specimen of *Zosterops* *westernensis flindersensis* and denied the existence of any of the differential characters claimed by its describer; previously the validity of this alleged subspecies had been queried by others (Mack, 1932).

A specimen from Streaky Bay which is intermediate between this subspecies and *Z. l. gouldi*, is described in the discussion of that race.

3. **Zosterops lateralis lateralis** (Latham)

S[ylvia] lateralis Latham, Suppl. Ind. Orn., 1801, p. LV, 12 — Nova Hollandia = New South Wales, restricted to Sydney by Mathews (1923).

[Zosterops] dorsalis Vigors & Horsfield, Trans. Linn. Soc. London 15, 1826 (1827?), p. 235 — type locality not specifically stated, but = Paramatta [Parramatta on recent maps].

Dacnis westernensis Quoy & Gaimard, Voy. Astrolabe, Zool. I, 1830, p. 215-216, pl. 11 fig. 4 — le Port Western à la Nouvelle Hollande.

Zosterops australis Ramsay, Ibis 5, 1863, p. 180 — nomen nudum.

Zosterops lateralis tasmanica Mathews, Nov. Zool. 18, 1912 (Jan.), p. 385 — Tasmania = Devonport, where the type was collected.

Zosterops lateralis investigator Mathews, Birds Austr. XI, 1923 (27 Dec.), p. 153 — New Zealand.

Zosterops lateralis norfolkensis Mathews, Bull. B. O. C. 50, 1929 (31 Oct.), p. 10 — near Kingston, Norfolk I.

Zosterops dorsalis; Gould, Synops. Birds Austr., 1837 (Jan.), text and pl., fig. 3 (New South Wales)[1]; Ewing, Tasm. Journ. Nat. Sc. 1, 1842, p. 54 (Tasmania); Ewing in Stoney, Resid. in Tasm., 1856, p. 305 (Tasmania); Meredith, Tasm. Friends and Foes, 2nd ed., 1881, p. 127 (Tasmania); Dove, Emu 15, 1916 (1 April), p. 234 (Tasmania); Dove, Emu 16, 1916 (2 Oct.), p. 96 (Tasmania); Dove, Avicult. Mag. (3) 8, 1917 (May), p. 198 (Tasmania); Lord, Emu 19, 1919, p. 99, 106 (Mount Field, Tasm.).

Zosterops lateralis; Heermann, Cat. Ool. Coll. Ac. Nat. Sc. Philad., 1853 (1 March), p. 10 (van Diemen's Land); Ewing in Stoney, Resid. in Tasm., 1856, p. 305 (Tasmania); Finsch, Journ. f. Orn. 15, 1867, p. 321 (Neu-Seeland); Pelzeln, Abh. zool.-bot. Ges. Wien 17, 1867, p. 316 (Neu-Seeland); Haast, Journ. f. Orn. 16, 1868, p. 241 (Neu-Seeland); Jouan, Mém. Soc. Imp. Sc. Nat. Cherbourg 14, 1868, p. 277 (la Nouvelle-Zélande); Buller, Trans. N. Z. Inst. 1, (1868), May 1869, 2nd ed. 1875, p. 53 (no locality); Finsch, Trans. N. Z. Inst. 1, (1868), May 1869, 2nd ed. 1875, p. 71 (New Zealand); Potts, Trans. N. Z. Inst. 2, (1869), April 1870, p. 61, pl. 5 fig. 3 (Rockwood Valley, Malurn Hills); Finsch, Journ. f. Orn. 18, 1870, p. 254 (Christchurch); Buller, Trans. N. Z. Inst. 3, (1870), May 1871, p. 15-23 (New Zealand); Buller, Trans. N. Z. Inst. 3, (1870), May 1871, p. 77, pl. XII (New Zealand); Finsch, Journ. f. Orn. 20, 1872 (March), p. 108 (Ellman-Distrikt der Südinsel); Hutton, Ibis (3) 2, 1872 (July), p. 244 (Chatham Islands); Potts, Trans. N. Z. Inst. 5, (1872), May 1873, p. 178 (New Zealand); Hutton, Trans. N. Z. Inst. 5, (1872), May 1873, p. 239 (New Zealand); Buller, Birds N. Z., 1873, p. 80-86 (New Zealand); Finsch, Journ. f. Orn. 22, 1874, p. 171, 182 (Christchurch; Chatham Inseln); A. N[ewton], Encycl. Brit., 9th ed., III, 1875, p. 742 (New Zealand); Buller, Trans. N. Z. Inst. 8, (1875), May 1876, p. 183 (Akitio (North Island)); Wallace, Geogr. Distr. Anim. I, 1876, p. 451, 452 (New Zealand); Giebel, Thes. Orn. III, 1877, p. 776 (Nov. Zeal.); Buller, Trans. N. Z. Inst. 10 (1877), May 1878, p. 202 (various localities in New Zealand); Gillies, Trans. N. Z. Inst. 10, (1877), May 1878, p. 318 (Otago); Buller, Trans. N. Z. Inst. 11, (1878), May

[1]) Description and figure clearly refer to the nominate race.

1879, p. 371 (New Zealand); Robson, Trans. N. Z. Inst. 11, (1878), May 1879, p. 390 (Okarito District); Reischek, Trans. N. Z. Inst. 14, (1881), May 1882, p. 274 (Chicken Islands, east coast of North Island); Finsch, Ibis (4) 6, 1882 (July), p. 393, 397 (North Island of New Zealand); Buller, Manual Birds N. Z., 1882, p. 12 (New Zealand, Chatham Islands, Australia, and Tasmania); Travers, Trans. N. Z. Inst. 15, (1882), May 1883, p. 179, 187 (New Zealand, Chatham and Auckland Islands); Reischek, Mitth. Orn. Ver. Wien 8, 1884 (June), p. 83 (Hauturu Insel, N. Z.); Finsch, Mitth. Orn. Ver. Wien 8, 1884 (Aug.), p. 122 (Neu-Seeland); Potts, N. Z. Journ. Sc. 2, 1884 (Nov.), p. 280 (New Zealand); Reichenow, Vögel Zool. Gärten II, 1884, p. 360 (Neu-Seeland); Finsch, Vögel der Südsee, 1884, p. 42 (Neu Seeland); Palacký, Die Verbr. d. Vögel, 1885 (after July), p. 121 (Cambellinseln); Hamilton, Trans. N. Z. Inst. 18, (1885), May 1886, p. 125 (Petane, Hawke's Bay); Reischek, Trans. N. Z. Inst. 19, (1886), May 1887, p. 183 (Hauturu Island); Cheeseman, Trans. N. Z. Inst. 20, (1887), May 1888, p. 163 (Sunday and Macaulay Islands (Kermadec Islands)); W. W. Smith, Trans. N. Z. Inst. 21, (1888), May 1889, p. 207, 213 (Lake Brunner District); Sandager, Trans. N. Z. Inst. 22, (1889), May 1890, p. 288 (Mokohinore Islands); Kirk, Trans. N. Z. Inst. 25, (1892), May 1893, p. 263, footnote (New Zealand); Kirk, Trans. N. Z. Inst. 28, (1895), June 1896, p. 8 (New Zealand); Handly, Trans. N. Z. Inst. 28, (1895), June 1896, p. 361 (no locality = Marlborough District); Hutchinson, Trans. N. Z. Inst. 33, (1900), July 1901, p. 215 (Napier, Scinde Island); North, Rec. Austr. Mus. 5, 1904 (22 Dec.), p. 338 (Norfolk Island); Mellor & S. A. White, Emu 12, 1913 (1 Jan.), p. 163 (Flinders Island); Iredale, Trans. N. Z. Inst. 45, (1912), 9 June 1913, p. 80 (New Zealand); Mathews & Iredale, Austral Av. Rec. 4, 1920 (28 July), p. 63 (N. Z.); Bathgate, N. Z. Journ. Sc. Techn. 4, 1922 (Jan.), p. 278 (Otago); Stidolph, Emu 21, 1922 (1 April), p. 292 (near Wellington, N. Z.); Oliver, Emu 22, 1922 (1 July), p. 51 (Little Barrier Island, N. Z.); Sharland & Crane, Emu 22, 1922 (1 Oct.), p. 132 (Hobart, large flocks); Oliver, N. Z. Journ. Sc. Techn. 4, 1922, p. 290 (Little Barrier Island); Ick-Hewins, Emu 22, 1923 (5 Jan.), p. 245 (Selwyn River, Lake Ellesmore, etc., South Island, N. Z.); Stidolph, Emu 22, 1923 (5 Jan.), p. 248 (New Zealand); McGilp & Parsons, Emu 23, 1924 (7 Jan.), p. 204 (Adventure Bay, Tasm.); Stoner, Univ. Iowa Stud. Nat. Hist. 10, 1924 (1 Sept.), p. 269 (Mamaku Brush, Rotorua, Wellington, Auckland); Wilkinson, Emu 24, 1924 (1 Oct.), p. 125 (Tararuas, N. Z.); A. S. Le Souef, Emu 24, 1924 (1 Oct.), p. 153 (New Zealand); Archey & Lindsay, Rec. Canterb. Mus. 2, 1924 (4 Dec.), p. 200 (Chatham Islands: plentiful); Oliver, Journ. Linn. Soc. London, Bot. 47, 1925 (16 Sept.), p. 131 (Tasmania, New Zealand); Hamilton, N. Z. Journ. Sc. Techn. 8, 1925 (Sept.), p. 18 (Hen Island); Moncrieff, N. Z. Birds, [1925], p. 29, 79, also 67 (New Zealand); Stidolph, Emu 25, 1926 (1 Jan.), p. 207 (Wellington, abundant); Dove, Emu 26, 1927 (1 Jan.), p. 228 (West Devonport, Tasm.); Lord, Emu 26, 1927 (1 April), p. 268 (Cox Bight, S.W. Tasm.); Wilkinson, Emu 26, 1927 (1 April), p. 244 (Kapiti Island); Ridley, Dispersal of Plants, 1930, p. 469 (New Zealand); Stresemann in Kükenthal & Krumbach, Handb. Zool. VII (2), Aves, 1931 (10 Sept.), p. 641 (Neuseeland); Bryant, Emu 32, 1933 (2 Jan.), p. 167 (Coles Bay, Freycinet Peninsula, Tasm.); Dove, Emu 32, 1933 (2 Jan.), p. 224 (West Devonport, Tasm.); Mayr, Mitt. Zool. Mus. Berlin 19, 1933 (29 Sept.), p. 321 (die neuseeländische Region); T. W. Taylor, Avicult. Mag. (4) 12, 1934 (Sept.), p. 246-247 (New Zealand); Althofer, Emu 34, 1934 (1 Oct.), p. 111 (Wellington); Guthrie-Smith, Sorrows and Joys of a N. Z. Naturalist, 1936, p. 54 (Nelson Province); Stidolph, Emu 37, 1937 (1 July), p. 5 (Wairarapa, N. Z.); Falla, B. A. N. Z. A. R. E. Rep. (B) 2, 1937 (20 Aug.), p. 24 (Campbell Island); Moncrieff, Emu 37, 1938 (1 Jan.), p. 209 (Nelson Province, N. Z.); Stidolph, Emu 38, 1939 (2 Jan.), p. 355 (Wairarapa District, N. Z.); Fleming, Emu 38, 1939 (1 April), p. 508 (Chatham Islands); J. Gray, Emu 38, 1939 (1 April), p. 449 (Adventure Bay, Tasm.); Turbott, Emu 40, 1940 (Aug.), p. 160, 161 (Taranga, N. Z.); Anonymus, Ann. Rep. N. Z. Orn. Soc. 1939-1940, 1940, p. 21-22 (Dunedin, Auckland) [1]; Various Authors, Ann. Rep. N. Z. Orn. Soc. 1940-1941, 1941, p. 19 (many localities in N. Z).; Wodzicki, Bull. Orn. Soc. N. Z. 2, 1942 (18 May), p. 10 (Taupo district); Wodzicki, Bull. Orn. Soc. N. Z. 3, 1942 (24 Oct.), p. 6 (New Zealand); Various Authors, Bull. Orn. Soc. N. Z. 3, 1942 (24 Oct.), p. 24 (many localities in N. Z.); Fleming, Emu 42, 1943 (April), p. 193-217, pl. 18, 19 (Auckland); Kirk & Wodzicki, N. Z. Bird Notes 1, 1943 (April), p. 16 (Waikane River Estuary); Various Authors, N. Z. Bird Notes 1, 1943 (Sept.), p. 28 (New Zealand); Marples, N. Z. Bird Notes 1, 1944 (April), p. 41-48 (New Zealand); Various Authors, N. Z. Bird Notes 1, 1944 (Dec.), p. 81 (New Zealand); Marples, Emu 44, 1945, p. 277-287 (Dunedin, New Zealand); Cunningham, Emu 45, 1946 (Jan.), p. 212-223 (New Zealand: many localities); Marples, N. Z. Bird Notes 1, Suppl., 1946 (March), p. vii (N. Z.); Various Authors, N. Z. Bird Notes 1, 1946 (1 July), p. 135 (various localities); Wodzicki, Emu 46, 1946 (July), p. 31, 36 (Waikanae Estuary); Cunningham, Emu 46, 1946 (Nov.), p. 209-214, plate 25, 26 (New Zealand); Various Authors, N. Z. Bird Notes 2, 1947 (Jan.), p. 52 (many localities in N. Z.); Turbott, N. Z. Bird Notes 2, 1947 (July), p. 96, 104 (Little Barrier Island); Watt, N. Z. Bird Notes 2, 1947 (July), p. 120 (northern tip of North Island); Middleditch, N. Z. Bird Notes 2, 1947 (Oct.), p. 126 (Cromwell, Otago); Davidson, N. Z. Bird Notes 2, 1947 (Oct.), p. 132 (Leith Valley, Dunedin); Sibson, N. Z. Bird Notes 2, 1947 (Oct.), p. 141 (Little Barrier Island); Anonymus [Dunedin Naturalist's Field Club], N. Z. Bird Notes 2, 1947 (Oct.), p. 146 (Routeburn Valley near Kinloch, N. Z.); Turbott, N. Z. Bird Life, 1947 (Oct.), p. 101, also p. 12, 13 (New Zealand); Powell, Nat. Anim. N. Z., Auckl. Mus. Handb. Zool., 2nd imp., 1947, p. 86-87 (New Zealand); Cunningham & Wodzicki, Emu 47, 1948 (Jan.), p. 193 (Porangahau); Various Authors, N. Z. Bird Notes 2, 1948 (Jan.), p. 172 (many localities in N. Z.); Graham, N. Z. Bird Notes 2, 1948 (April), p. 180 (near Woodbury, South Canterbury, N. Z.); Anonymus [Falla?], N. Z. Bird Notes 2, 1948 (April), p. 183 (Snares Islands); Cunningham, N. Z. Bird Notes 2, 1948 (April), p. 192 (Westmere near Masterton, N. Z.); McKenzie, N. Z. Bird Notes 3, 1948 (July), p. 7 (Little Barrier Island); Stidolph, N. Z. Bird Notes 3, 1948 (July), p. 16 (Kapiti Island); Bell, N. Z. Bird Notes 3, 1948 (July), p. 19 (Inangahua district, N. Z.); Ryder, N. Z. Bird Notes 3, 1948 (July), p. 21 (Kaingaroa Forest, N. Z.); Phillipps & Lindsay, N. Z. Bird Notes 3, 1948 (Oct.), p. 48 (Rotorua district, N. Z.); Falla, N. Z. Bird Notes 3, 1948 (Oct.), p. 55 (Big Solander); Stidolph, N. Z. Bird Notes 3, 1948 (Oct.), p. 65 (Farewell Spit, N. Z.); Turbott, Forest and Bird, no. 90, 1948 (Nov.), p. 8 (Little Barrier Island); Turbott, Rec. Auckl. Inst. & Mus. 3, 1948 (20 Dec.), p. 257, 258 (Little Barrier Island, Hen Island, Three Kings Islands); Turbott & Buddle, Rec. Auckl. Inst. & Mus. 3, 1948 (20 Dec.), p. 333, 336 (Great I., Three Kings); Stead, N. Z. Bird Notes 3, 1948 (Dec.), p. 78 (Snares Islands); Weeks, N. Z. Bird Notes 3, 1949 (Jan.), p. 83 (Whakarewarewa and Kaingaroa forests, N. Z.); Anonymus [Dunedin Naturalists' Field Club], N. Z. Bird Notes 3, 1949 (Jan.), p. 86 (Collin's Valley, Wakatipu, N. Z.); Various Authors, N. Z. Bird Notes 3, 1949 (Jan.), p. 103 (several localities in N. Z.); Hodgkins, N. Z. Bird Notes 3, 1949 (April), p. 118 (Tauranga, N. Z.); N. F. Stidolph, N. Z. Bird Notes 3, 1949 (April), p. 133 (Ohau River, N. Z.); Wall, Tasm. Nat. N. S. 1, 1949 (May), p. 20 (Saltwater River, Tasm.); Dawson & Cresswell, N. Z. Bird Notes 3, 1949 (July), p. 143 (Governor's Bay, Lyttelton Harbour, N. Z.); Sibson, N. Z. Bird Notes 3, 1949 (July), p. 154 (Little Barrier Island); Watters, N. Z. Bird Notes 3, 1949 (July), p. 159 (north-west Otago, N. Z.); Dunckley & Todd, N. Z. Bird Notes 3, 1949 (July), p. 164 (west of Waian River, Southland, N. Z.); Edgar, N. Z. Bird Notes

[1]) Of the reports and bulletins of the Ornithological Society of New Zealand, the 1953 reprint has been used, but the dates and page references are those given for the original cyclostyled issues.

3, 1949 (Oct.), p. 172 (several localities in New Zealand); Stidolph, N. Z. Bird Notes 3, 1949 (Oct.), p. 175 (Tararua and Kiriwhakapapa, N. Z.); Cunningham, N. Z. Bird Notes 3, 1949 (Oct.), p. 177 (Kiriwhakapapa, Tararua Ranges); Sibson, N. Z. Bird Notes 3, 1949 (Oct.), p. 187 (Hen Island); Taylor, N. Z. Bird Notes 3, 1949 (Oct.), p. 194 (Wairuna, south Otago); Moncrieff, Forest and Bird 94, 1949 (Nov.), p. 6 (New Zealand); Phillipps, Rep. sixth N. Z. Sc. Congr., Trans. R. Soc. N. Z. 77, 1949 (Nov.), p. 243 (Martin Bay, N. Z.); Davidson, N. Z. Bird Notes 3, 1950 (Jan.), p. 197 (no locality = Dunedin); Various Authors, N. Z. Bird Notes 3, 1950 (Jan.), p. 218 (many localities in N. Z.); Clark, N. Z. Bird Notes 3, 1950 (April), p. 228 (Big Wanganui River, South Westland); Laird, Zool. Publ. Vict. Univ. Coll. 5, 1950 (31 May), p. 2, 10, 11, 14 (Masterton, New Zealand); Wilson, Emu 50, 1950 (July), p. 45 (Lake St. Clair, Tasm.); Various Authors, Notornis 4, 1951 (Jan.), p. 55 (many localities in New Zealand); Secker, Notornis 4, 1951 (April), p. 65 (no locality = N. Z.); Dawson, Notornis 4, 1951 (Oct.), p. 148 (Stewart Island); Whitten & Salisbury, Austr. Vet. Journ. 27, 1951, p. 291 (Lower Hutt); Bull & Falla in Poole (editor), Prelim. Rep. N. Z.-Am. Fiordland Exp., N. Z. Dept. Sc. Ind. Res. Bull. 103, 1951, p. 90 (Fiordland, N. Z.: in all localities and at all altitudes, from about 20 March on); Sibson, Proc. 10th Int. Orn. Congr. (1950), 1951, p. 323 (New Zealand); de Beaufort, Zoogeography of the Land and Inland Waters, 1951, p. 165 (South Island of New Zealand); Various Authors, Notornis 4, 1952 (Jan.), p. 193 (several localities in New Zealand); Cunningham, Notornis 5, 1952 (July), p. 23 (no locality = New Zealand); Various Authors, Notornis 5, 1953 (Jan.), p. 101 (several localities in New Zealand); Falla, Emu 53, 1953 (Feb.), p. 37 (New Zealand); Sibson, Notornis 5, 1953 (April), p. 113 (Cavalli Islands); Westerskov, Notornis 5, 1953 (April), p. 125 (Matata Bird Sanctuary, Bay of Plenty, N. Z.); G. R. Williams, Ibis 95, 1953 (1 Oct.), p. 680 (New Zealand and surrounding islands); Macdonald, Notornis 5, 1953 (Oct.), p. 195 (Howick, N. Z.); Turbott, Proc. Seventh Pacific Sc. Congr. 4, Zool., 1953, p. 54 (N. Z.: Little Barrier Island, Taranga (Hen Island)); Various Authors, Notornis 5, 1954 (Jan.), p. 236 (several localities in New Zealand); Owen, Ibis 96, 1954 (1 April), p. 303 (N. Z.); Bull, Notornis 6, 1954 (July), p. 17 (Blenheim, N. Z.); Crockett, Notornis 6, 1954 (Oct.), p. 41 (Motunau River, N. Z.); R. V. F. Smith, Forest and Bird 114, 1954 (Nov.), frontispiece (no locality = New Zealand); Andrewartha & Birch, The Distribution and Abundance of Animals, 1954, p. 710 (New Zealand); Mayr in Huxley (editor), Evolution as a Process, 1954, p. 174 (New Zealand); Bell, Notornis 6, 1955 (Jan.), p. 68 (Chatham Island, Pitt Island); Various Authors, Notornis 6, 1955 (Jan.), p. 106 (several localities in New Zealand); Edwards, Notornis 6, 1955 (April), p. 119 (Mayor Island); Bailey, Birds N. Z., Mus. Pictorial no. 11, Denver Museum Nat. Hist., 1955 (20 July), p. 109 (North and South Islands); Bull, Notornis 6, 1955 (July), p. 142 (Mahina Bay, Day's Bay, N. Z.); Oliver, N. Z. Birds, 2nd ed., 1955, p. 385, 496-499, fig., phot. (distribution, particulars); Falla, N. Z. Bird Life Past and Present, Cawthron Lecture Series No. 29, 1955, p. 7 (New Zealand); Various Authors, Notornis 6, 1956 (Jan.), p. 211 (several localities in New Zealand); Penniket, Notornis 7, 1956 (Oct.), p. 60 (Westland, N. Z.); Law & Burstall, A. N. A. R. E. Interim Rep. 14: Macquarie Island, 1956, p. 20 (Macquarie Island); Degerbøl in Bruun, Greve, Mielche & Spärck, Galathea Deep Sea Exp., 1950-1952, 1956, p. 270 (Campbell Island; Engl. transl.); Various Authors, Notornis 7, 1957 (Jan.), p. 87 (several localities in New Zealand); Moreau, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1957 (Feb.), p. 316, 317, 419 (New Zealand); Kinsky, Notornis 7, 1957 (July), p. 135 (New Plymouth, N. Z.; Lower Hutt, N. Z.); Moon, Focus on N. Z. Birds, 1957, p. 21-24, (N. Z. = neighbourhood of Waskworth, some 40 miles north of Auckland); Secker, Emu 58, 1958 (Jan.), p. 70 (Wellington, N. Z.); Various Authors, Notornis 7, 1958 (Jan.), p. 200 (several localities in New Zealand); Cashion, Emu 58, 1958 (22 Sept.), p. 331 (Cat Island, Furneaux Group, Tasmania: **not** breeding); Kinsky, Notornis 8, Suppl., 1958 (Oct.), p. 29 (Lower Hutt, 41° 12′ S, 174° 55' E); G. E. Dawson & E. W. Dawson, Notornis 8, 1958 (Oct.), p. 48 (French Pass); Greenway, Extinct Birds, 1958, p. 91 (Macquarie Island); Sharland, Tasm. Birds, 3rd ed., 1958, p. 136 (Tasmania); Various Authors, Notornis 8, 1959 (Jan.), p. 80 (Clevedon, Moumoukai, Minginui); Ed. [= Sibson], Notornis 8, 1959 (April), p. 124 (no locality = N. Z.); Green, Cat. Tasm. Birds, [1959, about June], p. 28 (Tasmania); Wodzicki & Robertson, N. Z. Dept. Sc. Ind. Res. Bull. 127, 1959, p. 73 (White Island) [Bay of Plenty]; Riney & al., N. Z. Dept. Sc. Ind. Res. Bull. 135, 1959, p. 44 (Lake Monk); Various Authors, Notornis 8, 1960 (Jan.), p. 214 (Clevedon, Minginui); Kinsky, 9th Ann. Rep. Banding Comm. N. Z., 1960 (April), p. 33 (Lower Hutt); Kikkawa, Proc. N. Z. Ecol. Soc. 7, 1960 (April), p. 12, 13 (Dunedin); Longhurst, Avicult. Mag. 66, 1960 (May-June), p. 89-90, pl. (New Zealand); Kinsky, 10th Ann. Rep. Banding Comm. N. Z., 1960 (June), p. 38 (Mahina Bay, Hutt Valley); Kikkawa, Rec. Dominion Mus. 3, 1960 (Aug.), p. 318 (Kapiti Island); Carrick, Austr. Mus. Mag. 13, 1960 (Sept.), p. 227 (Launceston, Tasmania); Secker, Emu 60, 1960 (30 Nov.), p. 284 (Goat Hill, Hutt Valley, N. Z.); Various Authors, Notornis 9, 1960 (Dec.), p. 82 (Clevedon, Minginui, Moerangi, Kaimanawas 3450 ft., Dunedin); Westerskov, Birds Campbell Isl., N. Z. Dept. Int. Aff. Wildlife Pub. 61, 1960, p. 13, 19, 22, 23, 25, 33, 35, 75 (Campbell Island); Mollison, Emu 61, 1961 (March), p. 58, 59 (Mt. Wellington foothills, 800 feet, Tasmania); Kikkawa, Tori 16, 1961 (April), p. 315-327 (Dunedin); Kinsky, 11th Ann. Rep. Banding Comm. N. Z., 1961 (June), p. 12, 33 (Lower Hutt, Upper Hutt, Palmerston North, Gorge Road, Dunedin); Kikkawa, Ibis 103a, 1961 (July), p. 428-442 (Dunedin); Lewis, Notornis 9, 1961 (Sept.), p. 209 (Puketiri, Hawkes Bay, 2000 ft.); Wright, Notornis 9, 1961 (Sept.), p. 210 (Brothers Lighthouse); Various Authors, Notornis 9, 1961 (Dec.), p. 253 (Little Barrier, Cuvier Island, Minginui, Clevedon); Green & Mollison, Emu 61, 1961 (31 Dec.), p. 233 (Port Davey, S. Tasmania); Turbott in Hamilton, Little Barrier Island (Hauturu), 2nd ed., N. Z. Dept. Sci. Ind. Res. Bull. 117, 1961, p. 173 (Little Barrier Island); Gibb, Proc. N. Z. Ecol. Soc. 8, 1961, p. 30, also p. 34, 35 (Kaingaroa Forest, North Island, N. Z.); Turbott, Proc. N. Z. Ecol. Soc. 8, 1961, p. 63 (New Zealand); Bailey & Sorensen, Subantarctic Campbell Isl. (Denver Mus. Nat. Hist. Proc. 10), 1962 (1 Feb.), p. 84, 85, 90, 287 (Campbell Island); Kikkawa, Notornis 9, 1962 (April), p. 280-291, pl. LII (Dunedin); Caughley, Emu 62, 1962 (Aug.), p. 138, also p. 130, 134 (Tutaekuri drainage, Kaweka Range, North Island of New Zealand); Kinsky, 12th Ann. Rep. Banding Comm. N. Z., 1962 (Nov.), p. 11, 32 (Lower Hutt, Upper Hutt, Palmerston North, Gorge Road, Dunedin); Kunkel, Zeitschr. f. Tierpsych. 19, 1962 (late), p. 565, 566, 572 (no locality = Dunedin); Jouanin, Ois. & Rev. Fr. d'Orn. 32, 1962 (late), p. 280-281 (Tahiti); Secker, Emu 62, 1963 (Feb.), p. 263 (the south-west of North Island, New Zealand); (pt.) Anonymus, Bird Bander 1, 1963 (March), p. 72 (banded North Ryde, recovered Rosebery, Tasmania); Gross, Notornis 10, 1963 (March), p. 181 (Kerikeri Inlet, N. Z.); Kikkawa, Emu 63, 1963 (30 April), p. 32-34 (South Island of New Zealand); J. L. Brown, Condor 65, 1963 (27 Nov.), p. 482 (no locality = New Zealand); Green & Macdonald, Emu 63, 1963 (30 Nov.), p. 182 (Black Pyramid, Tasm.); Mayr in Jepsen, Mayr & Simpson, Genetics, Paleontology, and Evolution, Atheneum ed., 1963, p. 288 (New Zealand); Kinsky, 13th Ann. Rep. N. Z. Bird Banding Scheme, 1963 (Dec.), p. 12 (various localities in N. Z.); Bell & Brathwaite, Notornis 10, 1964 (March), p. 380 (Great Barrier and Arid Islands); Gressitt, Pacific Insects Monogr. 7, 1964 (15 July), p. 33 (Campbell Island); Gressitt, Rennell & Wise, Pacific Insects Monogr. 7, 1964 (15 July), p. 516 (Campbell Island); Sorensen, Notornis 11, 1964 (Sept.), p. 80 (Kermadec Islands: Raoul Island, Macauley Island); Moreau in Thomson, New Dict. Birds, 1964 (Nov.), p. 885, 886 (New Zealand, Tasmania, reaching New South Wales); Robertson, 14th Ann. Rep. N. Z. Banding Scheme, 1964 (Nov.), p. 13, 29 (various localities in N. Z.); Skegg, Notornis 11, 1964 (Dec.), p. 175 (Hen and Chicken Islands); Blackburn, Notornis 12, 1965 (March), p. 52 (no locality

= Gisborne, N. Z.); Thomas, Emu 64, 1965 (31 May), p. 227 (various localities in Tasmania); Richdale, Trans. Zool. Soc. London 31, 1965 (Dec.), p. 9 (Whero Island, N. Z.); Blackburn, Notornis 12, 1965 (Dec.), p. 200 (Moki-iti Island off Stewart Island, N. Z.); Mayr in Baker & Stebbins (editors), Genetics of Colonizing Species, 1965, p. 34, 39 (New Zealand, etc.); Wodzicki in Baker & Stebbins (editors), Genetics of Colonizing Species, 1965, p. 436 (New Zealand); Kikkawa, Trans. R. Soc. N. Z., Zool. 7, 1966 (19 Jan.), p. 274 (South Island of New Zealand); Challies, Notornis 13, 1966 (March), p. 25 (Ruahine Ranges, N. Z.); Yaldwin, Austr. Nat. Hist. 15, 1966 (June), p. 186 (New Zealand); Ridpath & Moreau, Ibis 108, 1966 (July), p. 367, also p. 371 (Tasmania); Green, Emu 66, 1966 (Oct.), p. 107 (Antill Ponds, Tasm.); Merton, Notornis 13, 1966 (Dec.), p. 179, also p. 182-183 (Hen Island); Falla, Sibson & Turbott, Field Guide Birds N. Z., 1966, p. 223, pl. 17 fig. 4 (New Zealand, etc.); Keast, Australia, 1966, p. 210, 257, 260 (Society Islands, New Zealand); Blackburn, Notornis 14, 1967 (March), p. 6 (Cuvier Island, N. Z.); Warham, Notornis 14, 1967 (Sept.), p. 137 (Snares Island); Mayr, Austr. Nat. Hist. 15, 1967 (Dec.), p. 372 (New Zealand); Andrew, Notornis 14, 1967 (Dec.), p. 181 (Farewell Spit, N. Z.).

Zosterops; Buller, in N. Z. Exh. 1865, Rep. and Awards, 1866, p. 255 (New-Zealand); Travers, N. Z. Journ. Sc. (N. Iss.) 1, 1891 (Jan.), p. 11 (New Zealand); Beddard, A Text-Book of Zoogeography, 1895, p. 129 (New Zealand); Dove, Emu 6, 1907 (1 Jan.), p. 138-141 (Tasmania); Dove, Emu 28, 1929 (1 April), p. 296 (Cradle Valley, Tasm.); Strang, Avicult. Mag. (4) 13, 1935 (Jan.), p. 32 (no locality = New Plymouth, N. Z.), Falla, B. A. N. Z. A. R. E. Rep. (B) 2, 1937, p. 22, 24 (Macquarie Island); Sorensen, N. Z. Sc. Review 5, 1947 (April), p. 24 (Campbell Island); Delacour, Avicult. Mag. 69, 1963 (Nov.-Dec.), p. 236 (Mount Bruce, N. Z.).

Zosterops caerulescens; Legge, Pap. R. Soc. Tasm. for 1886, 1887, p. 241 (Tasmania); A. J. Campbell, Vict. Nat. 4, 1888 (Jan.), p. 137 (King Island); Buller, Classified List Mr. Silvers Coll. N. Z. Birds, 1888 (after May), p. 22, 67, 81, 83 (New Zealand); A. J. Campbell, Vict. Nat. 5, 1888 (Oct.), p. 83 (northern part of Tasmania); McClymont, Pap. R. Soc. Tasm. for 1887, 1888, p. 112 (Tasman's Peninsula); Buller, Hist. Birds N. Z., 2nd ed., I, 1888, p. 77-84, pl. opp. p. 76 (N. Zealand); Buller, Hist. Birds N. Z., 2nd ed., II, 1888, p. 338 (Kermadec Islands: Raoul); A. J. Campbell, Vict. Nat. 7, 1891 (Jan.), p. 135 (Kent Group); Parker, in Off. Rec. N. Z. and South Sea Exh., Dunedin 1889-90, 1891, p. 140 (New Zealand, Australia); Evans, Ibis (6) 5, 1893, p. 517 (New-Zealand); Forbes, Ibis (6) 5, 1893, p. 525 (Hanson's Bay, Chatham Islands); Meyer & Wiglesworth, Birds Celebes, 1898, p. 489 (New Zealand); Pycroft, Trans. N. Z. Inst. 31, (1898), June 1899, p. 142 (Bay of Islands); Evans, Cambridge Nat. Hist. IX, Birds, 1899, p. 568 (New Zealand); Hartert, Bull. B. O. C. 10, 1900, p. 89 (New Zealand); Hutton, Trans. N. Z. Inst. 33, (1900), July 1901, p. 252 (New Zealand); Lorenz-Liburnau, Ann. Naturh. Hofmus. Wien 17, 1902, p. 310 (Waipu, Waikato); Legge, Pap. R. Soc. Tasm. for 1900-1901, 1902, p. 96 (Tasmania); Hutton, Index Faunae Novae Zealandiae, 1904, p. 28 (New Zealand); Hutton & Drummond, Anim. N. Z., 1904, p. 98, 338, 341 (N. Zealand, Chatham Isl., the Snares, the Auckland Islands, the Campbell Islands); Hutton & Drummond, Anim. N. Z., rev. ed., 1905, p. 93, 332, 335, 369 (New Zealand, Chatham Islands, Auckland Islands, Campbell Islands, and Australia); Buller, Suppl. Birds N. Z., I, March 1905, p. 200 (Wanganui); Buller, Suppl. Birds N. Z. II, 1905, p. 101, 149 (New Zealand); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 416 (type of *Z. dorsalis* in BM); Drummond, Our feathered Immigrants, N. Z. Dept. Agric. Bull. 16, 1907, p. 46 (New Zealand); McLean, Ibis (9) 1, 1907, p. 535 (North Island of New Zealand, some forty or fifty miles inland to the N.N.W. of Poverty Bay); Drummond, Trans. N. Z. Inst. 40, (1907), June 1908, p. 505 (Little Barrier Island: very plentiful); Drummond, Trans. N. Z. Inst. 41, (1908), June 1909, p. 32 (Kapiti Island); Andersen, Trans N. Z. Inst. 41, (1908), June 1909, p. 428 (Stony Bay, Little Akaroa); Cockayne, Rep. Bot. Survey

Stewart Isl., N. Z. Dept. Lands, 1909 (after 1 June), p. 36 (Stewart Island); Hamilton, Hand-List Birds inhabiting N. Z., 1909, p. 16 (no locality = New Zealand); Thomson, A N. Z. Naturalist's Calendar, 1909, p. 39 (Dunedin); Bassett Hull, Proc. Linn. Soc. N. S. W. 34, 1910 (12 March), p. 641, 689 (Norfolk Island); Oliver, Trans. N. Z. Inst. 44, (1911), 1912 (10 June), p. 220 (Norfolk Island), p. 221 (Kermadec Islands: occasional visitor); Iredale, Trans. N. Z. Inst. 45, (1912), 1913 (9 June), p. 91 (Kermadec Islands); Stresemann, Verh. Orn. Ges. Bayern 13, 1917 (20 Sept.), p. 136 (Neu-Seeland); Andersen, Trans. N. Z. Inst. 50, (1917), 1918 (15 July), p. 282 (Kapiti Island); Andersen, Bird-Song and N. Z. Song-Birds, 1926, p. 106 (New Zealand).

Zosterops coerulescens; Cheeseman, Trans. N. Z. Inst. 23, (1890), May 1891, p. 218 (Kermadec Islands: Sunday Island, Macaulay Island: occasional visitant ... not known to breed); Smith, Ibis (6) 5, 1893, p. 517 (near Oamaru, New Zealand); A. J. Campbell, Vict. Nat. 15, 1898 (10 Nov.), p. 82 (New Zealand); Buller, Trans. N. Z. Inst. 31, (1898), June 1899, p. 15 (New Zealand); D. Le Souëf, Vict. Nat. 18, 1902 (April 10), p. 188 (Furneaux Group of Islands, situated in Bass Strait off the N. E. corner of Tasmania); McClymont, Emu 2, 1902 (1 Oct.), p. 97 (Tasmania); Littler, Emu 2, 1903 (1 Jan.), p. 169 (Launceston District); A. G. Campbell, Emu 2, 1903 (1 April), p. 207 (King Island); Anonymus, Emu 3, 1904 (7 Jan.), p. 163 (near Hobart); Fletcher, Emu 4, 1904 (1 July), p. 15 (Wilmot, Tasmania); Hutton, Emu 4, 1905 (5 Jan.), p. 94 (New Zealand); Ogilvie-Grant, Ibis (8) 5, 1905, p. 591 (Snares; Enderby I., Auckland Is.); Dove, Emu 6, 1906 (1 Oct.), p. 53-55 (Tasmania); Le Souëf, Emu 6, 1907 (1 Jan.), p. 87, 105 (Cliffy Island); Fletcher, Emu 7, 1907 (1 July), p. 24 (Wilmot, Tasmania); Maclaine, Emu 7, 1908 (1 April), p. 192 (Clarke Island, Bass Strait); Fletcher, Emu 8, 1908 (1 July), p. 32 (Wilmot District, N. N. W. Tasmania); Drummond, Bird Notes 7, 1909 (Feb.), p. 298 (New Zealand); Littler, Emu 9, 1910 (1 Jan.), p. 148 (Ninth Island, Bass Strait); Iredale, Emu 10, 1910 (1 July), p. 7 (Kermadec Islands); Littler, Handb. Birds Tasm., 1910, p. 52 (Tasmania); Thompson, Emu 11, 1911 (1 July), p. 40 (Tunnel District, Tasmania); M'Lean, Emu 11, 1912 (1 April), p. 223, pl. XXIII (N. Zealand); Hall, Tasm. Field Nat. Cl., Easter Camp-Out, 1912, to Maria Island, 1912, p. 15 (Maria Island, Tasm.); Ick-Hewins, Emu 16, 1917 (15 Jan.), p. 193 (Waiuku district, N. Z.); Dove, Emu 17, 1917 (2 July), p. 54 (no locality = Tasmania); Dove, Emu, 18, 1918 (1 Oct.), p. 134 (West Devonport, Tasm.); Thomson, Naturalisation Anim. Plants N. Z., 1922, p. 161, 511 (New Zealand); Thomson, Trans. N. Z. Inst. 57, 1927 (10 March), p. 106 (New Zealand); Thomson, N. Z. Journ. Sc. Techn. 9, 1927 (May), p. 43 (Dunedin).

Zosterops albigularis; Hull, Proc. Linn. Soc. N. S. W. 34, 1910, p. 641, 690 (Norfolk Island).

Zosterops lateralis tasmanica; Mathews, Austral Av. Rec. 1, 1912 (18 Sept.), p. 103 (Tasmania); Mathews & Iredale, Ibis (10) 1, 1913 (1 July), p. 449 (New Zealand: both islands and outlying groups); Benham, Trans. N. Z. Inst. 46, (1913), 1914 (15 June), p. 196 (New Zealand); C. E. Lord, Descr. List Birds Tasm., 1917, p. 42 (Tasmania); Philpott, Trans. N. Z. Inst. 51, 1919 (1 Sept.), p. 220 (South-western Otago); Mathews, Birds Austr. XI, 1923, p. 153 (Tasmania, (?) Flinders Island); Lord & H. H. Scott, Synops. Vert. Anim. Tasm., 1924, p. 220 (Tasmania); Low, List Vertebr. Anim. Zool. Soc. London, II, Birds, 1929, p. 174 (New Zealand; both islands and outlying groups); Mathews, Syst. Av. Australas. II, 1930, p. 709 (Tasmania); Snouckaert, Alauda (2) 3, 1931, p. 20 (Tasmanie); Mathews, List Birds Australas., 1931, p. 375 (Tasmania); Keast, Gould League Notes (N. S. W.) 24, 1958, p. 11 (Tasmania, New Zealand, Norfolk Island); Boosey, Foreign Bird Keeping, 1959(?), p. 300 (Tasmania); Keast, Some Bush Birds of Austr., 1960, p. 95 (Tasmania); Keast, Bull. M. C. Z. 123, 1961 (March), p. 387, 388 (Tasmania, southern Victoria).

Zosterops cerulescens; Stuart-Sutherland, Emu 22, 1922, p. 59 (Puysegur Point, South Island, N. Z.); Richards, The Chatham Islands, 1952, p. 73-74, phot. (Chathams).

Zosterops westernensis; Ashby, S. Austr. Orn. 8, 1925 (1 Oct.), p. 125 (Tasmania).

Zosterops halmaturina; Oliver, N. Z. Journ. Sc. Techn. 8, 1926 (Dec.), p. 336 (Steward Island); Legge, Emu 27, 1927 (1 July), p. 22 (Sandy Cape, Tasm.); Hope, N. Z. Journ. Sc. Techn. 9, 1927 (Sept.), p. 186 (North Canterbury); C. E. Lord in Giblin, Lewis & Lord, Handb. Tasm., 1927, p. 95 (Tasmania: common); Moncrieff, Emu 28, 1928 (1 Oct.), p. 108 (Taranga, Hen and Chickens Group, N. Z.); Moncrieff, Emu 28, 1929 (1 April), p. 301 (various localities in New Zealand); Dove, Emu 29, 1929 (1 Oct.), p. 90 (apparently Devonport, Tasm.); Stidolph, Emu 31, 1931 (1 July), p. 7, 14 (various localities in New Zealand); Stidolph, Emu 31, 1931 (1 Oct.), p. 139 (Wairarapa Plains); Wilkinson, Emu 31, 1931 (1 Oct.), p. 157-159, pl. 32 (Kapiti Island); E. F. Stead, Life Histories N. Z. Birds, 1932, p. 139, 160, pl. 87-89, also p. 158 (New Zealand); Dove, Emu 32, 1933 (2 Jan.), p. 181 (Devonport, Tasm.); Stidolph, Emu 33, 1933 (1 July), p. 11 (N. Z.); Porter, Avicult. Mag. (4) 13, 1935 (Feb.), p. 37-42 (New Zealand); Mona Gordon, The Children of Tane, 1938, p. 137, 237 (various localities in New Zealand); Various Authors, Ann. Rep. N. Z. Orn. Soc. 1939-40, 1940, p. 17 (many localities in N. Z.); Stead, Bull Orn. Soc. N. Z. 2, 1942, p. 4 (Stewart Island); Sharland, Tasm. Birds, 1945, p. 103 (Tasmania); Sharland, Tasm. Birds, 2nd ed., 1945, p. 103 (Tasmania); Sharland, Tasm. Nat. N. S. 1, 1946 (May), p. 9 (Point Puer area, Tasm.); Ranston, Avicult. Mag. 53, 1947 (Jan.-Feb.), p. 15 (New Zealand, apparently Auckland); Anonymus, Forest and Bird, no. 89, 1948 (Aug.), p. 13, and frontispiece (no locality = New Zealand); Anonymus, N. Z. Birds, 2nd ed., 1948, pl. 18 (New Zealand); A. S. & Amy Wilkinson, Kapiti Bird Sanctuary, 1952, p. 70-72, 149, pl. 8, opp. p. 41 (Kapiti: breeds); Moncrieff, N. Z. Birds, 4th ed., [1955], p. 31, 109, also 81, 132 (New Zealand); Munro, Birds Hawaii, 2nd ed., 1960, p. 171 (New Zealand); Delacour, Avicult. Mag. 69, 1963 (Sept.), p. 198 (Hobart).

Zosterops halmalurina; Sladden & Falla, N. Z. Journ. Sc. Techn. 9, 1928 (Feb.), p. 287 (Alderman Islands).

Zosterops lateralis lateralis; Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 7 (Rangatura or Southeast Island and Round Island, Chatham Group; Norfolk Island); M. Laird, Journ. Parasitol. 45, 1959 (Feb.), p. 48 fig. 3, 50, 51 (Masterton, New Zealand); Mees, Emu 65, 1965 (29 Oct.), p. 99 (Tasmania); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 316 (distribution).

Zosterops lateralis investigator; Mathews, Syst. Av. Australas. II, 1930, p. 710 (New Zealand); Snouckaert, Alauda (2) 3, 1931, p. 20 (New Zealand); Mathews, List Birds Australas., 1931, p. 375 (New Zealand); Hopkinson, Avicult. Mag. (5) 3, 1938 (Oct.), p. 282 (N. Z.).

Zosterops lateralis norfolkensis; Mathews, Syst. Av. Australas. II, 1930, p. 710 (Norfolk Island); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 19 (Ile Norfolk); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 205, 228 (Norfolk Island); Mathews, List Birds Australas., 1931, p. 375 (Norfolk Island); Meise, Proc. 8th Int. Orn. Congr. (1934), 1938, p. 67 (no locality); Mayr, Am. Nat. 74, 1940, p. 271 (Norfolk Isl.); Lack, Ibis 86, 1944 (July), p. 266 (Norfolk I.); Lack, Occ. Pap. Calif. Ac. Sc. 21, 1945, p. 130 (Norfolk Island).

Zosterops tasmanica; Guild, Avicult. Mag. (5) 3, 1938 (Jan.), p. 9 (New Zealand).

Zosterops norfolkensis; Mayr, Systematics and the Origin of Species, 1942, p. 158 (Norfolk Island); G. R. Williams, Ibis 95, 1953, p. 685 (Norfolk Island); Welty, Life of Birds, 1962, p. 494 (Norfolk Island).

Zosterops lateralis norfolkiensis; Mayr, Systematics and the Origin of Species, 1942, p. 173 (Norfolk Island); Mayr, Animal Species and their Evolution, 1963, p. 506 (Norfolk Island).

Zosterops halnaturina; Hodges, Avicult. Mag. 55, 1949, p. 26 (New Zealand).

zosterops lateralis; R. V. F. Smith, Forest and Birds 117, 1955 (Aug.), frontispiece (no locality = New Zealand).

Zosterops lateralis norfolciencis; Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1956, p. 172 (Norfolk Island).

Zosterops literalis; Kikkawa, Proc. N. Z. Ecol. Soc. 7, 1960 (April), p. 13 (Lake McKerrow).

Subspecific characters. A well-marked subspecies, characterised by the dark Buckthorn Brown flanks and the little amount of yellow on the throat: in more typical specimens there is only on the sides of the throat some yellow, the centre of the throat is greyish as are breast and belly, median stripe on belly whitish or pale grey. In some specimens the whole throat can be greenish yellow, but it is never as bright yellow or as well defined as in the other subspecies. In the coloration of throat and flanks this subspecies differs clearly from all other races, except perhaps some dark-flanked individuals of *halmaturina* and the variable populations of the south-east of the Australian mainland. Head and rump Warbler Green, under tail coverts whitish or pale yellow.

Unfeathered parts. Iris brown, bill light horn colour, legs and feet blue-grey (T. P. Austin); iris brown, light brown, or yellowish brown, bill dark and light grey or blackish and blue-grey, legs light grey or light blue-grey (Bell); iris brown, bill greyish and brownish horn, legs pale grey (McCann); iris light brown, bill greyish and brownish horn, legs light greyish horn (Bull). Many other collectors noted about the same colours of the unfeathered parts.

Measurements. Tasmania: wing 9 ♂, 61-63½ (62.17); 7 ♀, 60-63½ (61.79); 17 specimens, 60-63½ (62.09); tail 9 ♂, 42-46 (43.83); 7 ♀, 42-45 (43.07); 17 specimens, 42-46 (43.65); tarsus 17 specimens, 16½-19 (17.62); entire culmen 17 specimens, 12-13 ¾ (13.09); exposed culmen 17 specimens, 9-10 (9.87); culmen from anterior point of nostril, 17 specimens, 6-8 (7.34).

New Zealand: wing 26 ♂, 60-65 (62.56); 9 ♀, 61-65½ (62.28); 36 specimens, 60-65½ (62.44); tail 25 ♂, 43-50 (45.32); 9 ♀, 42-49 (44.44); 35 specimens, 42-50 (45.14); tarsus 33 specimens, 16-18¾ (17.45); entire culmen 33 specimens, 12-14¼ (13.01); exposed culmen 33 specimens, 9¼-10¾ (10.00); culmen from anterior point of nostril 33 specimens, 6½-7¾ (7.31).

Norfolk Island: wing 15 ♂, 61-64 (62.23); 8 ♀, 59-63 (60.88); 25 specimens 59-64 (61.73); tail 15 ♂, 41-45½ (42.73); 8 ♀, 39½-46 (42.69); specimens, 60-65½ (66.44); tail 25 ♂, 43-50 (45.32); 9 ♀, 42-49 (44.44); entire culmen 24 specimens, 12¼-13¾ (13.13); exposed culmen 24 specimens, 9-11¼ (9.82); culmen from anterior point of nostril 24 specimens, 7-8 (7.40).

Australian mainland: wing 18 ♂, 59-63 (61.89); 5 ♀, 60-62 (61.10); 28 specimens, 59-63 (61.77); tail 17 ♂, 42-49 (44.35); 5 ♀, 43½-45½ (44.70); 27 specimens, 41-49 (44.31); tarsus 27 specimens, 16-18¼ (17.19); entire culmen 27 specimens, 11½-14¼ (12.88); exposed culmen 28 specimens, 9-11 (9.75); culmen from anterior point of nostril 27 specimens, 6½-8 (7.29).

Structure. This subspecies has a long 2nd primary; I checked the wing formula of a fair number of specimens, and found invariably 5>2>6. Tail on an average relatively slightly shorter than in the two preceding subspecies, 69-72.2 % (cf. table I).

Weights. Marples (1945) has recorded a great number of weights in different months, which suggest that the mean weight is highest in June and lowest in December; it should be noted, however, that good numbers of birds were weighed from May to September only, when the average weight was found to be in the neighbourhood of 14 g. He also studied the daily variation in weight, and found that the daily fluctuation was about 7%, birds being lightest between 9 and 10 hours in the morning, and gradually increasing in weight until about 17 hours, after which feeding ceased for the day and the weight decreased again.

Walker (1964) and McKean (1965) have recorded weights of birds of the "Tasmanian type", in other words of the nominate race, and compared these with the weights of their local birds (Turramurra and Canberra respectively). That Tasmanian birds proved to be heavier is as one would expect on the basis of their larger linear measurements. What is difficult to understand, however, is that the average weights of these supposed Tasmanian birds are distinctly lower than Marples' weights from New Zealand. Of course it is possible, and even likely, that in the weights given by Walker and McKean a few birds from Victoria, which would average lighter, have been included, and perhaps also the methods of weighing may have been different and may have caused the results to be not fully comparable. My impression is that the figures given by Marples are too high. It would be interesting to have more weights taken in Tasmania.

Weights of specimens collected in winter near Canberra are: ♂ 10½, 12½, 13; ♀ 9½, 10½, 12, 12, 12½ g. Weights of specimens collected in Tasmania are: ♂ 12, 12, 13; ♀ 11½, 12, 12½ g (from specimens in RMNH).

Distribution. As a breeding bird known from Tasmania, islands in the Bass Strait, New Zealand (both main islands and all smaller adjacent islands), outlying islands of New Zealand: The Snares, Auckland and Campbell Islands, Chatham Islands, Norfolk Island. Has been recorded as a straggler from Macquarie Island, and is known from the Kermadec Islands, where its status is not clear: Cheeseman (1888, 1891) recorded it as an occasional visitor only, not known to breed, and Iredale (1910) failed to find it during a visit in 1907 [1]).

This subspecies was introduced in Tahiti from New Zealand in 1937, and appears to be firmly established as recent observations show (Jouanin, 1962).

As a migrant known from South Australia (as far west as Adelaide), Victoria, coastal New South Wales, and southeast Queensland (near Brisbane). This winter range should be compared with the known winter ranges of other Tasmanian birds, for example *Lathamus discolor* (cf. Hindwood & Sharland, 1964, fig. 1) and *Pardalotus s. striatus*. Particulars on migration, and a historical account of the colonisation of New Zealand and outlying islands by the species will be given in the discussion.

First collector. Unknown to me, certainly before 1801.

Figures. Quoy & Gaimard (1830), plate 11 fig. 4 (coloured; for comment on this figure, see Mack, 1932, p. 292). Gould (1837), coloured plate of head only. Buller (1888), plate opp. p. 76 (coloured, on natural size, by Keulemans); M'Lean (1912), plate XXIII (photograph of nest); Sharland (1958) (photograph of incubating bird on a nest in Hydrangea); Longhurst (1960) (attractive coloured plate by C. Talbot-Kelly); Kikkawa (1962), plate LII (photograph); Keast (1966), p. 257 (photograph).

Type. Certainly lost. The type of *dorsalis* is BM no. 1863.7.7.38, the type of *westernensis* does not appear to exist any more (see the discussion on p. 31). The type of *tasmanica* is AMNH no. 701090 (specimen examined).

Moult. See Table II. The non-moulting birds collected from March to

TABLE II

Moult in *Zosterops lateralis lateralis*

month	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
moult			3	2				1[1]	2			1[2]
no moult	2	3	4	21	6	28[3]	14	4	3	1		

[1]) rectrices only.
[2]) secondaries only.
[3]) one of these birds is moulting forehead-feathers, no main moult.

1) Mayr's (1965) statement that *Zosterops lateralis* has "invaded" Macquarie Island and the remark in the Checklist of New Zealand Birds (1953) that the species has "colonised" the island, appear a bit over-optimistic as the only evidence of its occurrence is a single observation in 1915 of "a small bird with greenish plumage and a white ring around the eye" (Falla, 1937). Since in 1944 (Sorensen, 1964) and in 1964 (Edgar, Kinsky & Williams, 1965) no trace of *Z. lateralis* was found on the Kermadec Islands, it is obvious that the species has not become established on these islands.

June and July are all in fresh plumage, which suggests that the main moult takes place in the first three months of the year. This further fits in with what is known of the breeding-season and of migration, the main moult falling just between the two.

Nidification. *Z. l. lateralis* is one of the few members of the family of which anything like a complete life history has been attempted (Fleming, 1943). As regards breeding activities, Fleming found that in 1940 pair formation took place in late August and September, nest building began in the first week of October, and the first eggs appeared in the second week of that month. Breeding was continued to February.

The clutch size is two or three eggs; both sexes participate in incubation, and the minimum period of incubation to hatching is ten days. The fledging period is nine to eleven days (see also Taylor, 1934), or even twelve days (Medway, 1955).

Perhaps there is geographical variation in clutch-size, as on Clarke Island, Bass Strait, the normal clutch has been reported to be four (Maclaine, 1908), and in Tasmania three to four (Sharland, 1958), as against two or three at Auckland, but there is a dearth of published information on this subject, especially from Tasmania. Buller (1888) mentioned a clutch of from three to five, generally the former.

Second broods do occur; intervals between laying of the first successful and second clutch varied, in the cases examined by Fleming, from 47 to 60 days.

Measurements of eggs from New Zealand according to Oliver (1955): 18 × 13, 17.5 × 13.5, 17.8 × 13.4 and 16.8 × 13.2 mm. On Norfolk Island Hull (1910) recorded the following measurements: 19.3 × 15.2, 18.8 × 15.0, 20.1 × 15.0, 19.6 × 14.2, 18.5 × 15.0, 18.0 × 13.7 (calculated from inches). These measurements are distinctly larger than Oliver's, but the clutch of "*Z. albigularis*" in the Orton Collection, measured for me by Dr. G. M. Storr, is 17.3 × 12.3 and 16.8 × 12.2 (see p. 120), and this suggests that a slight error in measuring is responsible for Hull's rather large figures. A clutch of three from Tasmania measured 17.5-18.5 × 13 (Mathews, 1912).

Habits, etc. Similar to those of the two preceding subspecies. On a number of occasions I have seen birds on the ground, sometimes for lengthy periods, where they move about by hopping.

Winter flocks form in March, and tend to break up late August or early September, at the beginning of the breeding-season (Cunningham, 1946). Social behaviour in flocks has been studied by Kikkawa (1963) who established the existence of a pecking hierarchy.

Food includes the usual variety of animal and vegetable matter. As food

I can mention apples, lemons, berries of *Solanum mauritianum* and *Olea* sp. [1] (own observations), *Cotoneaster microphylla* (Potts, 1870), *Pittosporum tenuifolium, P. eugenoides, Coprosma lucida, Carpodetus serratus, Nothopanax colensoi, Pseudopanax crassifolium, Melicytus ramiflorus* (Oliver, 1955, ex McCaskill), *Coprosma ciliata, Hymenanthera dentata* (Riney & al., 1959), *Rubus australis, Solanum nigrum* (Ridley, 1930), *Loranthus micranthus* (Tily in Various Authors, 1948), *Cotoneaster sorotina, Coprosma pittosporum* (M. G. in Various Authors, 1941), etc.

In New Zealand the birds have a reputation as destroyers of the "American Blight" (*Schizoneura lanigera*), an aphid, and this has given them the name of "Blight Bird". See also Chisholm (1910).

Feeding on nectar was recorded by Powell (1947), Sibson (1950), Blundell in Various Authors (1960) and Falla, Sibson & Turbott (1966). Powell mentioned a partiality for the nectar of a *Homalanthus*.

Evidence from New Zealand is that the birds will eat almost anything: grass-seed (N. Macdonald in Various Authors, 1953), bread, meat and fat (Hodgkins, 1949; Penniket, 1956), which may be taken off carcasses (Watters in Various Authors, 1944; Cartwright, 1954).

On Norfolk Island, I saw individuals eat olives on several occasions. Invariably they would pierce the skin with their bills, and peck away the flesh from around the stone by little mouthfuls, in the hanging fruit; apparently these olives, of about 6 mm diameter, are too large to be swallowed whole (compare p. 72 and 121).

On Norfolk Island, where most of my observations on this subspecies were made (though I know it also from New Zealand and New South Wales), it occurs in all types of habitat, wherever there are trees and shrubs, but has a definite preference for the more open types of vegetation, and is not often seen in forest, where, on the other hand, *Z. tenuirostris* is a dominant species. Thus, there is a certain degree of ecological segregation between the two species.

Hartert (1900) recorded an aberrant specimen with a canary-yellow nape band, and Welch & al. (1943) observed a partial albino.

Laird (1950) mentioned infection with a *Toxoplasma* species, which he later ascribed to *Atoxoplasma paddae* (cf. Laird, 1959).

There are records of this subspecies being parasitized upon by *Chalcites l. lucidus* in New Zealand, but it appears to be but an infrequent host, though some observations indicate that a young cuckoo can be successfully

---

1) The "Wild Olive" of Norfolk Island; it has now been identified as *Olea africana* (see Turner, Smithers & Hoogland, Conserv. Norfolk Isl., 1968, p. 37).

reared (Buller, 1888, 1905). In Tasmania, Dove (1916) mentioned an egg of *Cuculus pallidus* in the nest of a silvereye. Stidolph (1949) found a chick of *Eudynamys taitensis* in a *Zosterops*-nest; a few days later the chick had dropped through the bottom of the nest, which had proved not strong enough to hold a bird of that size. Stidolph commented: "I cannot imagine any circumstances in which a silver-eye's nest could hold a long-tailed cuckoo chick until it had reached the flying stage". Even though eggs and young of *Eudynamys* [1]) have been found in *Zosterops*-nests on several occasions, it is apparent that for the purely mechanical reason of nest-construction, no satisfactory host-parasite relation can be established.

There are some unexpected natural enemies: Buller (1905) recorded an occasion of a silvereye being eaten by a *Botaurus poecilopterus*, and there are two records (Clark, 1950; Penniket, 1956) of *Egretta alba* having developed a technique for seizing and swallowing silvereyes. Drummond (1908, 1909) gave a description of how the birds were processed for consumption by Maoris, a point previously mentioned by Buller (1878).

Voice. The three calls described under *Z. l. gouldi*: contact-call, searching-call and call of alarm and agitation, are also used by *Z. l. lateralis*; see further Fleming (1943), and Falla, Sibson & Turbott (1966).

The ordinary song is very similar to that of *gouldi* but gave me an impression of being perhaps slightly richer, more varied. Without mechanical recording, of course, such a subjective impression does not mean much. I have also heard the subdued song, soft and varied. There are some lyric appreciations of the song in literature, for example by Hutton & Drummond (1905), and an attempt to put it in notes was made by Andersen (1926).

Migration. The occurrence of two distinct types of plumage in the Sydney area, as we now know caused by the fact that migrants of the nominate race

---

1) This generic name, though originally spelled *Eudynamys*, has been almost universally emended to *Eudynamis* until Peters (1937) resurrected the original spelling. From that date confusion reigns. Consulting the original publication (Vigors & Horsfield, 1826 or 1827) I found that though the spelling as it appears is *Eudynamys*, the derivation given in a footnote reads: Eὖ *bene*, and δύναμις *potentia*. This would suggest that the spelling *Eudynamys* is unintentional, a mere misprint that can be automatically corrected to *Eudynamis* under article 32a (ii) of the Code (Stoll & al., 1961, p. 34-35). This article, however, is ambiguous as it will often be impossible to ascertain if a spelling is a misprint (that can be emended) or an incorrect transliteration (that can not be corrected). Fortunately it has been possible to solve this problem. In Sophia Raffles' Memoir (1830) a list of birds appears anonymously, but the authorship of this list is with good reason ascribed to Vigors & Horsfield. In this list the spelling *Eudynamys* has been maintained, and in my opinion this shows convincingly that its authors intended it to be so.

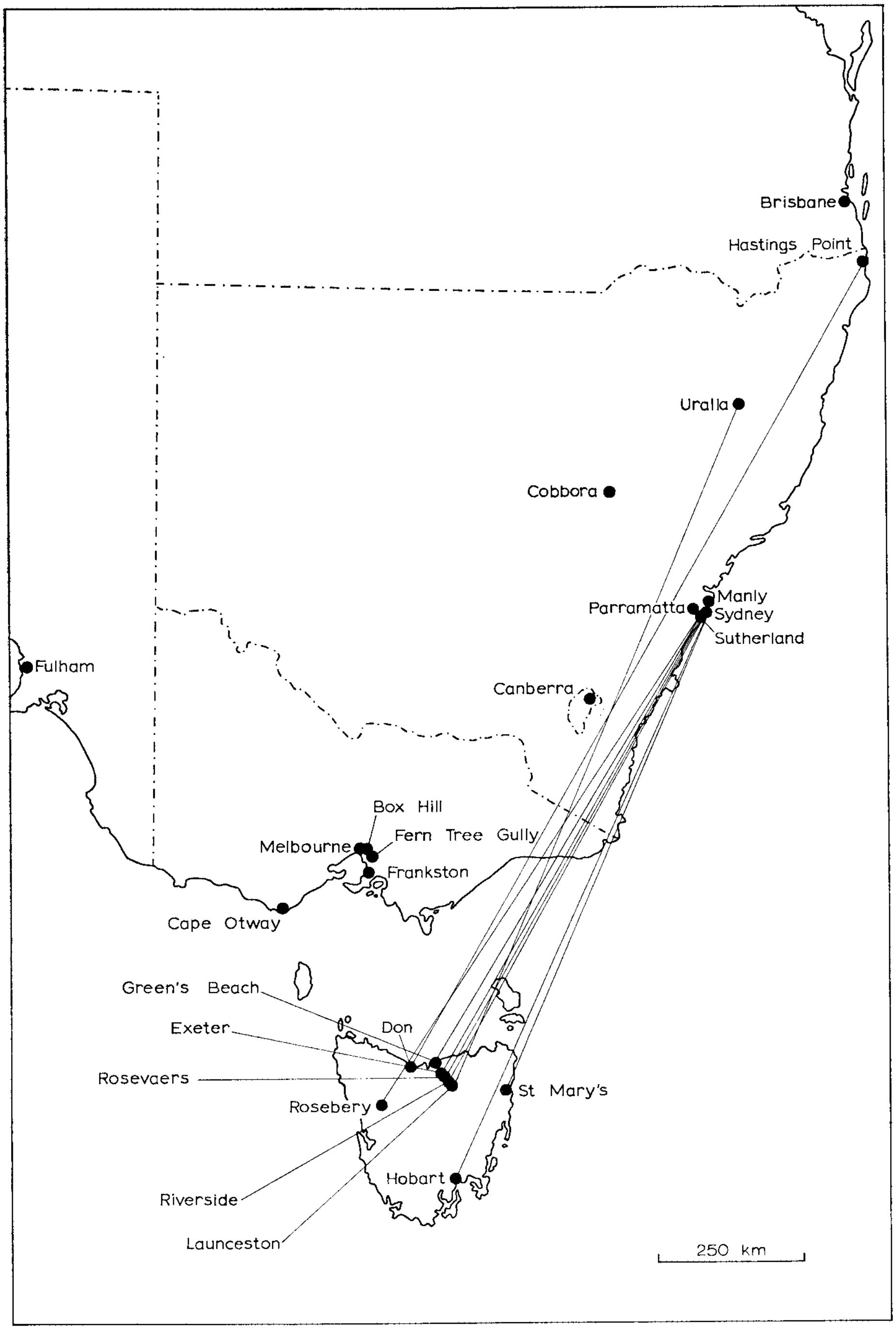


Fig. 6. The breeding range (Tasmania, perhaps occasionally southern Victoria) and winter range (other localities) of *Zosterops lateralis lateralis*. Lines connect places of ringing and recovery.

augment and outnumber the local breeding race in winter, has for a long time puzzled ornithologists. The first to attempt a solution was North (1896), who made the observation that in summer one type of plumage occurred, while in winter the other plumage predominated. It was a logical conclusion to draw that the birds have a summer and a winter plumage, and for some thirty years ornithologists were satisfied. Ashby (1925), however, called North's observations inconclusive, though he still regarded "deep tawny-buff" coloration of the flanks as a winter plumage. He differed from earlier revisers in that he recognized, on the basis of plumage characters, two distinct species in south-eastern Australia. Though E. C. Chisholm (1926) still supported the theory of seasonal variation, and even stated to have observed it in captive specimens, he mentioned that an individual held in captivity by him for fifteen months changed neither the colour of its throat, nor that of its flanks. Subsequently Mack (1932) rejected the theory altogether, stating that in south-eastern Australia there are two plumage-phases, "irrespective of sex or season". A. G. Campbell (1932) and even Hindwood & McGill (1958), on the other hand, still adhered to North's theory, and the opinion that there are a summer and a winter plumage was not definitely disproved until Keast (1953, 1958) commenced publication of his investigations.

It has since become common knowledge that the Tasmanian population is partially migratory and that great numbers winter in the environments of Sydney. As the nominate race, on the basis of plumage characters, is easily distinguished from the resident form, its winter range can be plotted from material in collections, as has been done in fig. 6. This shows that the nominate race occurs as a migrant at least as far north as Brisbane. The greatest concentration of records is at Sydney, but this probably reflects the presence of a great human population, providing good chances of recovery and preservation. On the other hand my own, few, winter observations in the neighbourhood of Sydney (near my parents' home at Normanhurst) indicate that in that season *Z. l. lateralis* is plentiful and greatly outnumbers the resident race. This has also been noted by other observers, and the fact that Bradley (1963) never saw large numbers of the nominate race in his garden in Sydney, must be due to purely local circumstances.

Museum material assists also in obtaining a general idea of the period *Z. l. lateralis* stays in its winter quarters, though, of course, exact dates of arrival and departure cannot be obtained from such specimens, collected in a haphazard way.

Little is known of the actual migration, but the fact that in the morning of 17 April 1906 forty specimens were picked up after striking the lighthouse of Cliffy Head, Bass Strait, out in sea east of Wilson's Promontory (Le Souëf, 1907), points to *Z. lateralis* being, like so many other small Passerine birds, a night migrant. This is confirmed by McNamara (1948), who recorded that in the Illawarra district during early April vast numbers pass over at night, travelling northwards, and by McKean (1963), whilst Dove's (1933) observations are also indicative of night migration. On the other hand, Liddy (1966) saw day migration in the extreme north-east corner of New South Wales. It is a pity that, after this early start, the study of migration at the lighthouses of the Bass Strait area has not been continued. Where this evidence of migration has been available for so many years it is surprising to read that "great excitement" was occasioned by the recovery of ".... a N. S. W. banded Silvereye at Rosevaers [in 1960]. Prior to this recovery it had not been suspected that this species was partially migratory" (Thomas, 1966).

The fact that in winter the migrant race outnumbers the resident race in Sydney certainly indicates the abundance of the former, but the difference may well be accentuated by the local breeding birds migrating away to places farther north. As breeding birds from Sydney are morphologically indistinguishable from birds from, say, Brisbane, only ringing of certain breeding birds could bring certainty.

The Australian ringing scheme, including mass-ringing of *Z. lateralis*, was initiated less than ten years ago, and interesting recoveries have only been made over the past five or six years. Many more may confidently be expected in the near future. A fortunate circumstance is that, through the large-scale ringing operations going on at various places, birds have been trapped and released alive on several occasions, so that more information concerning these individuals may be forthcoming later on.

The following recoveries of certain Tasmanian birds have been recorded at the time of writing:

Recoveries of Tasmanian birds

Ring no.		date	locality	distance in miles
010-06887	ringed	20-VI-1959	Lane Cove, N.S.W.	
	retrapped	7-VII-1959	same place	
	„	30-VII-1959	same place	
	„	5-VIII-1959	same place	
	„	21-VIII-1959	same place	
	killed by cat	19-I-1960	Rosevears, 10 m NNW of Launceston, Tasm.	570 SW
010-34267	ringed	9-VII-1961	Cartwright Point, Hobart, Tasm.	
	retrapped	9-VIII-1962	Eastwood, Sydney, N.S.W.	670 NNE

010-09570	ringed	17-VIII-1961	Green's Beach, Launceston, Tasm.	
	retrapped	18-VIII-1962	Eastwood, Sydney, N.S.W.	570 NNE
010-10425	ringed	2-VIII-1959	North Ryde, Sydney, N.S.W.	
	retrapped	26-V-1962	same place	640 SSW
	found dead	12-XI-1962	Rosebery, Tasm.	
010-67681	ringed	31-III-1963	Riverside, Tasm.	570 NNE
	retrapped	10-VIII-1963	Turramurra, N.S.W.	
010-43261	ringed	16-VI-1963	Sutherland, N.S.W.	560 SSW
	recovered	17-VI-1964	Exeter, Tasm.	
010-78709	ringed	20-V-1964	Pendle Hill, Sydney, N.S.W.	
	retrapped	22-V-1964	same place	
	"	4-VI-1964	same place	
	found dead	ca. 25-XI-1964	St. Mary's, Tasm.	560 SSW
010-12230	ringed	8-VII-1963	Launceston, Tasm.	
	recovered	10-IX-1965	Uralla, N.S.W.	800 NNE
011-13608	ringed	3-VII-1965	Hastings Point, N.S.W.	
	recovered	14-V-1966	Don near Devonport, Tasm.	995 SSW

The longest-distance recovery to date is Hastings Point-Don, 995 miles, but as *Z. l. lateralis* occurs as a fairly common winter visitor in the neighbourhood of Brisbane, this is not nearly a maximum distance for the normal migration.

Even these few recoveries raise more fundamental questions than they solve. It has always been known that a number of individuals of *Z. l. lateralis* stays in Tasmania throughout the winter, and does not participate in the migration. Originally my opinion was that this could be explained by assuming that the strength of the instinct to migrate showed a great individual variation, some individuals migrating far, others a shorter distance, and still others not at all. This hypothesis, however, is effectively refuted by the ring-finds. No. 010-34267 was ringed in southern Tasmania in mid-winter, yet, the next winter it was in Sydney; no. 010-09570 was ringed in winter in Tasmania, and was retrapped a year later on almost exactly the same date in Sydney. To no. 010-12230 the same pertains even though there is not the striking closeness of the dates. The recoveries listed this far would give food to the hypothesis that young birds tend to spend the winter in Tasmania, and older birds migrate, but this is contradicted by no. 010-43261 which was ringed in winter in Sutherland, and recovered in Tasmania a year later on almost the same date.

A second interesting point already emerging is that of fixed winter quarters: no. 010-10425, obviously a Tasmanian bird, was ringed in North Ryde in 1959, and retrapped on the same place three years later. Though a bird on migration will fly eight hundred or a thousand miles, once it arrives in its winter quarter it stays there the whole winter (no. 010-06887) and may return in later years (no. 010-10425), see also Lane (1962). How this can be reconciled with the evidence brought forward in the preceding paragraph, that a bird may one year migrate, and another year stay in Tasmania, I do not understand.

Another point that needs investigation is whether Victoria is also part of the winter range, or the birds only migrate through it, and the relative importance of the various parts of the winter range.

It is perhaps surprising that no clear pattern of migration appears to have developed in New Zealand as the southern half of South Island lies well south of Tasmania, and New Zealand must have been colonised by birds that had the instinct of migration. Though migration has been suspected (Philpott, 1919; Sibson, 1951) I am not aware that this has been confirmed in recent years. Perhaps the fact that the whole of New Zealand has been settled by the species, so that the northern localities that would be good wintering grounds do already carry a dense population, may be of some significance, especially as there are indications that in the early years, before the North Island had been colonised, there were migratory movements. The speed with which the outlying islands of New Zealand have been settled indicates also a considerable degree of mobility. At present we can only say that the factors that induce partial migration in Tasmania apparently fail to operate in a similar manner in New Zealand.

The history of the colonisation of New Zealand by *Zosterops l. lateralis* is one of the classics of ornithological literature, and is found in practically every text-book dealing with dispersal and zoogeography. Unfortunately, in a majority of books the matter has been simplified to the extent that it is stated that *Z. lateralis* has colonised New Zealand, flying across the Tasman Sea, in 1856. Actually the case is not nearly as well-documented as that. An excellent summary of everything known of the species' history in New Zealand is given in Buller's (1888) work. From this it appears evident that on the North Island of New Zealand the species was, indeed, not seen before 1856, but for the South Island the matter is not that clear, records from there, some of them perhaps of doubtful value, going back to 1832. This is so near the beginning of European colonisation, that no exact information can exist. Buller, in the work referred to, concluded that the species had probably always, anyway for a long time, been present in the South Island, before invading North Island.

Personally, I do subscribe to the theory of recent colonisation. My own interpretation of the facts is that about 1830 some migrating flocks of *Z. l. lateralis* did reach the South Island, commenced breeding and building up numbers, and then, being migratory in habits, first visited the North Island in strength in the winter of 1856, and again in 1858, subsequently rapidly colonising the whole country until Auckland was reached in 1865. All early and first records from North Island are of flocks seen in winter. Buller thought that: "This tendency of migration *northwards* appears to me quite inconsistent with the idea of the species having come to us from Australia", but he, naturally, was not yet aware that the Tasmanian subspecies, to which the New Zealand birds belong, is normally migratory, and notwithstanding the fact that the history of colonisation of New Zealand is not as well documented as suggested in many publications, I believe that it has happened essentially as nowadays is generally accepted.

On the Chatham Islands the species was first noted in 1856 or 1857 (Thomson, 1922), or perhaps only in 1865 (Richards, 1952), Norfolk Island was settled in 1904 (North, 1904), and Campbell Island before 1874 (Filhol, non vidi, teste Bailey & Sorensen, 1962).

Discussion. It has repeatedly been suggested that birds inhabiting respectively Tasmania, New Zealand and Norfolk Island show differences. Mathews even went so far as to give separate names to each, and one of his names, *norfolkensis* for the birds from Norfolk Island, has found acceptance in a good proportion of subsequent literature. The type of *norfolkensis* is a bird collected in April 1913, and since *Z. lateralis* was first seen on Norfolk Island in December 1904, this would imply subspecies formation in less than nine years (quite apart from the possibility that new colonists had arrived in subsequent years and that the type might have been several years of age when collected). Even believers in very fast subspecies formation would not consider that less than nine years suffice to produce morphological differentiation enough to justify a subspecific name.

When the name *investigator* was bestowed by Mathews (1923) on a New Zealand specimen, the birds inhabiting that country had been there for about ninety years at most. I would not have bothered discussing the name, which has not been accepted by any other worker, if Ridpath & Moreau (1966, p. 371) had not quoted Kikkawa's opinion that there are slight but significant differences, presumably eidonomical differences, between the populations of New Zealand and Tasmania. Personally I have been unable to find any difference between birds of these countries, neither do birds collected a century ago (in New Zealand) differ from recent material. Of course I do not preclude the possibility that very large series in identical condition of plumage could reveal subtle differences, but such series were not available to me and since I am not aware that they exist in collections I wonder what the opinion quoted by Ridpath & Moreau was based upon, especially in view of the known, not inconsiderable, individual variation (cf. Marples, 1945, p. 283).

4. **Zosterops lateralis familiaris** subspecies nova

Subspecific characters. In general appearance close to the nominate race but flanks very much paler, pale buffish; throat Lemon Yellow to Lemon Chrome, which colour is clearly demarcated from the greyish white upper breast; under tail coverts pale yellow. Differs from *halmaturina* by the bright yellow throat and less greyish breast, and from *ramsayi* by its paler yellow under tail coverts; from both these subspecies also by larger average size; from the nominate race by slightly smaller average size.

Unfeathered parts. Iris dark brown, bill bluish black, legs dark sepia-brown, digits grey (Henry: Emu Vale near Warwick, Queensland); iris light brown (Keast: Manly, N.S.W.); iris light hazel, bill dark horn, base of mandible light slate, legs light slate (Mellor: Gosford, N.S.W.); iris brown, bill light slate blue, legs grey blue (Schrader: Tweed River); iris pale brown, bill brownish, paler below, legs greyish brown (Cleland: Sydney).

Measurements. Wing 27 ♂, 58-63 (60.80); 18 ♀, 57-63½ (60.17); 45 specimens, 57-63½ (60.54); tail 27 ♂, 39-44 (41.57); 18 ♀, 38-44 (40.81); 45 specimens, 38-44 (41.27); tarsus 42 specimens, 15¼-18 (16.62); entire culmen 43 specimens 11½-14 (12.84); exposed culmen 43 specimens, 9¼-10¾ (9.77); culmen from anterior point of nostril 43 specimens, 6½-8 (7.22).

Structure. Wing-formula usually $5>2>6>7$, but frequently $5>6>2>7$.

Weights. At Turramurra, Walker (1964) recorded a mean weight of 11.5 g in 43 birds of this subspecies.

Distribution. South-eastern Australia: Queensland, New South Wales and Victoria. In Queensland confined to the south-eastern part of the state, north to about Mackay, where smooth intergradation with *ramsayi* occurs, west to Springsure (Broadbent, 1888), and the Carnarvon Ranges (Warham, 1960). I have not examined material from farther inland than Chinchilla and do not know what the status of the birds inland is.

In New South Wales widely distributed in the eastern part of the state, but apparently uncommon on the New England Plateau (Norton, 1922) and not found west of the Australian Alps. South of Sydney, especially inland (Canberra) the birds are paler, and show an approach to *halmaturina* and the nominate race. These intermediate populations, which cannot well be included in any subspecies, will be discussed separately.

In Victoria birds which are nearest to this race, though usually rather paler, are well distributed in the eastern half of the state, intergrading with *halmaturina* in a broad area round, and particularly east of, Melbourne (Selby, Sassafras).

First collector. Unknown. This bird must have been familiar to the first colonists but as I have shown on a previous page, the earliest descriptions of the species in the Sydney area pertain to the nominate race. The first definite reference is Swainson's (1822-23). Another certain reference to this subspecies is by Vigors & Horsfield (1827), who mention that Mr. Caley found it nesting in his garden in Parramatta. There is no evidence that Mr. Caley collected and preserved any specimens. The oldest specimen I have seen is one in Leiden, dating from Temminck's time (before 1858), but unfortunately merely labelled: "Australie", without date or name of collector. There may be more old specimens in other museums, but during my visits to foreign museums I have usually studied properly labelled material rather than very old specimens.

Figures. Swainson (1822-23), plate 165 (coloured, for its time quite meritorious, but far too much yellow on the cheeks); Froggatt (1914), p. 291 (an attractive coloured plate of two birds with a nest); Keast's (1958, p. 10, 12) photographs would also refer to this subspecies. Curiously, I have been unable to trace any other good illustration pertaining with certainty to it.

Type. ♂, September 1891, Manly north of Sydney, RMNH cat. no. 11.

Moult. Specimens collected in January (2), March (1), April (3), May (2), June (3), August (4), September (5), October (2), and November (4) do not show moult. The March bird is in strongly abraded plumage. Specimens collected in March (1) and May (1) are undergoing their main moult. Though this material does not supply good evidence, there is little doubt that the subspecies, like related forms, has its main moult in autumn. According to Keast (1953) daylength is the main factor regulating moult.

Note. Where records of food and habits are concerned it was obviously impossible to separate this subspecies from *lateralis*, and I have also found it impractical to separate breeding records of this subspecies from the intermediate birds of extreme south-eastern Australia, which in turn are continuous with *halmaturina*. Therefore under the heading Nidification, records from the range of the intermediate birds, right down to Victoria and the neighbourhood of Melbourne have been included. The same pertains to the sections on food and habits, except that there the nominate race may also have been included. Since there is no evidence of any differences in food and habits of these subspecies, and it is unlikely that any exist, the matter appears to be of no great importance.

Nidification. Like the previous subspecies, birds from Victoria and New South Wales nest in spring. In Victoria the main nesting months are from October to December. Chisholm (1908) once found a nest as early as August, and another in January, and Purnell & al. (1894), found a nest with eggs on 7 January. Hall (1898) mentioned callow young as late as February. In Canberra breeding takes place from the beginning of November until late February [1]). North's (1907) notes refer presumably to the neighbourhood of Sydney, N.S.W. He lists October, November and December as the main breeding months, and mentions having personally found fresh eggs from 5 September to 3 January. In Queensland the nesting is said to be in springtime (Filmer, 1946; Lord, 1956), though Lord mentions an exceptional case of a nest containing young in May.

At present there does not appear to be any evidence of a difference in breeding season between the southern (Victoria) and the northern (Queensland) part of the range, but information is still insufficient, especially from northern New South Wales and Queensland.

The clutch-size is three, less often four.

Habits, etc. Similar to the preceding subspecies.

As food the usual variety of insects, fruits, berries and nectar has been recorded. Berries and fruits include: blackberries (McNamara, 1937), wild figs (Weatherill, 1911), *Schinus molle* (Lowe, 1959), *Pittosporum undulatum* (Cooper, 1959), *Loranthus cambagei* (Blakely, 1923), *Phytolacca octandra* (Hamilton, 1919; Cleland, 1911), *Lantana* (De Warren, 1919), grapes, figs and cherries (French, 1905). A long list was given by Gannon (1936), but it appears not quite certain that all plants listed were actually eaten by *Zosterops*. Lowe (1959) mentioned that he took two seeds of *Schinus molle* from the stomach of a silvereye, which measured 3 × 4 × 5 mm, interesting in view of my observation that olives are not swallowed (cf. p. 62).

Nectar feeding was recorded by Blakely (1925) on flowers of *Loranthus vitellinus*, by Lawrence (1961) on *Banksia*, and by Gilbert (1939) who did not state which species of plant was involved. Gilbert (1939) also mentioned consumption of pollen, wiped from the anthers of various flowers with the tongue. Cleland (1911) found some stomachs full with small flowers of *Leucopogon*, and Lawrence (1961) observed that the petals of *Feijoa sellowiana* are eaten. This suggests that flowers are more than a casual food.

Insects as food were mentioned by Cleland (1911) and other authors.

E. C. Chisholm (1926) recorded an albino shot at Ashfield near Sydney in January 1912. From the date of collecting one may deduce that it belonged to this subspecies.

---

1) See: A Field-List of the Birds of Canberra and District, 1966.

Parasites. A tape-worm, *Zosteropicola clelandi* Johnston (1912) was described from *Z. lateralis* in the neighbourhood of Sydney. There is also a record of a protozoön *Haemoproteus* sp. The only external parasites hitherto recorded are the nasal mite *Ptilonyssus ruandae,* found in a bird from Brisbane (Domrow, 1964) and the feather mite *Anhemialges gracillimus* (Bonnet, 1924). As disease tuberculosis has been recorded (Marples, 1945).

Migration. It appears very likely that birds from the southern part of the range of this subspecies as well as the mixed birds from Victoria are migratory, but as yet there is no satisfactory evidence. The fact that in the neighbourhood of Sydney in winter the nominate race is more common than *familiaris* perhaps suggests that individuals of the latter migrate away, but there is no proof of this. The ringing results of the Australian mainland are discussed further down (p. 78-79).

Silvereyes in south-eastern Australia, like elsewhere, are sometimes parasitised by cuckoos. North (1907, p. 212) found a nest containing two eggs of *Z. lateralis* and one of *Chalcites basalis* at the Yarra River near Melbourne. The H. L. White collection contains two eggs of *Chalcites basalis* taken with two eggs of *Zosterops* at Chatwoods, Sydney, 13-X-1907, by S. W. Jackson. The H. L. White collection also contains an egg of *Chalcites lucidus plagosus,* taken with three eggs of *Z. lateralis* at Enfield, Sydney, 12-XI-1900, by H. Keane; an egg of *Cacomantis pyrrhophanus prionurus* taken with two of *Z. lateralis* at Stawell, Victoria, 23-XI-1915, by H. Simpson, and an egg of *Cuculus pallidus* taken with two eggs of *Z. lateralis* at Swing Bridge, Thompson River, Sale, Victoria, 21-X-1914, by J. Kelsey. I have examined an egg of *Chalcites lucidus plagosus,* taken with two of *Z. lateralis* (one of which is now missing) at Dandenong, Victoria, 11-XI-1925 (RMNH no. 11385).

There is an observation of a silvereye feeding a young *Cuculus pallidus* (Steel, 1918), but as several other small birds participated in feeding, there is no evidence that the silvereye was its foster-parent. Even though four species of cuckoo are known to parasitise it, I do not believe that *Z. lateralis* in south-eastern Australia is more than an infrequent host of any of them.

Some unusual predators are known. Hall (1900) took advantage of the fear silvereyes have of butcher-birds, by placing two individuals of *Cracticus torquatus* in his orchard to keep them off his grapes; a similar experiment was made in Western Australia (Newman, 1929: see under *Z. l. gouldi).*

Gosper (1956) recorded an observation of an *Eudynamys scolopacea* swallowing a silvereye.

Not because of its great scientific interest, but because of the remarkable way it has become entrenched in literature, do I mention MacLeay's incidental observation of a fledgling *Zosterops* which had become enmeshed in the web of a spider (supposedly an *Epeira*). The story began when Shuckard (in Swainson & Shuckard, 1840, or 1841?) quoted a personal letter from MacLeay. This was followed by MacLeay's (1842) description of how he saw a young of *Zosterops lateralis*, evidently only just from the nest, hanging in the web of a spider, apparently having been dead for two or three days. The spider was thought to be in the act of sucking its juices. MacLeay definitely stated that he regarded this as a great exception and that birds are certainly not a normal food for these spiders. Since, however, the idea of bird-catching spiders has fascinated and horrified man for centuries, it is not surprising that MacLeay's observation has been mentioned many times in later literature: by Rainbow (1895), Stead (1899), Berland (1932), and McKeown (1943). Rainbow already stated that spiders (in Australia) do not catch birds on purpose and do not eat them, though they will kill them.

Voice. The song of this subspecies is similar to that of the nominate race; for a description I refer to Tryon (1908) and Hartshorne (1953). Barker (1910) drew attention to its mimetic powers.

Intermediate populations of South-Eastern Australia. The populations breeding in central and north-eastern Victoria, adjacent New South Wales, and the Australian Capital Territory, cannot be satisfactorily assigned to any one race. In a general way they are intermediate between the very dull *halmaturina*, with which they intergrade in the area round and east of Melbourne, and the much brighter *familiaris* which occurs in New South Wales east of the Australian Alps and in a slightly diluted condition down into eastern Victoria. The situation is further complicated by the fact that very likely, as previously observed by Keast (1958, 1961), individuals of the nominate race also breed and probably hybridize in southern Victoria. This point needs verification, but I have examined specimens collected in summer in Victoria (♀, 29-III-1912, Fern Tree Gully, AMNH no. 701065; ♀, 16-I-1901, Auburn, AMNH no. 701073; also ♀ "breeding", 26-XI-1949, Parker Range near Cape Otway, leg. W. B. Hitchcock, Nat. Mus. Vict. no. B 4312). Whether or not these birds are actual immigrants from Tasmania, or constitute variants of a mixed local breeding population, or are nonbreeding summering birds, remains to be seen.

As yet I have not examined enough material from the critical area (roughly between Melbourne and Canberra) to be sure, and the possibility of migrations must always be considered, but my impression is that many of these populations are somewhat variable in characters, which would support the opinion that not only smooth intergradation, but also hybridisation occurs. On the other hand small series from Sassafras and Selby which I examined (AMNH) were very uniform in appearance and exact intermediates between *halmaturina* and *familiaris*.

Four individuals collected in summer (December, January) in the Australian Capital Territory are similar to *familiaris*, but have the yellow on throat and under tail coverts paler. I do not know if they are part of a gradient from *halmaturina* to *familiaris*, from Melbourne to Sydney, or that there is also a direct contact with the populations of *halmaturina* inhabiting the Murrumbidgee and perhaps the upper Murray. Unfortunately little appears to be known of the occurrence of the species to the south-west and west of the Australian Capital Territory. The measurements of the A.C.T. specimens (wing ♂ 62, ♂ juv. 59½, ♀ 61, 62) suggest that there is no direct contact with *halmaturina*.

Recoveries of ringed birds from the Australian mainland 1)

Ring no.		date	locality	distance in miles
010-25575	ringed	13-IX-1960	Port Fairy, Vict.	
	found dead	25-XI-1960	Barwon Heads, Vict.	120 E
010-18100	ringed	1-X-1960	Kulnura, N.S.W.	
	found dead	ca. 23-VIII-1961	Near Rathdowney, Qld.	370 NNE
010-27743	ringed	14-VII-1961	Port Fairy, Vict.	
	retrapped	25-IV-1962	Willaroo, Coleraine, Vict.	75 NNW
010-32200	ringed	28-VIII-1961	Bandon Grove, Dungog, N.S.W.	
	retrapped	8-VII-1962	Tianjara Creek Falls, N.S.W.	210 SSW
010-20892	ringed	6-VIII-1960	Port Fairy, Vict.	
	retrapped	27-VI-1962	Willaroo, Coleraine, Vict.	64 NNW
010-36546	ringed	9-VI-1962	South Grafton, N.S.W.	
	found dead	23-IX-1962	Canberra, A.C.T.	455 SSW
010-45214	ringed	4-VI-1962	Terry Hills, Sydney, N.S.W.	
	retrapped	30-IX-1962	Thirroul, N.S.W.	47 SSW

1) Only long-distance recoveries have been included; for a map of local movements in the Sydney area, as ascertained from ringed individuals, I refer to Lane (1962).

Ring no.		date	locality	distance in miles
010-28287	ringed	12-III-1961	Uriarra Crossing, A.C.T.	
		28-XII-1962	Bathurst, N.S.W.	128 NNE
	recovered			
010-21881	ringed	17-IV-1962	Willaroo, Coleraine, Vict.	
	killed by cat	21-II-1963	Telangatuk, Vict.	38 NE
010-58905	ringed	1-IX-1962	Eastwood, N.S.W.	
	recovered	19-I-1963	Bega, N.S.W.	215 SSW
010-22076	ringed	9-VIII-1962	Eastwood, N.S.W.	
	killed by cat	25-IV-1963	Tanjil South, near Moe, Vict.	410 SSW
010-43713	ringed	23-VI-1962	Maryborough, Vict.	
	retrapped	15-X-1962	Hordern Vale, Vict.	110 S
010-71578	ringed	12-VIII-1963	Narrabundah, A.C.T.	
	found dead	5-X-1963	Captains Flat, N.S.W.	26 SE
010-4425	ringed	1-V-1963	Joanna, S.A.	
	caught	21-III-1964	Rendelsham, S.A.	45 SW
010-18640	ringed	2-IX-1963	Sutherland, N.S.W.	
	retrapped	4-I-1964	Lake George, N.S.W.	125 SW
010-86554	ringed	26-I-1964	Wooleys Lake, Beachport, S.A.	
	recovered	29-III-1964	Coonawarra, S.A.	46 ENE
010-33001	ringed	16-IV-1961	Lake George, N.S.W.	
	found dead	22-V-1964	Cheesman's Creek near Dubbo, N.S.W.	139 NNW
010-83586	ringed	12-I-1964	Wooleys Lake, Beachport, S.A.	
	retrapped	23-V-1964	Port Fairy, Vict.	138 ESE
010-83587	ringed	12-I-1964	Wooleys Lake, Beachport, S.A.	
	retrapped	22-V-1964	Port Fairy, Vict.	138 ESE
010-86042	ringed	25-I-1964	Wooleys Lake, Beachport, S.A.	
	shot	26-III-1964	Mt. Gambier, S.A.	48 ESE
010-10095	ringed	15-IV-1960	Thirroul, N.S.W.	
	found dead	11-VII-1964	Speers Point, N.S.W.	102 NNE
010-70107	ringed	13-IV-1963	Beachport, S.A.	
	found dead	21-VII-1964	Aspley, Vict.	74 NE
010-76831	ringed	14-V-1963	Wyong, N.S.W.	
	retrapped	1-IX-1964	Menai, N.S.W.	54 S

Ring no.		date	locality	distance in miles
010-83333	ringed	11-I-1964	Beachport, S.A.	
	found dead	25-VII-1964	Mt. Gambier, S.A.	48 ESE
010-91326	ringed	13-II-1964	Birkdale, Qld.	
	retrapped	16-VIII-1964	Canberra, A.C.T.	610 SSW
011-02552	ringed	4-IV-1964	Millicent, S.A.	
	recovered	10-IX-1964	8 miles east of Coleraine, Vict.	85 E
011-06009	ringed	6-IV-1964	Hawkesdale, Vict.	
	found dead	early-IX-1964	Port MacDonnell, S.A.	85 W
010-98280	ringed	15-VI-1964	Cudgen, N.S.W.	
	recovered	15-XI-1964	Silvan, Vict.	823 SW
011-43186	ringed	31-I-1965	Wooleys Lake, Beachport, S.A.	
	shot	14-V-1965	Glencoe West, S.A.	35 ESE
011-12723	ringed	8-VIII-1964	Loddon River near Bulli Pass, N.S.W.	
	retrapped	11-VII-1965	Minnie Water near Grafton, N.S.W.	340 NNE
020-17871	ringed	10-VII-1960	Port Fairy, Vict.	
	retrapped	14-VIII-1965	Minnie Water near Grafton, N.S.W.	890 NE
010-62774	ringed	9-VII-1963	Narrabundah, A.C.T.	
	found dying	28-VIII-1965	Goulburn, N.S.W.	50 NE
010-89556	ringed	13-VI-1965	Clarendon, S.A.	
	retrapped	17-X-1965	Meredith, Vict.	355 ESE
011-46053	ringed	13-VI-1965	Kingston, S.A.	
	found dead	5-XI-1965	Cooltang, Renmark, S.A.	24 ENE
010-71493	ringed	9-VIII-1963	Tianjara Creek 20 miles south-west of Nowra, N.S.W.	
	retrapped	6-XII-1964	Kianga Creek near Narooma, N.S.W.	80 SSW
011-24269	ringed	24-V-1965	Port Fairy, Vict.	
	shot	12-IV-1966	Heywood, Vict.	36 WNW
011-38165	ringed	26-VI-1965	Blewitt Springs, S.A.	
	retrapped	18-III-1966	Antechamber Bay, Kangaroo Island, S.A.	56 SW
011-82675	ringed	2-IX-1966	Caloundra, Qld.	
	retrapped	16-XI-1966	Thornlands, Brisbane, Qld.	52 S

Ring no.		date	locality	distance in miles
011-96321	ringed	25-IV-1966	Willaroo, Vict.	
	found dead	24-X-1966	Glenelg River, Vict.	79 SW
021-21468	ringed	6-I-1966	Waitpinga Lagoon near Victor Harbour, S.A.	
	recovered	19-V-1966	Morphett Vale, S.A.	35 N
021-44211	ringed	12-IX-1965	Minnie Water near Grafton, N.S.W.	
	shot	26-XII-1966	Birdwood, N.S.W.	117 SSW
011-56478	ringed	17-IV-1966	Hawkesdale, Vict.	
	found dead	6-VII-1966	Coleraine, Vict.	49 NW
011-98426	ringed	1-III-1966	Wooley's Lake, Beachport, S.A.	
	found dead	4-III-1967	Mount Burr, S.A.	27 SE
010-83140	ringed	11-I-1964	Wooley's Lake, Beachport, S.A.	
	recovered	25-IV-1966	Keith, S.A.	97 NNE
011-06025	ringed	2-V-1964	Dunmore, Vict.	
	found dead	11-IX-1966	Heywood, Vict.	26 W
011-56251	ringed	26-III-1966	Hawkesdale, Vict.	
	killed by cat	end-IV-1966	Nildottie near Swan Reach, Vict.	282 NNW
011-56254	ringed	26-III-1966	Hawkesdale, Vict.	
	killed by cat	end-IV-1966	Nildottie near Swan Reach, Vict.	282 NNW
011-81041	ringed	28-V-1966	Fairy Meadow, N.S.W.	
	retrapped	4-IX-1966	Cronulla, N.S.W.	39 NNE
011-84012	ringed	13-II-1966	Beachport, S.A.	
	found dead	19-VIII-1966	Naracoorte, S.A.	53 NE
011-94551	ringed	2-IV-1966	Mt. Burr, S.A.	
	retrapped	23-IV-1966	24 miles SSE of Kingston, S.A.	30 NNW
011-94576	ringed	2-IV-1966	Mt. Burr, S.A.	
	shot	1-V-1966	7 miles south of Naracoorte, S.A.	36 NNE
011-90911	ringed	13-III-1967	Yanakie, Wilson's Promontory, Vict.	
	found dead	8-VII-1967	Tatham near Casino, N.S.W.	810 NNE

An analysis of the ringing results on the Australian mainland is hampered in two ways. The first and most serious one is that hitherto practically all ringing has been of adult birds, so that where the birds originated is unknown. For this reason also it has been impossible to sort out the records to the subspecific level. The second, less serious, difficulty is that a recovery usually gives knowledge of only two points: the place where a bird was ringed, and the place where it was recovered, and though in the figure these points are connected by straight lines, this obviously does not give a picture of the actual movements in the intervening time; especially not if the interval is long.

The problems mentioned make it difficult to be sure how and where, if at all, birds of the Australian mainland populations migrate, for it will be clear that many of the recoveries may pertain to Tasmanian birds, *Z. l. lateralis*. A few birds, the nos. 010-22076 and 010-76831, had actually been marked by their ringers as being of the Tasmanian type. Though a certain separation of Tasmanian from mainland birds is not possible on the basis of the records, it appears to me that birds either ringed or recovered in the months November, December, January and February, the Tasmanian summer, would be mainlanders, and that birds ringed as well as recovered in the months April-October might well be Tasmanian; about birds ringed in March I feel a bit doubtful.

Of the 52 recoveries listed, on the basis of the criteria mentioned, 32 might pertain to Tasmanian birds, so that 20 remain for analysis. That in this way some of the greatest-distance recoveries have been excluded is only as could be expected, knowing that Tasmanian birds can be highly migratory. Of the 20 remaining recoveries, seven are of birds that have moved less than fifty miles from their ringing places, and are therefore indicative of wandering rather than migration; four have moved between fifty and a hundred miles, and may come in the same class; the remaining nine, of birds that have moved over a hundred miles, are the essential ones which deserve to be individually discussed.

It is remarkable that of these nine recoveries, three pertain definitely to the race *Z. l. halmaturina* (ring nos. 010-25575, 010-83586 and 010-83587). The distances covered, 120, 138 and 138 miles respectively, are moderate, and at the moment it is impossible to decide if they are just examples of extreme wandering or of true migration.

Indicative of true migration in mainland birds are nos. 010-28287, 010-58905 (recorded by its ringer as being of the "Canberra-type"), 010-18640, 010-98280, and 021-44211.

Finally there is the puzzling no. 010-91326, which shows that as yet we know practically nothing of the backgrounds of movements and migration, for this bird was ringed in mid-summer in Queensland and retrapped six months later in mid-winter in Canberra, over 600 miles south of its ringing place.

5. **Zosterops lateralis ramsayi** Masters

Zosterops ramsayi Masters, Proc. Linn. Soc. N. S. W. 1, 1876, p. 56 — Palm Island [Halifax Bay, Queensland].

Zosterops westernensis vegeta Hartert, Nov. Zool. 6, 1899, p. 425 — Cape York.

Zosterops lateralis cornwalli Mathews, Nov. Zool. 18, 1912 (Jan.), p. 385 — Mackay, Queensland.

Zosterops; Macgillivray, Narr. Voy. Rattlesnake I, 1852, p. 101 (Low Isles, northern part of Trinity Bay); A. J. Cambell, Emu 18, 1918, p. 72 (Cardwell); Fletcher, Proc. Linn. Soc. N. S. W. 54, 1929, p. 247 (Palm Islands).

Zosterops luteus; (pt.) J. Macgillivray, Narr. Voy. Rattlesnake II, 1852, p. 357 (north-east coast of Australia); Le Souëf, Vict. Nat. 8, 1892, p. 163 (South Barnard Islands).

Zosterops westernensis; Finsch, Verh. zool.-bot. Ges. Wien 22, 1872, p. 324 (Port Mackay); (pt.) De Vis, Rep. Govt. Sc. Exp. Bellenden-Ker Range, 1889, p. 88 (Bellenden-Ker Range); De Vis, Queensl. Parl. Pap., sess. 1889, IV, p. 1237, or p. 33 in separate report (Bellenden-Ker); (pt.) North, Descr. Cat. Birds, 1889, p. 234 (Rockingham Bay).

Zosterops coerulescens; (pt.) Ramsay, Proc. Linn. Soc. N. S. W. 2, 1877, p. 191 (Rockingham Bay); De Vis, Rep. Govt. Sc. Exp. Bellenden-Ker Range, 1889, p. 89 (Bellenden-Ker); De Vis, Queensl. Parl. Pap., sess. 1889, IV, p. 1237, or p. 37 in separate report (foot of Bellenden-Ker); Broadbent, Emu 10, 1910, p. 239 (Cardwell).

Zosterops ramsayi; Ramsay, Proc. Linn. Soc. N. S. W. 2, 1877, p. 191 (Palm Island); Ramsay, Tab. List Austr. Birds, 1888, p. 14 (Palm Island); North, Rec. Austr. Mus. 2, 1896, p. 100 (Palm Islands, lying north of Halifax Bay, N. E. Queensland); A. J. Campbell & al., Rep. 7th Meeting Australas. Ass. Adv. Sc., 1898, p. 138 (no locality); Hall, Key Birds Austr., 1899, p. 38 (North Queensland); A. J. Campbell, Nests Eggs Austr. Birds, 1900, p. 349 (North Queensland (Palm Islands)); Finsch, Tierreich 15, 1901, p. 41 (Palm-Inseln in der Halifax-Bai von Queensland); Dubois, Syn. Av. I, 1902, p. 712 (Iles des Palmes (Queensland)); A. G. Campbell, Emu 5, Suppl., 1905, p. 40 (no locality); Hall, Key Birds Austr., 2nd ed., 1906, p. 38 (North Queensland); Mathews, Emu 7, Suppl., 1908, p. 90 (N. E. Australia (Palm Is., Halifax Bay)); Hull, List Birds Austr., 1909, p. 25 (no locality); Sharpe, Hand-List Birds V, 1909, p. 17 (N. E. Australia (Palm Isl., Halifax Bay)); A. J. Campbell & al., Emu 12, Suppl., 1913, p. 105 (N. Queensland (Cape York)); H. L. White, Emu 15, 1915, p. 64 (no locality).

Zosterops caerulescens; (pt.) North, Descr. Cat. Birds, Austr. Mus. Cat. 12, 1889, p. 233 (Rockingham Bay).

Zosterops vegeta; Finsch, Tierreich 15, 1901, p. 41 (Kap York); North, Nests Eggs Birds Austr. Tasm. II, 1907, p. 212 (North-eastern Queensland); Mathews, Emu 7, Suppl., 1908, p. 90 (Cape York); Hull, List Birds Austr., 1909, p. 25 (no locality); Sharpe, Hand-List Birds V, 1909, p. 17 (Cape York, N. Australia); Lucas & Le Souëf, Birds Austr., 1911, p. 364 (North-east Queensland).

Zosterops lateralis Var. *Vegeta*; Dubois, Syn. Av. I, 1902, p. 72 (Cap York).

Zosterops westernensis vegeta; Hall, Key Birds Austr., 2nd ed., 1906, p. 113 (North Queensland).

Zosterops lateralis vegeta; Sassi, Journ. f. Orn. 57, 1909, p. 376 (Nord-Queensland); Hartert, Nov. Zool. 27, 1920, p. 433 (Cape York); Mathews, Syst. Av. Australas. II, 1930, p. 709 (North Queensland (Cape York)); Mathews, List Birds Australas., 1931, p. 375 (North Queensland (Cape York)); Keast, Gould League Notes (N. S. W.) 24, 1958, p. 11 (N. Queensland (on map)); Keast, Bull. M. C. Z. 123, 1961, p. 388 (Cairns-Atherton).

Zosterops lateralis cornwalli; Mathews, Austral Av. Rec. 1, 1912 (2 April), p. 61 (Queensland); Mathews, List Birds Austr., 1913, p. 253 (Mid-Queensland); Mathews, Syst. Av. Australas. II, 1930, p. 709 (Queensland (Mid)); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 20 (Mackay, Queensland central); Mathews, List Birds Australas., 1931, p. 375 (Queensland (Mid)).

Zosterops tephropleura; Campbell & Barnard, Emu 17, 1917, p. 30 (Rockingham Bay); Macgillivray, Emu 17, 1918, p. 203 (North Queensland); (pt.) Mack, Emu 31, 1932, p. 295 (Coen, Hambledon and Cardwell); A. G. Campbell, Emu 32, 1932, p. 92 (Mackay); Oliver, N. Z. Birds, 2nd ed., 1955, p. 497 (Queensland).

Zosterops lateralis ramsayi; Mathews, Nov. Zool. 18, 1912 (Jan.), p. 385 (Palm Island, Torres Straits); Mathews, List Birds Austr., 1913, p. 253 (North Queensland (Cape York)); Mathews, Syst. Av. Australas. II, 1930, p. 709 (Queensland (North), Palm Island, off Cardwell); Mathews, List Birds Australas., 1931, p. 374 (Queensland (North), Palm Island, off Cardwell); Mack, Mem. Queensl. Mus. 13, 1953, p. 38 (Iron Range, Upper Parrot Creek, Mt. Finnegan); Keast, Gould League Notes (N. S. W.) 24, 1958, p. 44 (around Cairns); Parker, Emu 66, 1966, p. 121 (Chester River); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 317 (distribution).

Zosterops ramsay; Page, Bird Notes N. S. 4, 1913, p. 1 (Palm Island, Torres Straits).

Zosterops dorsalis cornwalli; Mathews, Birds Austr. XI, 1923, p. 154 (Mid-Queensland).

Zosterops dorsalis ramsayi; Mathews, Birds Austr. XI, 1923, p. 154 (North Queensland).

Zosterops lateralis; Alexander, Emu 25, 1926 (1 April), p. 258 (Magnetic Island, Kuranda); Barnard, Emu 26, 1926 (1 July), p. 10 (Hinchinbrook Island, mainland Cardwell District); (pt.) Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926 (after June), p. 93 (N. Q.); (pt.) Leach, An Austr. Bird Book, 1926, p. 223 (N. Q.); Marshall, Emu 34, 1934 (2 July), p. 39 (Whitsunday Isls.: Hayman, Hook, Whitsunday, etc.); Marshall, Emu 34, 1934 (1 Oct.), p. 130 (Mackay), p. 131 (Ross River 19° 18′ S.), p. 132, 135 (Rockingham Bay 18° 15′ S.); S. R. White, Emu 46, 1946, p. 116 (Green Island, 17 miles N. E. from Cairns); Bourke & Austin, Emu 47, 1947, p. 107 (summit of Bartle Frere, Atherton Tablelands); Hopkins, Emu 47, 1948, p. 343 (Townsville); Whittell, List Birds N. Queensl., N. Queensl. Nat. Cl., publ. 5, 1949 (March), p. 10 (N. Queensland); Brown, Emu 49, 1949 (31 Aug.), p. 48, 49 (Daydream Island, Whitsunday Group); Storr, Emu 53, 1953, p. 243 (Cooktown, Marton, Helenvale, Big Tableland); Binns, Emu 54, 1954, p. 43 (Atherton Tableland: Hartley's Creek, Kuranda and Lake Barrine); Seaton, N. Queensl. Nat. 24, 1956, p. 23 (Edge Hill near Cairns); Roberts, Emu 57, 1957 (19 Dec.), p. 309 (Cumberland Islands: Carlyle Island, Brampton Island); Immelmann, Im unbek. Austr., 1960, p. 201 (Cairns); Lavery & Hopkins, Emu 63, 1963, p. 251 (Townsville); Wheeler, Austr. Bird Watcher 3, 1967 (Dec.), p. 72 (Cairns, Green Island, Atherton Tablelands).

Zosterops albiventris; Whittell, Lit. Austr. Birds, Hist. Austr. Orn. 1954, p. 113 (Low Isles in the northern part of Trinity Bay).

Zosterops lateralis albiventris; Immelmann, Im unbek. Austr., 1960, p. 212 (Green Island).

Subspecific characters. Very close to *familiaris* but differs by its Pale Lemon Yellow under tail coverts, which are much darker yellow than the pale yellowish under tail coverts of *familiaris*, and by smaller size. Differs also from this and from all other subspecies of *Z. lateralis* by its relatively shorter tail (table I).

Unfeathered parts. Iris light brown or brown, bill dark horn colour or black, legs and feet dark grey (Schrader); iris light brown, bill black with slate underneath at base, feet slate (Mack); iris light brown, bill slate, black tip, feet slate (Olive); iris light grey or very pale brown, bill, upper black, lower black tip, grey base, feet and legs grey (Vernon).

Measurements. Wing 24 ♂, 55-62 (58.27); 8 ♀, 55-59½ (57.56); 33 specimens, 55-62 (58.09); tail 24 ♂, 35-42 (38.73); 8 ♀, 34½-40 (38.19); 33 specimens, 34½-42 (38.60); tarsus 33 specimens, 15-17½ (16.34); entire culmen 32 specimens, 11½-14 (13.30); exposed culmen 32 specimens, 9-11 (10.32), culmen from anterior point of nostril 32 specimens, 6¾-8¾ (7.60).

Structure. The wing formula is 6>2>7 or 6 = 2. The difference in relative tail-length between this and all other subspecies of *Zosterops lateralis*, measured in good series, is so striking that it appears justified to regard it as real. Normally I do not attach much significance to tail-length, measured in small series, because of the variation in this character, which is probably largely caused by difficulties of measuring.

Weights. ♂: 12 g, ♂ juv. 11 g (specimens from Russell Island).

Distribution (fig. 7). Coastal districts and offshore islands of eastern tropical Queensland from Iron Range (Cape York Peninsula) to Mackay, where this subspecies intergrades with the preceding one.

First collector. The birds observed by John Macgillivray on the Low Isles, in the northern part of Trinity Bay, in July 1848, would have belonged to *Z. l. ramsayi* rather than to *Z. c. albiventris* which is not known to range that far south, but I have found no evidence that he collected any. The two cotypes of *Z. l. ramsayi*, obtained on 2 June 1875 by E. Spalding and G. Masters may be the first that have been collected of this subspecies.

Figure. Mathews (1923) plate 505, opposite p. 136, bottom figure (type of *cornwalli*, coloured, on natural size, by Grönvold). In the text the type is erroneously stated to be the top figure.

Types. There are two specimens from Palm Island in the Macleay Museum, both collected on 2 June 1875 by Spalding and Masters; one of these is marked (in a later handwriting) as the type (both specimens examined). Specimen AMNH no. 700950 is following Hartert's (1920) selection kept as type of *vegeta* (specimen examined), but as no type was indicated in the original description, actually all specimens in the original series, in AMNH and BM, are cotypes.

Moult. Specimens collected in February (3), May (6), June (2), July (3), August (1), September (4), October (2), November (4) and Decem-

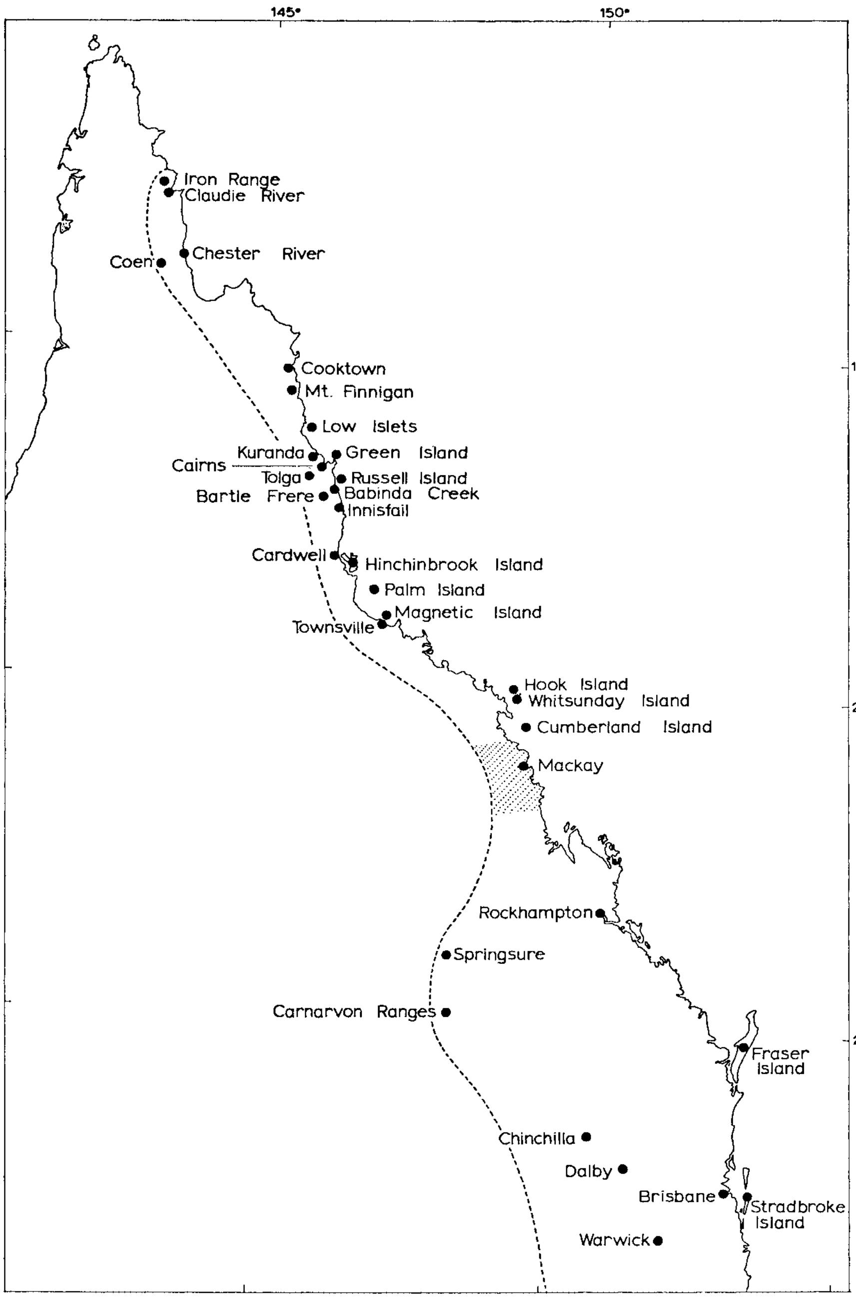


Fig. 7. The distribution of *Zosterops lateralis* in Queensland; south, *familiaris*, north, *ramsayi*. The area of presumed intergradation between the two subspecies is dotted.

ber (2) show no moult. The November birds are in worn plumage. Specimens collected in February (1), July (1) and August (1) are moulting rectrices, and a bird taken in June shows wing moult.

Nidification. Apart from the classical descriptions like North (1907), which make it apparent that nests and eggs of this subspecies do not differ from those of related forms, very little information exists. Mathews (1912) described a clutch of eggs, taken on 11 September 1909, but as the only locality given is "Queensland", this case applies perhaps to the subspecies *familiaris.* A clutch of two, taken near Atherton in November 1908, is in the H. L. White collection (cf. p. 350), and Barnard (1926) mentioned a nest with two young, without giving a date or other particulars. Alexander (1926) saw birds collecting nesting material at Kuranda in the first half of September 1925, and S. R. White (1946) observed similar activities on Green Island on 22 December 1944 and at Edge Hill on 22 October 1945.

Habits, etc. Most observers have found this subspecies fairly common in various parts of north-eastern Queensland, where it favours the edges of scrub-land and second-growth, *Lantana*-thickets, etc. In Townsville, however, Hopkins (1948) and Lavery & Hopkins (1963) regard it as a rare visitor, though they mention that it is common in nearby rain forest.

The feeding habits are presumably not different from those of the preceding races. A. J. Campbell (1918) mentioned oranges as food.

Discussion. This subspecies has been fairly generally recognised. Mack (1932), followed by several other authors, erroneously identified it with *tephropleura,* but later he has corrected this (Mack, 1953).

Mathews (1912) was apparently the first to synonymize *vegeta* with *ramsayi.* Hartert (1920) did not agree and observed: "when I named *vegeta* I was not acquainted with Masters's description, but it does not suit my *vegeta.* The middle of the abdomen is whitish and not "light grey", and the wing measures 56-57, and not over 60 mm. ["2.4 inches"]. The suggestion that *vegeta* is *ramsayi* therefore cannot be accepted and must remain doubtful until specimens from "Palm Island" have been examined. Where "Palm Island" is I do not know, nor does Mathews (in litt.), as neither our maps nor the Pacific Ocean Directory give it".

Palm Island appears on all good maps, and its exact position had been indicated by North (1896), Finsch (1901), etc.

In later years Keast (1958) recognised *vegeta,* but without any explanation or indication of differential characters.

As regards the difference in size relied upon by Hartert, the two cotypes of *ramsayi* are, indeed, large: wing 61, 62, tail 41, 42. The largest mainland birds are from Cardwell (wing 60½, tail 38) and Upper Parrot Creek (wing

60½, tail 38); the mainland specimen with the longest tail is from Barron River (wing 59, tail 41½). The difference in size, therefore, is at most very doubtful, and even if it would be confirmed by more material from Palm Island, certainly not enough to base a separate name on. On the mainland there does not appear to be any difference in size or otherwise between birds of the northern and the southern part of the range of the subspecies.

Since writing the foregoing notes, I had an opportunity to examine two specimens from Russell Island, Great Barrier Reef (17° 14′ S, 146° 06′ E) collected on 13-XI-1961 (Oslo Museum). Measurements of an adult male, wing 61, tail 43, tarsus 17, entire culmen 14½, exposed culmen 11, culmen from anterior point of nostril 8. These measurements have not been included in the measurements and averages given above. The second bird is a juvenile male with all remiges still growing out. The birds from this locality are of interest for several reasons: the adult bird is as large as the individuals from Palm Island, and the juvenile provides proof that the species breeds on Russell Island.

The specific identity of the birds recorded from islands in the Trinity Bay off Cairns has long been in doubt. S. R. White (1946) listed birds from Green Island as *Z. lateralis*. Whittell (1954) assumed that the Low Isles are inhabited by *Z. citrinella albiventris*. Immelmann (1960) apparently believed that birds from Green Island are not identical with those of the adjacent mainland, though his nomenclature is confused. Mr. McKean (in litt., 5-IX-1966) has informed me as follows: "I have seen the *Zosterops* on Green Island. One of the Cairns Field Naturalists told me it was *Z. albiventris,* but it looked exactly the same as *Z. lateralis* to me. I cannot recall the back colour .....". Inasmuch as Whittell wrote about birds he had never seen, and Immelmann was clearly somewhat hazy about the situation, I was inclined to rely on the identifications made by S. R. White and McKean, both experienced observers, and this has now been confirmed by Mr. A. Miller, Curator of Green Island Marineland (in litt., 17-IV-1967), according to whom the species occurring on Green Island is without any doubt at all *Z. lateralis*.

In view of the occurrence of the well-marked endemic race *Z. l. chlorocephala* on the Capricorn Islands, some ornithological collecting on islands here included in the range of *Z. l. ramsayi* might be rewarding. As mentioned above, there is already some evidence that the insular populations tend to be larger.

The type locality Cape York for *vegeta* as given by Hartert and on the labels of the type series is vague and actually misleading since *Z. lateralis* is not known to occur as far north as Cape York. Hartert (1899) stated that the collection from which he described *vegeta* was obtained by Mr. Meek's men in June and July 1898, and from Parker's (1966) reconstruction of Meek's travels, we know that in that period his men were camped at the Chester River (13° 42′ S, 143° 33′ E), which therefore is the type locality.

It is of interest to mention that on the label of the specimen kept as type of *vegeta*, the name Eichhorn is given. Perhaps the two men collecting for Meek at Chester River were the Eichhorn brothers, anyway one of them was an Eichhorn. According to Whittell (1954), Eichhorn was a brother-in-law of Meek. The Eichhorns have continued their relations with the Tring Museum for many years.

6. **Zosterops lateralis chlorocephala** A. J. Campbell & S. A. White

Z[osterops] chlorocephalus A. J. Campbell & S. A. White, Emu 10, 1910 (1 December), p. 196 — Capricorn Group, restricted to North-West Island by Mathews's (1924) selection of a lectotype from that locality.

Zosterops lateralis tephropleura; Mathews, Nov. Zool. 18, 1912, p. 386 (Capricorn Group, Barrier Reef, Queensland); Mathews, List Birds Austr., 1913, p. 253 (Capricorn Group, Barrier Reef); Keast, Gould League Notes (N.S.W.) 24, 1958, p. 11 (Capricorn Islands); (pt.) Keast, Bull. M.C.Z. 123, 1961 (March), p. 387 (Capricorn Islands).

Zosterops tephropleura; A. J. Campbell & al., Emu 12, Suppl., 1913, p. 84 (Queensland, Islands of Great Barrier Reef); (pt.) Leach, An Austr. Bird Book, 8th ed. (Barrett), 1939, p. 84 (Barrier Reef); Cooper, Emu 48, 1948, p. 112, 125 (Capricorns).

Zosterops lateralis chlorocephala; Mathews, List Birds Austr., 1913, p. xxvi (Capricorn Group); Mathews, Syst. Av. Australas. II, 1930, p. 709 (Queensland (South), Great Barrier Reef); Snouckaert, Alauda (2) 3, 1931, p. 20 (Groupe du Capricorne); Mathews, List Birds Australas., 1931, p. 375 (Queensland (South), Great Barrier Reef); Mathews, Working List Austr. Birds, 1946, p. 122 (Southern Great Barrier Reef, Queensland); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 317 (Capricorn Group).

Zosterops dorsalis chlorocephalus; Mathews, Birds Austr. XI, 1924, 154 (Capricorn Group, Barrier Reef, Queensland).

Zosterops; W. D. K. MacGillivray, Emu 25, 1926 (1 April), p. 230 (Capricorn Islands).

Zosterops lateralis; W. D. K. MacGillivray, Emu 25, 1926 (1 April), p. 238 (Capricorn Islands); Gilbert, Austr. Zool. 4, 1926 (30 April), p. 226 (Capricorn Group: Northwest Islet, Tryon Islet, Wilson Islet); (pt.) Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926 (after June), p. 93 (Capricorn Is.); W. D. K. MacGillivray, Emu 27, 1928, p. 248 (Capricorn and Bunker Group: ... seen and heard on every island... Lady Musgrave, North West, Tryon or Wilson Islands, Heron Island, One Tree Island); W. D. K. MacGillivray, Emu 30, 1931, p. 272 (Capricorns); Keast, Bull. M.C.Z. 123, 1961 (March), p. 485 (Capricorn Islands); Keast, Australia, 1966, p. 130 (Heron Island); Keast, Austr. Nat. Hist. 15, 1967, p. 377 (Heron Island).

Zosterops lateralis (tephropleura?); D'Ombrain, Emu 63, 1964 (31 March), p. 335 (Heron Island).

Pachycephala pectoralis; K. Heinroth, Sitzungsb. Ges. Naturf. Freunde Berlin N.F. 6, 1966, p. 46 (Heron-Island).

Subspecific characters. In coloration and general appearance similar to *familiaris* of the opposite mainland, and also with yellow throat, but size very much larger in every dimension. The large size brings this form very close to *vatensis*, from which it differs, however, by the different wing-formula, and by having the under tail coverts on an average darker yellow; head perhaps slightly brighter in colour, bill a little finer and smaller.

Unfeathered parts. Iris brown, bill slate, mandible horn, legs horn, soles yellowish (R. F. Brown).

Measurements of two specimens (one ♂, one ♀): wing 66, 67, tail 46, 47, tarsus 17½, 19, entire culmen 13½, 15¼, exposed culmen 11, 12, culmen from anterior point of nostril 8½, 9¼.

Structure. Wing formula in one specimen with $2 = 6$, in the other with $6>2>7$.

Distribution. Confined to the Capricorn and Bunker Groups, small coral islands off the coast of southern Queensland, where apparently common and occurring on all islands of these groups.

First collector. Apparently J. W. Mellor on one of the islands of the Capricorn Group in October 1910 (cf. A. J. Campbell & S. A. White, 1910). Probably the bird listed below as the type was the first to be collected.

Figure. Mathews (1923), plate opp. p. 136, middle figure (coloured, on natural size, by Grönvold; this plate does not bring out the diagnostic characters of the race); Cooper (1948), plate 23 (good photograph of bird on nest).

Type. This subspecies was based on "several" skins, but Mathews's (1924, p. 139) remark that a male collected 9 October 1910 on North-West Island is the type, though not formally a designation of a lectotype, may be constructed as such. This specimen, collected by J. W. Mellor is AMNH no. 700956 (specimen examined). A female in poor condition collected two days later on the same island, bears no collector's name; it is in the same museum.

Moult. Two specimens collected on 6 September do not show moult.

Nidification. Gilbert (1926) mentions the finding of several nests on North-west Island towards the end of November, 1925. Most of these had been occupied, one contained two eggs, and one had two young. MacGillivray (1928), during his stay lasting from the second half of November to early December, records several nests found on North-West Island; usually these were placed at about three or four feet from the ground; one in *Convolvulus* contained three young birds which were just getting their feathers and pretty well filled the nest. Another nest contained four eggs: this nest was suspended from the horizontal fork of a *Scaevola* bush; it was wholly composed of fine rootlets, bound around the rim and outside with cobweb and decorated with the greenish-white egg-sacs of spiders. Another nest found on the same island contained one egg. On Heron Island and One Tree Island birds were seen carrying nesting material into *Pandanus* trees. Cooper (1948), in December 1946, records the birds as common on all islands, and breeding freely. One of the nests, when found, contained one egg and two newly hatched young. D'Ombrain (1964) found a nest with three eggs on 24 October 1962; he described the nest as similar to that of mainland birds, but much bulkier. Measurements of eggs have not yet been published; they may be expected to be slightly larger than eggs of the mainland races.

Habits, etc. Cooper (1948) recorded extensive feeding on small round figs (*Ficus* sp.).

Voice. The song does not appear to differ from that of the mainland birds (Gilbert, 1926).

Discussion. This subspecies has almost universally been confused with *Z. l. tephropleura* from Lord Howe Island, a confusion initiated by Mathews (1912), but as will be seen by comparing the measurements, *chlorocephala* is far bigger than *tephropleura* and, on the basis of size and proportions, certainly deserves a separate name; the 2nd primary seems also to be relatively longer. From the zoogeographic point of view a union of the two would also be difficult to accept.

Heinroth's (1966) record of supposed *Pachycephala pectoralis* on Heron Island reads as follows: "Gezwitscher von Kleinvögeln erwies sich als Gesang des „Golden Wistler", *Pachycephala pectoralis;* einmal bekam ich ein Pärchen zu Gesicht, sie sassen dicht aneinandergedrängt auf einem Zweig, klein wie Laubsänger, grünlichgelb und wunderbar im Laub getarnt". I am convinced that her informer erred about the identity of the birds involved, for *Pachycephala pectoralis* has never been recorded from the Capricorns (Cooper, 1948), and the information about size and appearance, and sitting close together, indicates that *Z. l. chlorocephala* was concerned, the only small passerine bird resident on Heron Island.

The occurrence of this very marked subspecies on islets off the coast is of much interest and will be fully discussed in one of the concluding chapters (p. 319-322).

7. **Zosterops lateralis tephropleura** Gould

Zosterops tephropleura Gould, Proc. Zool. Soc. London 23, 1855, p. 165, 166 — Lord Howe's Island.

Zosterops tephropleurus; Gould, Birds Austr., Suppl., 1859, p. 97, pl. 49 (Lord Howe's

Island); G. R. Gray, Ibis 4, 1862, p. 222 (Lord Howe's Island); Gould, Handb. Birds Austr. II, 1865, p. 538 (Lord Howe's Island); Pelzeln, Abh. zool.-bot. Ges. Wien 17, 1867, p. 316 (Lord Howe's Insel); Wallace, Geogr. Distr. Anim. I, 1876, p. 454 (Lord Howe's Island); Ramsay, Proc. Linn. Soc. N. S. W. 7, 1882, p. 88 (Lord Howe's Island); Buller, Hist. Birds N.Z., 2nd ed. I, 1888, p. lviii (Lord Howe's Island); Etheridge, Austr. Mus. Mem. 2, 1889, p. 9, 17 (Lord Howe Island).

Zosterops tephropleura; Hartlaub, Journ. f. Orn. 13, 1865, p. 18 (Lord Howe's Island); G. R. Gray, Hand-List Birds I, 1869, p. 162 (Lord Howe's I.); Boucard, Cat. Av., 1876, p. 230 (L. Howe I.); Giebel, Thes. Orn. III, 1877, p. 777 (Ins. Hower); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 157, 158 (Lord Howe's Island); Tristam, Cat. Coll. Birds, 1889, p. 212 (Lord Howe's Island); North, Rec. Austr. Mus. 2, 1896, p. 100 (Lord Howe Island); Finsch, Tierreich 15, 1901, p. 40 (Lord-Howe-Insel); Mathews, Emu 7, Suppl., 1908, p. 90 (Lord Howe Is.); Sharpe, Hand-List Birds V, 1909, p. 17 (Lord Howe Isl.); Hull, List Birds Austr., 1909, p. 25 (no locality); Hull, Proc. Linn. Soc. N. S. W. 34, 1910, p. 641, 689 (Lord Howe Island); Stone & Mathews, Austral Av. Rec. 1, 1913, p. 171 (note on type); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 34 (Lord Howe-Ins.); Hall, Emu 19, 1920, p. 283, 287 (no locality); (pt.) Mack, Emu 31, 1932, p. 295 (Lord Howe Island); Hindwood, Emu 40, 1940, p. 14, 20, 72, 74 (Lord Howe Island); Stresemann, Mitt. Zool. Mus. Berlin 30, 1954, p. 47 (Lord Howes Island); McKean & Hindwood, Emu 64, 1965, p. 94 (Lord Howe Island).

Zosterops tefropleura; Palacký, Die Verbr. d. Vögel, 1885, p. 120 (Norfolkinsel).

Zosterops Tephropleurus; Broinowski, Birds Austr. IV, 1890, pl. VIII fig. 4 (Lord Howe's Island).

Zosterops westernensis; (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Lord Howe's Id.); Legge, Rep. 10th meeting Australas. Ass. Adv. Sc. 1904, 1905, p. 252 (Lord Howe).

Zosterops westernensis tephropleura; Hartert, Nov. Zool. 6, 1899, p. 425 (Lord Howe's Island).

Zosterops lateralis Var. *Tephropleura*; Dubois, Syn. Av. I, 1902, p. 712 (Ile du Lord-Howe).

Zosterops lateralis tephropleura; Oliver, Trans. N. Z. Inst. 44, (1911), 1912 (10 June), p. 219 (Lord Howe Island); Mathews, List Birds Austr., 1913, p. xxvi (Lord Howe Island); Ashby, Emu 25, 1925, p. 116 (locality uncertain); Mathews, Birds Norfolk & Lord Howe Isl., 1928, p. 50 (Lord Howe Island); Mathews, Syst. Av. Australas. II, 1930, p. 710 (Lord Howe Island); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 205, 228 (Lord Howes Island); Mathews, List Birds Australas., 1931, p. 375 (Lord Howe Island); Hindwood, Emu 32, 1932, p. 27 (Lord Howe Island); Lack, Ibis 86, 1944, p. 266 (Lord Howe I.); Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1956, p. 172 (Lord Howe); Greenway, Extinct Birds, 1958, p. 427 (Lord Howe); (pt.) Keast, Bull. M. C. Z 123, 1961 (March), p. 387 (Lord Howe Island); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 317 (Lord Howe Island).

Zosterops lateralis; (pt.) Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926, p. 93 (Lord Howe I.); Sharland, Emu 29, 1929, p. 9 (Lord Howe Island).

Subspecific characters. In general size and coloration of plumage very similar to *familiaris*, but bill and tarsus definitely longer, and wing more rounded; under tail coverts slightly deeper yellow.

Unfeathered parts. Iris brown, light brown, yellowish brown or light yellowish brown, bill black or dark grey, base of mandible light grey, legs light blue grey or blue grey (Bell); iris brown, bill blackish, basis of mandible greyish, legs light grey, inside of bill light grey (McKean).

Measurements of 15 specimens (9 ♂, 5 ♀, 1 unsexed): wing 58-63 (60.33), tail 41-48 (45.10), tarsus 18½-20 (19.32), entire culmen 14½-17 (15.52), exposed culmen 11-13 (11.90), culmen from anterior point of nostril 8-9¼ (8.72).

Structure. In specimens examined the wing formula was $7>2>9$, from $7=2$ to $8>2>9$.

Distribution. Lord Howe Island.

First collector. John Macgillivray of H. M. Surveying Ship "Herald" in 1853.

Figures. Gould (1859) plate 49 (coloured plate of two individuals on natural size, by Gould and Richter); Broinowski (1890) plate VIII, fig. 4 (coloured plate, poor); Mathews (1928), plate opp. p. 50, top figure (coloured, on natural size, by Grönvold, fair).

Type BM no. 1855.10.23.1.

Moult. Specimens collected in January (3), May (2), August (1), September (1), and October (2) show no moult; specimens collected in January (1) and November (3) are in full moult. The main moulting season is therefore presumably November-December.

Nidification. The only description of the eggs I have been able to trace in literature is that by Mathews (1928), who mentions a clutch of two eggs, found on the 11th of January, 1914, which he describes as in size between those of *lateralis* and *tenuirostris,* and measuring 28.6 × 15 and 29.4 × 15.2 mm. These measurements are obviously wrong (as previously noted by Hindwood, 1940), and should probably read 18.6 × 15 and 19.4 × 15.2 mm. In the National Museum of Victoria (H. L. White Coll.), is a clutch of two eggs taken by H. Wilson on 27 March 1910; Mr. McEvey has measured these for me: 19.1 × 14.2 and 19.1 × 14.5 mm.

Habits, etc. Not known to differ from those of other subspecies of *Z. lateralis.*

Discussion. Hindwood (1940) has given arguments in favour of retaining *tephropleura* as a species, but apparently he compared his specimens with the race *lateralis* rather than with the very similar *familiaris,* and his assumption that in *lateralis* there is a seasonal variation in plumage has now of course been shown to be false. *Z. l. tephropleura* has since been given specific status in several publications. As set forth above, the only characters in which it differs from *familiaris* of the opposite mainland, from which subspecies it has probably been derived, are the slightly longer bill and tarsus. Though these characters are clear-cut, they are so slight that I do not consider them to be of more than subspecific value.

Until recently I was convinced that this subspecies was extinct, as it had not been reliably recorded since 1914 and the ill-advised introductions of mainland birds at a moment that the native birds had become scarce, made it likely that the latter had replaced the former, or at least that the endemic subspecies would have lost part of its identity as a result of interbreeding with introduced subspecies. Fortunately this view has been too pessimistic, as McKean has in recent years observed and collected *Z. l. tephropleura* (McKean & Hindwood, 1965). I have examined one of McKean's specimens, collected on 5 September 1963 (CSIRO no. 848), and though unfortunately it has been preserved in alcohol prior to being skinned, it is doubtless a pure *tephropleura*, with a long slender bill and heavy tarsus (entire culmen 15½, tarsus 19).

It is now likely that the silvereyes observed on Lord Howe Island by Sharland (1929) and Hindwood (1940) actually belonged to this subspecies and not to *Z. l. lateralis*, even though Hindwood mentioned that most of the birds he saw on the island in 1936 appeared to be typical *lateralis*.

8. **Zosterops lateralis griseonota** G. R. Gray

Zosterops griseonota G. R. Gray, Proc. Zool. Soc. London 27, 1859, p. 161 — Island of Nu; the type is labelled as coming from Port de France (= Noumea).

Zosterops griseonota; G. R. Gray, Cat. Birds Trop. Isl. Pacific Ocean, 1859, p. 15 (New Caledonia (Island of Nu)); J. Verreaux & O. des Murs, Rev. Zool. (2) 12, 1860, p. 435 (Nouvelle-Calédonie, île de Nu); J. Verreaux & O. des Murs, Rev. Zool. (2) 14, 1862, p. 134 (la Nouvelle-Calédonie); Hartlaub, Journ. f. Orn. 13, 1865, p. 7, 20 (Neucaledonien und die Insel Nu); Hartlaub & Finsch, Beitr. Fauna Centralpolyn., Orn. Viti-, Samoa- und Tonga-Ins., 1867, p. 53 (Neu-Caledonien); G. R. Gray, Hand-List Birds I, 1869, p. 162 (New Caledonia); Marie, Act. Soc. Linn. Bordeaux 27, 1870, p. 328 (la Nouvelle-Calédonie); Bouchard, Cat. Av., 1876, p. 230 (Nova Caledonia); Giebel, Thes. Orn. III, 1877, p. 775 (Nov. Caledonia); Marie, Ibis (4) 1, 1877 (July), p. 362 (New Caledonia); Ridgway, Proc. U. S. Nat. Mus. 4, 1882 (10 March), p. 320 (no locality); E. L. Layard & E. L. C. Layard, Ibis (4) 6, 1882 (Oct.), p. 508 (New Caledonia); Tristram, Cat. Coll. Birds, 1889, p. 211 (Noumea, N. Caledonia); Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 289 (la Nouvelle-Calédonie); Finsch, Tierreich 15, 1901 p. 40 (Neu-Kaledonien); (pt.) Sharpe, Hand-List Birds V, 1909, p. 17 (New Caledonia); F. Sarasin, Neu-Caledonien, 1917, p. 30 (Niauliwald); Ridley, Dispersal of Plants, 1930, p. 469 (New Caledonia).

Zosterops griscinota; E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878, p. 259 (Noumea); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Neu-Caledonien).

Zosterops westernensis; (pt.) Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 158 (Nu, Port de France, New Caledonia); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (New Caledonia); (pt.) Nehrkorn, Kat. Eiersamml., 1899, p. 79 (Neu-Caledonien).

Zosterops griseonata; Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 290 (la Nouvelle-Calédonie); Fuhrmann, Les Ténias des Ois., 1932, p. 326 (Nouvelle Calédonie, Nouvelles Hébrides).

Zosterops flaviceps; (pt.) Finsch, Tierreich 15, 1901, p. 40 (Neu-Kaledonien); (pt.) Dubois, Syn. Av. I, 1902, p. 712 (Nouv.-Calédonie).

Zosterops lateralis griseonota; F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 2, 33, pl. I fig. 1 (Neu-Caledonien); Porta in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 170 (Nuovo Cáledonie: Oubatche); Menegaux, Rev. Fr. d'Orn. 3, 1914, p. 354 (la Nouvelle-Calédonie); Fuhrmann in Sarasin & Roux, Nova Caledonia, Zool. II, 1918, p. 400, 429, 443 (Nouvelle-Calédonie: Oubatche); Baylis, Ann. Mag. Nat. Hist. (10) 1, 1928, p. 614 (New Caledonia); Mathews, Syst. Av. Australas. II, 1930, p. 710 (New Caledonia); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 228 (Neu Caledonien); A. Meyer in Bronn, Klass. Ordn. d. Tierreichs IV, 2, 2, 1933, p. 192 (Neu-Kaledonien, Loyalty-Inseln); Mayr, Am. Mus. Nov. 912, 1937, p. 2 (New Caledonia); Mayr, Birds Southwest Pacific, 1945, p. 174 (New Caledonia); Warner, Orn. New Caledonia and Loyalty Isl. (unpubl. thesis), 1947, p. 219 (New Caledonia); M. Laird, Journ. Parasitol. 45, 1959, p. 47, 48, 49, 52 (Uitoé River, S. New Caledonia; Tontouta, New Caledonia); Yamaguti, Syst. Helminth. II, Cestodes of Vertebrates, 1959, p. 323 (New Caledonia); Baer, Traité de Zool. IV (1), 1961, p. 744 (no locality); Delacour, Guide Ois. Nouv. Calédonie, 1966, p. 146 (Nouvelle-Calédonie); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 317 (New Caledonia).

Zosterops lateralis; Leach, Emu 27, 1928, p. 40 (New Caledonia); Leach, Ois. Rev. Fr. d'Orn. 10, 1929, p. 336 (la Nouvelle Calédonie).

Zosterops griseotincta; Rausch & Morgan, Trans. Am. Microsc. Soc. 66, 1947, p. 209 (New Caledonia and New Hebrides); Yamaguti, Syst. Helminth. II, Cestodes of Vertebrates, 1959, p. 271 (New Caledonia).

Zosterops; Yamaguti, Syst. Helminth. V, Acanthocephala, 1963, p. 119 (New Caledonia).

Subspecific characters. Extremely similar to *familiaris*, from which this subspecies seems to differ only in its slightly larger size and in wing formula: 7>2 rather than 2>7. Bill perhaps not so blackish, more brownish in skins, but this character is doubtful. Differs from *tropica* and *flaviceps* in its smaller bill-size.

Measurements. Wing 12 ♂, 60-66 (63.46); 10 ♀, 60-65 (62.00); 22 specimens, 60-66 (62.80); tail 12 ♂, 45½-49 (47.13); 10 ♀, 43½-47, (45.25); 22 specimens, 43½-49 (46.27); tarsus 22 specimens, 17¾-20 (18.89); entire culmen 21 specimens, 12-14½ (13.36); exposed culmen 21 specimens, 9½-11 (10.17); culmen from anterior point of nostril 21 specimens, 6¾-8 (7.27).

Structure. As mentioned above, this subspecies belongs to the group with rounded wings, 6>2>9, usually 7>2>8.

Weights. ♂: 11.15, 11.35, 12.25, 12.8, 13, 13.05, 15.2; ♀: 11, 11, 13.1, 13.65, 13.7, 13.7 g.

Distribution. New Caledonia.

First collector. The skin kept as type, which is the oldest specimen I have seen, is registered in the British Museum under no. 54.4.19.6, which means that it has been received on 19 April, 1854. It was collected by John Macgillivray, who visited New Caledonia on board of H. M. S. "Herald" in 1853. See also Sharpe (1884, p. 158).

Not figured.

Types. BM nos. 54.4.19.6 (specimen examined, kept as type), and 1859.4.19.6.

Moult. Specimens collected in January (1), March (1), May (3), June (6), July (1), August (3), September (1), October (1) and November (1), are not in moult. One specimen collected in May and one collected in August show primary-moult, and another specimen collected in August is moulting its tail.

Nidification. According to the Layards (1882), the birds usually breed from August to October, and may be double-brooded. Their description of nest and eggs (two to four in number, turquoise-blue), shows that these are typical of the genus. Warner (1947) confirmed these observations, but noted a more extended breeding season.

Habits, etc. Macmillan in 1939 (notes on labels) found this form fairly common, but in numbers varying from day to day. This was probably because the birds moved from place to place as fruit ripened. He usually saw them in small parties, from four to six and up to twelve, and rarely more. The habitat seems to be fairly open country like *Lantana*-growth along river flats. While mixed flocks of *Z. lateralis griseonota* and *Z. xanthochroa* may be seen frequently the former never ventures far into forest, and the latter is rarely seen far from it. Macmillan and Warner agree that *Z. lateralis* is less common than *Z. xanthochroa*.

The food consists of both insects and vegetable matter. Stomachs examined by Macmillan contained small insects, various kinds of small berries, seeds, and red chili peppers. The Layards mentioned *Lantana* berries as a favourite food.

Intestines examined by Sarasin (1913) contained many parasites, especially Cestodes, described by Porta (1913) and Fuhrmann (1918).

Discussion. For further notes on the characters of this subspecies, see the discussion of *Z. l. tropica*. I do not know how the lapsus *griseotincta* (the name of a different species) for *griseonota,* occasionally found in parasitological literature, originated.

9. **Zosterops lateralis nigrescens** F. Sarasin

Zosterops lateralis nigrescens F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 34, pl. I fig. 2 — Maré und Ouvéa, Loyalty Inseln.

Zosterops lateralis nigrescens; Mathews, Syst. Av. Australas. II, 1930, p. 710 (Maré and Uvea); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 20 (Maré et Uvéa); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 228 (Maua und Ouvea); Mayr, Am. Mus. Nov. 912, 1937, p. 2 (Maré and Uvea); Mayr, Am. Mus. Nov. 1057, 1940, p. 1, 2, 3 (Uvea and Mare); Mayr, Birds Southwest Pacific, 1945, p. 174 (Maré, Uvea); Warner, Orn. New Caledonia and Loyalty Isl. (unpubl. thesis), 1947, p. 220 (Mare and Uvea); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 317 (Maré and Uvea).

Subspecific characters. Intermediate between *griseonota* and *melanops*. Differs from the former by having a blackish forehead, but this colour is not nearly as extended as in *melanops*. Under tail coverts almost white, with hardly any yellow.

Unfeathered parts. Not recorded on the labels of the specimens examined.

Measurements. Wing 20 ♂, 60½-65 (62.60); 13 ♀, 59-65 (62.88); 33 specimens, 59-65 (62.71); tail 20 ♂, 44-50 (47.08); 13 ♀, 43-49 (46.96); 33 specimens, 43-50 (47.03); tarsus 32 specimens, 17½-20¼ (19.27); entire culmen 32 specimens, 13¾-15½ (14.62); exposed culmen 32 specimens, 10-12 (11.40), culmen from anterior point of nostril 32 specimens, 7½-8¾ (8.21).

Structure. Wing rounded, 7>2>9.

Weights. ♂: 12.2, 14.0, 14.0, 14.3, 14.45, 14.6, 14.73, 15.12, 15.2, 15.25, 15.4, 15.7, 16.1, 16.4, 17.0, 17.1, 17.35, 17.9, 17.9 g; ♀: 12.6, 13.7, 15.1, 15.3, 15.4, 15.45, 15.5, 16.1, 16.5, 16.95, 17.05 (noted as very fat), 18.0 g.

Distribution. Maré, Uvéa and Beaupré Islands, in the Loyalty Group. This race had hitherto been recorded from Uvéa and Maré only, but Macmillan found it fairly common on Beaupré (better Beautemps Beaupré), where he collected an individual in June, 1938 (AMNH no. 337247).

First collector. Probably F. Sarasin on Maré, 27 November, 1911.

Figure. Sarasin (1913) plate I fig. 2, coloured figure of head.

Type. This subspecies was based on twelve specimens: eight skins and four specimens in alcohol, in the Basle museum. According to information kindly supplied by Dr. Sutter (in litt. 1-IX-1966) all these specimens are still present as skins, the four alcohol specimens having been prepared as skins at some later date. Particulars and registered numbers are as follows:

5710	♂	Fayaoué,	Ouvéa,	13	May	1912,	"Typus"
5711	♀	„	„	15	„	„	„
5712	♂	„	„	15	„	„	"Cotypus"
5713	♂	„	„	13	„	„	„
5714	♀	„	„	15	„	„	„
5715	♀	Netché,	Maré,	6	Dec.	1911	„
5718	♀	„	„	27	Nov.	„	„
5719	♂	„	„	14	Dec.	„	„

5720-23 Sex?, Fayaoué, Ouvéa, 13-15 May 1912 "Cotypus" (from spirits).

Dr. Sutter adds: "Die Nummern 5710 und 5711 hat Sarasin mit eigener Hand als "Typus" bezeichnet, wie es damals üblich war ein ♂ und ein ♀.

Allerdings sind diese Designationen in der Erstbeschreibung nicht publiziert. Wollen Sie entscheiden, ob No. 5710 als Holotypus gelten darf oder als Lectotypus bezeichnet werden muss. Von den beiden Sarasin'schen "Typus"-Exemplaren ist 5710 zugleich das bessere Stück".

Since in the description there is no mention of any one bird as the type, in my opinion all twelve specimens have, as matters stand now, equal status as cotypes, notwithstanding the fact that Sarasin himself marked only two as "Typus". If a lectotype has to be made, obviously Dr. Sutter's suggestion to take no. 5710 as such should be followed, but at present, I do not regard it opportune to do so.

Moult. Specimens collected in January (5), March (2), April (4), May (6), June (3), November (3) and December (1) do not show moult; some of the January specimens are in very worn plumage. Skins taken in March (1), April (1), May (3), June (1), November (1) and December (1) show moult; of these, two of the May specimens and the June specimen have almost completed their moult (of the primaries); the April specimen shows no wing-moult, but is moulting its rectrices, on the label of this bird appears the note: "very late moult". The data are insufficient to decide if there is a definite season for moulting.

Nidification. Sarasin (1913) describes a nest found on 6-XII-1911, on Maré. He does not mention anything about its contents, so that it was probably empty and abandoned. A female from Maré, collected on 10-XII-1937, showed a breeding patch and had an egg of 9 mm in the oviduct (Macmillan, note on label).

Habits, etc. According to Macmillan (notes on labels), *nigrescens* inhabits open types of scrub, native gardens, secondary growth of old gardens, *Lantana*-patches, scrub in Coconut-groves, etc., and is but rarely found in real forest. The stomachs of birds collected contained insects, seeds, *Lantana*-berries, *Carica papaya,* banyan figs, and chili peppers. Macmillan notes that in the field the birds are easily confused with *Z. xanthochroa,* but that their calls are different, higher pitched and thinner.

Discussion. *Z. l. nigrescens* is, as indicated above, intermediate between *griseonota* and *melanops,* and may well be of hybrid origin. The fact that it can be considered as having a disjunct range, on Uvéa and Maré, but not on Lifu where *melanops* occurs, lends support to this view. As, however, these populations are insular and seem more or less stabilized, I regard it as justified to retain for them their own subspecific name. The amount of blackish on the forehead is somewhat variable, but this needs not be an indication of hybrid origin, as there are many immatures in the series examined, and, like in other species with black on the crown (for example

Z. atricapilla, cf. this revision, pt. I, p. 130) the black may be less extensive in young birds. There is no difference between specimens from Maré, Uvéa and Beaupré.

10. **Zosterops lateralis melanops** G. R. Gray

Zosterops melanops G. R. Gray, Cat. Birds Trop. Isl. Pacific Ocean, 1859, p. 15 — Loyalty Islands [1]).

Zosterops melanops; Hartlaub, Journ. f. Orn. 13, 1865, p. 21 (Loyalty-Islands); G. R. Gray, Hand-List Birds I, 1869, p. 162 (Loyalty Isl.); Buller, Trans. N.Z. Inst. 3, 1871, p. 16 (Loyalty Islands); Boucard, Cat. Av., 1876, p. 230 (Loyalty I.); Giebel, Thes. Orn. III, 1877, p. 776 (Ins. Loyalty); E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878, p. 259 (Loyalty Islands); Tristram, Ibis (4) 3, 1879, p. 186 (Lifu); E. L. Layard & E. L. C. Layard, Ibis (4) 4, 1880, p. 225 (Loyalty Islands); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 198 (Loyalty Islands); Tristram, Cat. Coll. Birds, 1889, p. 211 (Kepenche, Lifu); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 36 (Lifu); Finsch, Tierreich 15, 1901, p. 39 (Lifu); Dubois, Syn. Av. I, 1902, p. 711 (Ile Lifu); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 377 (Loyalty Islands); Sharpe, Hand-List Birds V, 1909, p. 16 (Loyalty Is. (Lifu)); Page, Bird Notes N. S. 4, 1913, p. 3, 6 (Loyalty Is.); Fuhrmann, Les Ténias des Ois., 1932, p. 32 (Iles Loyalty).

Zosterops lateralis melanops; F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 2, 35, pl. I fig. 3 (Lifou: Quépénée); Brazil, Rev. Fr. d'Orn. 4, 1916, p. 221 (Lifou); Fuhrmann in Sarasin & Roux, Nova Caledonia, Zool. II, 1918, p. 400, 443 (Iles Loyalty: Lifou: Quépénée); Mathews, Syst. Av. Australas. II, 1930, p. 710 (Lifu Island); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 203, 228 (Lifou); Mayr, Am. Mus. Nov. 1057, 1940, p. 1 (Lifu); Mayr, Birds Southwest Pacific, 1945, p. 174 (Lifu); Warner, Orn. New Caledonia and Loyalty Isl. (unpubl. thesis), 1947, p. 219 (Lifu); Yamaguti, Syst. Helminth. II. Cestodes of Vertebrates, 1959, p. 323 (Loyalty Isl.); Delacour, Guide Ois. Nouv. Calédonie, 1966, p. 146 (Lifou); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 317 (Lifu).

Subspecific characters. Similar to *griseonota* from New Caledonia, but differs from that form as well as from all other races of the species by having forehead and the whole anterior part of the crown blackish. Size a trifle larger on an average.

Unfeathered parts. Iris yellow drab, bill corneous, legs pale brown (Layard).

Measurements of 11 specimens (7 ♂, 3 ♀, 1 ?): wing 61-65 (63.45), tail 45-50 (47.41), tarsus (10 specimens only) 19-20 (19.35), entire culmen 13¼-15¼ (14.30), exposed culmen 11-12 (11.25), culmen from anterior point of nostril 7-8¼ (7.93).

Structure. Like other Pacific races, this subspecies has a comparatively short 2nd primary, usually $7>2>8$ or $2 = 8$.

---

1) According to Mathews, Ibis (13) 6, 1936, p. 309, the actual date of publication was 14 January, 1860.

Weights, ♂: 14.5, 14.6, 15.5, 15.5, 17.15; ♀: 13.4, 13.9, 14.0 g.

Distribution. Confined to Lifu, Loyalty Islands.

First collector. The type and oldest known specimen was presented by Sir George Grey, who may have collected it personally, although I have found no other evidence that he visited Lifu.

Figure. Sarasin (1913), plate I fig. 3 (coloured figure of head).

Type. BM no. 54.5.31.12 (type examined).

Moult. Specimens collected in July (8) and August (2) do not show moult, they are in fairly fresh plumage.

Nidification. Apparently not recorded.

Habits, etc. Macmillan (notes on labels) found this subspecies fairly common around gardens and open types of scrub, generally in small parties of up to half a dozen and sometimes associating with other species of *Zosterops*. Stomachs contained *Carica papaya,* chili peppers, and various seeds and berries.

11. **Zosterops lateralis vatensis** Tristram

Zosterops vatensis Tristram, Ibis (4) 3, 1879, p. 444 — Havannah Harbour, Vate, New Hebrides.

Zosterops lateralis macmillani Mayr, Am. Mus. Nov. 912, 1937, p. 2 — Tanna, New Hebrides.

Zosterops griseinota; E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878, p. 270 (New Hebrides = Vate); Schmeltz, Verh. Ver. Naturw. Unterh. 4, (1877), 1879, p. 6 (in reprint) (Neu-Hebriden); Seth-Smith, Avicult. Mag. (4) 12, 1934 (May), p. 146 (new Hebrides); Goodfellow, Avicult. Mag. (4) 12, 1934 (July), p. 182 (Shepherd Group, New Hebrides).

Zosterops griseonota; E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878, p. 280 (Vate); Ramsay, Proc. Linn. Soc. N.S.W. 3, 1878 (1879?), p. 338 (Eromanga); (pt.) Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 158 (Erromanga); (pt.) Sharpe, Hand-List Birds V, 1909, p. 17 (New Hebrides).

Zosterops vatensis; Reichenow & Schalow, Journ. f. Orn. 27, 1879, p. 431 (Solomon Islands); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 158 (Vate); A. N[ewton], Encycl. Brit., 9th ed. XXIV, 1888, p. 824 (one of the New Hebrides); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Vate); Collett, Christiania Vidensk. Selsk. Forh. 13, 1892, p. 7 (Tongoa); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 446 (no locality); Page, Bird Notes N.S. 4, 1913, p. 1 (Vate).

Zosterops vateensis; Tristram, Cat. Coll. Birds, 1889, p. 212 (Havannah Harbour, Vaté).

Zosterops westernensis; (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Erromango, Vate, Ambrym, Mallicolo, Api).

Zosterops flaviceps; (pt.) Finsch, Tierreich 15, 1901, p. 40 (Neu-Hebriden); (pt.) Dubois, Syn. Av. I, 1902, p. 712 (Nouv.-Hébrides).

Zosterops lateralis vatensis; (pt.) Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 8 (Efate, Malekula, Pauuma, Lopevi, Ambrym, Epi); (pt.) Mathews, Syst. Av. Australas. II, 1930, p. 710 (the New Hebrides Archipelago, from Efate northwards...); (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 228 (Neue Hebriden von Efate nordwärts); (pt.) Mayr, Am. Mus. Nov. 912, 1937, p. 2 (northern New Hebrides);

(pt.) Mayr, Birds Southwest Pacific, 1945, p. 199 (northern New Hebrides from Erromanga northward); Parker, Bull. B. O. C. 87, 1967 (May), p. 91 (Tongoa I.); (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 318 (from Erromango...).

Zosterops lateralis; Mayr, Am. Mus. Nov. 986, 1938, p. 1 (Erromanga).

Zosterops lateralis macmillani; Mayr, Birds Southwest Pacific, 1945, p. 198 (Tanna, Aniwa); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 318 (Tanna and Aniwa).

Subspecific characters. Distinguished from other subspecies in the area by large size; the only other race of the species that almost equals it in size is *chlorocephala* (for differential characters, see under that subspecies). The southern populations have a tendency to blacking of forehead and crown, but this is not very pronounced.

Unfeathered parts. Iris brown or brownish, bill brownish or black, feet grey (Beck, Correia); iris dark brown (Layard); iris brown or reddish brown (Brenchley).

Measurements. Wing 25 ♂, 65½-74 (69.02); 19 ♀, 66-70 (67.92); 44 specimens, 65½-74 (68.55); tail 25 ♂, 48-56 (51.24); 19 ♀, 46-53 (49.39); 44 specimens, 46-56 (50.44); tarsus 43 specimens, 19½-22 (20.78); entire culmen 41 specimens, 14-17 (15.65); exposed culmen 41 specimens, 11¼-14 (12.60); culmen from anterior point of nostril 42 specimens, 8½-10 (9.09) [1]).

Distribution. The southern New Hebrides, where known from Tanna, Aniwa, Erromanga, Vate, Makura, Tongariki, Mai, Tongoa, Epi. Lopevi, Paama, Ambryum and Malekula. I have examined material from all the islands listed except Tongoa, whence Collett recorded the species.

First collector. Brenchley, on Erromanga in August 1865 (specimens collected in August and September, 1865, examined in the British Museum).

Not figured.

Type. The two cotypes (♂ and ♀), collected in November 1878 by Lieut. G. E. Richards, R. N., were in the Tristram Collection in the Liverpool Museum, and would have been destroyed.

Nidification. A clutch of two eggs, taken on Tongoa, 3-IX-1933, was described as pale blue, faintly glossy, measuring 19.4 × 14 and 18.9 × 13.5 mm (Parker, 1967).

Habits, etc. The Layards (1878) found this race in pairs in the cultivated grounds. Macmillan (notes on labels) collected individuals in open grassland with patches of scrub and scrubby gullies, and open places in forest. As

---

1) Several specimens from Tanna have been thrown away since Mayr published his paper and others are in a poor condition. Mayr found as wing length: 7 ♂, 70-73 (71.7); 7 ♀, 68-72 (70.3).

stomach contents he found insects, including grubs, and seeds of hardwood trees, guava and red pepper.

Discussion. The subspecies was correctly diagnosed by Tristram (1879) as "*Z. griseonota* affinis, sed robustior, rostro fortissimo...". The colour characters which Tristram also claimed to exist do not hold; the yellow of the throat is not more extended than in *griseonota*, but the birds are so much larger, that there is far more yellow, without the extension being greater. The existence of this difference was denied by later workers, for example Finsch (1901).

Mayr (1937) separated birds from Tanna and Aniwa from *vatensis* on account of their being darker and much larger, and with paler bill. Mayr refers to his *macmillani* as an excellent form of which he states in his discussion that: "It is surprising and highly interesting to find this giant race, right between the ranges of the very similar small *vatensis* (northern New Hebrides) and *griseonota* (New Caledonia)". From these remarks it is clear that Mayr regarded the name *vatensis* as applicable to the small birds of the northern New Hebrides.

TABLE III

Comparative wing-measurements of *Zosterops lateralis vatensis*

locality	males	females
Tanna	71, 73, 74	70, 70
Aniwa	69	
Erromanga	67, 68, 69, 69, 70 70½, 72	66, 66, 66½
Vate	66, 67, 67, 68	67½, 68, 69½
Makura	70, 71	67
Tongariki	70	
Mai		69
Epi	65½	68
Lopevi	67½, 68, 69	
Paama		66, 68½, 69
Ambryum	69	67, 67, 67½, 69, 69
Malekula	66, 69	

My own investigations show that all characters claimed by Mayr for *macmillani* hold true when this form is compared with the small birds from the northern New Hebrides hereafter described as a new subspecies. On comparison of material I find however that, though specimens from Tanna are definitely largest, Vate is also inhabited by a large-sized population and that on the basis of size alone it seems inadvisable to maintain *macmillani* (table III). As regards colour, the fuscous wash on the crown is quite distinct, but many birds from neighbouring Erromanga (which were retained in *vatensis* by Mayr) have exactly the same colour of crown. Birds from Vate have slightly brighter crowns than those from Tanna, with only faint traces of fuscous left, but the Erromanga series bridges the gap, several specimens being as bright as birds from Vate, others being indistinguishable from Tanna birds. As regards colour of bill the Erromanga birds are also intermediate. Birds from Paama appear to have the heads slightly brighter again than those from Vate. It appears therefore that as regards coloration there is, over the various islands, a smooth gradient rather than any clear cut break, and that, though *macmillani* represents one extreme in this gradient, *vatensis* is not quite at the other end of it. As these differences are rather slight it seems inadvisable to break up these populations, inhabiting a contiguous chain of islands, in two subspecies: I prefer to keep them all under one name. I have no doubt that Mayr was induced to describe *macmillani* because the fact that *vatensis* also applies to a large-sized population had been overlooked in recent years.

12. **Zosterops lateralis tropica** subspecies nova

Zosterops westernensis; (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (St. Bartholomew, Santo).

Zosterops griseonota; Sharpe, Ibis (7) 6, 1900, p. 346 (Espiritu Santo); Farquhar, Ibis (7) 6, 1900, p. 609 (Espiritu Santo); (pt.) Sharpe, Hand-List Birds V, 1909, p. 17 (New Hebrides).

Zosterops lateralis vatensis; (pt.) Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 8-10 (Malo, Espiritu Santo, Meralav or Melapav, Toga or Tog or South or Puka Puka, Low Island); (pt.) Mathews, Syst. Av. Australas. II, 1930, p. 710 (northern New Hebrides, including Banks and Torres Islands); (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 228 (Neue Hebriden ... nordwärts, einschliesslich der Banks- und Torres- Inseln); Mayr & Camras, Field Mus. Nat. Hist., Zool. 20, 1938, p. 457 (Vila Island, Espiritu Santo Island); W. E. Scott, Auk 63, 1946, p. 368 (Espiritu Santo); (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 318 (New Hebrides ... northward, Banks Islands (except Valua), and Torres group).

Zosterops vatensis; J. R. Baker, Ann. Mag. Nat. Hist. (10) 2, 1928, p. 297 (New Hebrides = Espiritu Santo); J. R. Baker, Man and Animals in the New Hebrides, 1929, p. 93, 109, 112, fig. 18 (New Hebrides = Espiritu Santo); Moreau, Wilk & Rowan, Proc. Zool. Soc. London 117, 1947, p. 359, 362 (no locality = Espiritu Santo).

Zosterops lateralis; A. J. Marshall & J. R. Baker, Proc. Linn. Soc. N.S.W. 65, 1940, p. 567 (New Hebrides = Espiritu Santo).

Subspecific characters. In plumage identical with *familiaris, vatensis, griseonota,* and *flaviceps,* but differs from *familiaris* by its wing formula (7>2), from *vatensis* by its smaller size, and from *griseonota* by its longer bill. Very similar to *flaviceps* but a little larger on an average; the bill is generally slightly longer, and particularly wider at the base; several specimens, however, are identical. Extremely similar to *tephropleura* from far-away Lord

Howe Island, but under tail coverts paler yellow, bill more slender at the base, though of identical length. The grey on the back is in this subspecies usually slightly more restricted than in the other forms mentioned: in the adjacent *valuensis*, of course, the grey has virtually entirely been replaced by green.

Unfeathered parts. Iris brown, bill black, horn below, legs grey or brownish (Hicks, Correia); iris brown, bill horn, legs dark plumbeous (Farquhar).

Measurements. Wing 19 ♂, 61-66 (63.66); 8 ♀, 59-65 (63.00); 28 specimens, 59-66 (63.46); tail 19 ♂, 43-47 (45.63); 8 ♀, 41½-47 (43.38); 28 specimens, 41½-47 (45.02); tarsus 27 specimens, 18½-21½ (19.67); entire culmen 26 specimens, 14¼-16 (15.27); exposed culmen 26 specimens, 11½-13½ (12.36), culmen from anterior point of nostril 26 specimens, 8¼-10 (8.97).

Distribution. The northern New Hebrides: Malo, Espiritu Santo, Tongoa (off Espiritu Santo, not to be confused with Tongoa near Epi); Banks Group: Gaua, Melapav, Ureparapara or Blight; Torres Group: Low Island, Toga.

First collector. Probably Captain A. M. Farquhar of H.M.S. "Wallaroo" on Espiritu Santo, 18 June, 1899. E. L. C. Layard (Layard & Layard, 1878, p. 280) observed birds which must have belonged to this subspecies on Santo, and St. Bartholomew (Malo), in June-July 1877, but he failed to procure any.

Not figured.

Type. ♂, 1-IX-1926, Espiritu Santo, leg. R. H. Beck, AMNH no. 214054.

Moult. Specimens collected in February (1), June (1), September (6), and November (10) are not in moult; specimens collected in February (4), July (1) and August (1) are undergoing their main moult. As the November specimens are in abraded plumage the main moult takes probably place early in the year.

Nidification. Baker (1929), ascertained a peak season of gonadal activity in males in September and October, and a minimum in March and April, with an average weight of the testes of 194 milligrammes in the first mentioned period, and only 12 milligrammes in the second period.

Habits, etc. Not recorded.

Discussion. The three subspecies *griseonota, tropica* and *flaviceps* are extremely close, and I have long hesitated before deciding what would be the best way to deal with them nomenclaturally. In colour there are no significant differences between the races, and the measurements of the wing are also very similar. However, *griseonota* differs from *tropica* in its definitely smaller bill: in the moderate series available, a 100 % separation was possible on the basis of this character. The difficulty is, however, that in bill-size the third race, *flaviceps* is intermediate; its bill length is closer to *griseonota*, with which there is considerable overlap, than to *tropica*, but some large-billed specimens cannot be distinguished from the latter. In the great majority of cases, however, *flaviceps* and *tropica* can be distinguished on bill-size. The agreement between *griseonota* and *flaviceps* is greater, but here an additional helpful character is the smaller wing-measurement of *flaviceps*. In other words, *flaviceps* is the smaller bird, but with the longer bill, and *griseonota* is the larger bird with the smaller bill. This means that in the bill:wing index of each the differences would be accentuated. The average indices (exposed culmen:wing) for the three subspecies are as follows: *griseonota* 16.2 %, *flaviceps* 17.7 %, *tropica* 19.5 %.

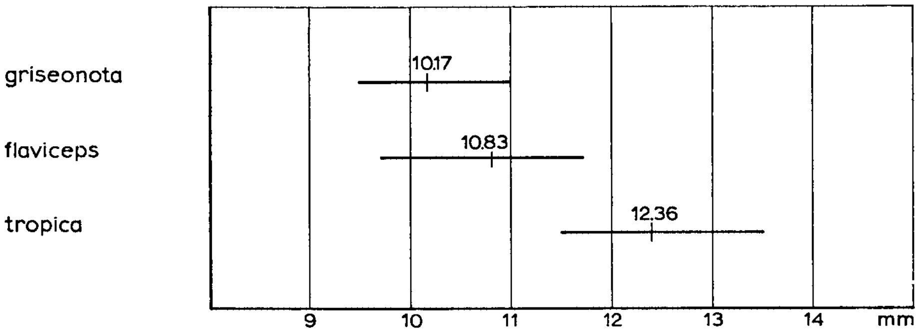


Fig. 8. Length of the exposed culmen (variation and means) in three very similar subspecies of *Zosterops lateralis*.

The only alternate way to deal with these three subspecies would be to bring them all under one name. This would, however, obscure the fact that *tropica* is clearly differentiated from *griseonota*, whereas a look at the map will show that such a classification would almost certainly be artificial.

13. **Zosterops lateralis valuensis** Murphy & Mathews

Zosterops lateralis valuensis Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 10 — island of Valua.

Zosterops lateralis valuensis; Mathews, Syst. Av. Australas. II, 1930, p. 711 (Valua Island); Snouckaert, Alauda (2) 3, 1931, p. 19 (Ile Valua); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 229 (Banks Gruppe: Valua); Mayr, Birds Southwest Pacific, 1945, p. 199 (Valua); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 318 (Valua).

Subspecific characters. In general characters and size similar to *tropica*, but whole upper back green, the grey being reduced to mere remnants; under tail coverts slightly darker yellow.

Unfeathered parts: iris brownish, bill brownish, horn below, feet grey (Beck).

Measurements of seven specimens (2 ♂, 2 ♀, 3 ?): wing 64½-66 (65.07), tail 44½-47½ (45.93), tarsus 18½-20¾ (19.97), entire culmen (six specimens only) 14-15¾ (15.00), exposed culmen (six specimens only) 12-13¼ (12.25), culmen from anterior point of nostril (six specimens only) 8½-9 (8.75).

Structure. 2nd primary in length between 6th and 8th.

Distribution. Confined to Valua Island, Banks Group, northern New Hebrides.

First collectors. Collectors of the Whitney South Sea Expedition: R. H. Beck, J. G. Correia and Hicks on 18 September, 1926.

Not figured.

Type. AMNH no. 214063.

Moult. Of seven specimens collected in September, one is in the last stage of primary moult, the others do not show moult.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. It is interesting to find here, on the fringe of the range of the species, another green-backed race, as remote as possible from *gouldi* of Western Australia. The affinities of *valuensis* lie clearly with *tropica* and other populations of the New Hebrides and the green back is almost certainly a secondary phenomenon, recently developed from grey-backed ancestors.

14. **Zosterops lateralis flaviceps** Peale

*Zosterops flaviceps** Peale, in U.S. Expl. Exp., Mamm. Orn., 1848, p. 95, Orn. pl. 25 — Venua Levu.

Zosterops caerulescens Var. *kandavensis* Ramsay, Proc. Linn. Soc. N.S.W. 1, 1876, p. 70 — Kandavu.

Zosterops lateralis mugga Mathews, Bull. B.O.C. 45, 1925, p. 86 — Viti, Fiji.

Zosterops flaviceps; Hartlaub, Arch. f. Naturg. 18 (1), 1852, p. 100, 130 (Venualevu); Hartlaub, Journ. f. Orn. 2, 1854, p. 168 (Feejee- oder Viti-Inseln); Cassin, U. S. Expl. Exp., Mamm. Orn., 1858, p. 167, 438, Orn. pl. 10 fig. 4 (Venua Levu); G. R. Grey, Cat. Birds Trop. Isl. Pacific Ocean, 1859, p. 15 (Feejee Islands); Hartlaub, Ibis 6, 1864, p. 232 (Feejee Islands); Hartlaub, Journ. f. Orn. 13, 1865, p. 7, 21 (Feejee-Islands); Hartlaub & Finsch, Beitr. Fauna Central-polynesiens, 1867, p. 52 (Venua Levu, Viti-Levu); G. R. Gray, Hand-List Birds I, 1869, p. 163 (Fiji I.); Buller, Trans. N.Z. Inst. 3, 1871 (May), p. 16 (Fiji Islands); E. L. Layard, Proc. Zool. Soc. London, 1875, p. 29 (Kandavu); E. L. Layard, Proc. Zool. Soc. London, 1875, p. 430 (Fiji); Cabanis & Reichenow, Journ. f. Orn. 24, 1876, p. 321 (Ovalau, Fidschi); E. L. Layard, Ibis (3) 6, 1876, p. 140, 153, 392 (Fiji Islands: Ovalau, Wakaia & Mokani, Vanua Levu, Taviuni, Loma-Loma & Mango, Viti Levu, Kandavu); Kleinschmidt, Journ. Mus. Godeffroy 12, 1876, p. 166 (Viti-Inseln: alle inseln der Gruppe); A. E. Brehm & Finsch, Gefangene Vögel I, 2, 1876, p. 286 (die Gruppe der Vitiinseln); Giebel, Thes. Orn. III, 1877, p. 775 (Viti); Finsch, Proc. Zool. Soc. London for 1877, (1878?), p. 733 (Levuka); Nehrkorn, Journ. f. Orn. 27, 1879, p. 396 (nidification); Finsch, Zool. Challenger Exp. VIII, 1880, p. 48, pl. XIV fig. 1 (Levuka); Ridgway, Proc. U. S. Nat. Mus. 4, 1882, p. 320 (no locality); Crowley, Cat. Birds' Eggs, 1883, p. 16 (no locality); Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 7, 19, 20 (Viti Levu); Tristram, Cat. Coll. Birds, 1889, p. 211 (Ovalau, Rewa); (pt.) Finsch, Tierreich 15, 1901, p. 40 (die ganze Gruppe der Fidschi-Inseln); (pt.) Dubois, Syn. Av. I, 1902, p. 712 (Iles Fidji); Sharpe, Hand-List Birds V, 1909, p. 17 (Fiji Is.); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Viti Inseln); Bahr, Ibis (9) 6, 1912, p. 299 (Suva, Vitilevu); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. V, 1912, p. 7 (Fiji); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1, 1913, p. 34 (Fidji); Townsend & Wetmore, Bull. M.C.Z. 63, 1919, p. 162 (Viti Levu); Wetmore, Bull. M.C.Z. 63, 1919, p. 224 (Viti Levu); Stoner, Univ. Iowa Stud. Nat. Hist. 10, 1924, p. 132 (Vitilevu); Wetmore, Ibis (12) 1, 1925, p. 854 (Suva, Suva Point, Viti Levu: MBenga); Wood, Ibis (12) 2, 1926, p. 135 (Fiji Islands: on all the islands visited); Berlioz, Ois. & Rev. Fr. d'Orn. 19, 1929, p. 585 (Iles Viti); Timmermann, Beitr. Fortpfl.-biol. Vögel 7, 1931 (Juli), p. 140 (Taviuni); Barlett, Proc. Am. Philos. Soc. 82, 1940, p. 695 (Venua Levu, Feejee Islands).

Zosterops westernensis; (pt.) Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 157 (Levuka, Ovalau, Taviuni); Reichenow, Journ. f. Orn. 39, 1891, p. 129 (Viti Levu); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Fiji Is.); (pt.) Nehrkorn, Kat. Eiersamml., 1899, p. 79 (Viti-Inseln).

Zosterops explorator; Nicoll, Ibis (8) 4, 1904, p. 63 (Suva).

Zosterops; (pt.) Harrison, Austr. Nat. 1, 1907 (April), p. 70 (Fiji).

Zosterops lateralis flaviceps; Mathews, Ibis (12) 5, 1929, p. 693 (Vanua Levu Island, Fiji); Mathews, Syst. Av. Australas. II, 1930, p. 710 (Fiji Islands (all the Group)); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 229 (Alle Inseln der Fidji-Gruppe); Mayr & Camras, Field Mus. Nat. Hist., Zool. 20, 1938, p. 457 (Viti Levu Island); Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 206 (Fiji); Mayr, Birds Southwest Pacific, 1945, p. 147 (Fiji: on the main islands from Kandavu to Taviuni and on all the adjacent smaller islands, also on Ngau, Koro, and Moala, but is absent from the entire Lau Archipelago); Deignan, U.S. Nat. Mus. Bull. 221, 1961, p. 510 (Vanua Levu Island); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 318 (distribution).

Zosterops lateralis mugga; Snouckaert, Alauda (2) 3, 1931, p. 19 (Fidji).

Zosterops vesternsis; Ward, Trans. Fiji Soc., 1939-1940, 1940, p. 24 (Suva).

Zosterops lateralis; Morgan & Morgan, Notornis 12, 1965, p. 168 (throughout Fiji); Mercer, Field Guide Fiji Birds, 1966, p. 24 (Fiji).

Subspecific characters. Very similar to *griseonota*, but bill on an average somewhat longer, in other measurements slightly smaller, perhaps the grey of the back a little less extended. Very similar to *tropica*, but a little smaller in all dimensions, including the bill. See further the discussion of *tropica*.

Unfeathered parts. Iris brown, bill brownish, legs greyish (Correia); iris brown or yellowish, bill brown, horn below, legs grey, light grey, or flesh (Beck); iris brown, bill livid brown, legs livid or livid flesh colour (Layard).

Measurements. Wing 41 ♂, 58-66 (61.66); 32 ♀, 57½-64 (60.67); 84 specimens, 57½-66 (61.15); tail 41 ♂, 41-50 (44.85); 32 ♀, 41-47 (43.94); 84 specimens, 37, 40-50 (44.15); tarsus 80 specimens, 17-19½ (18.37);

entire culmen 76 specimens, 12¼, 13-15 (13.66); exposed culmen 77 specimens, 9¾-11¾ (10.83); culmen from anterior point of nostril 77 specimens 7-8¾ (7.91).

Structure. In this subspecies the 2nd primary comes in length between the 6th and the 8th; in other words it has a moderately rounded wing.

Distribution. Fiji Islands, where widely distributed though apparently absent from the whole Eastern (or Lau) Group. I have examined material from 27 islands, as follows: Kandavu, Kioa, Koro, Levuka, Makongai, Malaki, Mbatiki, Moala, Moengha, Nairai, Namena, Nathoulla, Naviti, Ngau, Ovalau, Taviuni, Vanua Kula, Vanua Levu, Vatu Leile, Viti Levu, Viwa, Vura, Waia, Wakaya, Yanuya (= Yandue?), Yasawa, and Yaukuve.

First collector. T. Peale of the U. S. Exploring Expedition, on 15 June, 1840 (the type), in a *Casuarina* growth on Vanua Levu.

Figures. Peale (1848) plate 25 (not seen); Cassin (1858) Orn. plate 10 fig. 4 (coloured, by G. G. White, on natural size; very poor, colour of green wrong, back bluish instead of grey, eye-ring and loral line altogether missing); Hartlaub & Finsch (1867) plate VI (coloured, two-thirds natural size, by O. Finsch: a picture of two birds attending a nest; primitive but attractive); Finsch (1880) plate XIV fig. 1 (coloured, on natural size, by J. Smit: the eye-ring has been overlooked, the breast is too grey, and the tail rather stumpy).

Type. USNM no. 15762 (cf. Deignan, 1961, p. 510).

Moult. A clear moulting season is not evident from the available data summarized in table IV, but as many of the non-moulting birds collected from October tot January are in more or less worn plumage, and the majority of birds collected in January and February are undergoing their main moult, its appears that the first two or three months of the year may be regarded as the main moulting season (see also Bahr, 1912). But the large proportion of birds moulting around the middle of the year would appear to contradict this.

TABLE IV

Moult in *Zosterops lateralis flaviceps*

month	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
no moult	7	2	1	—	1	1	7	—	1	20	6	3
moult	10	9	1	—	2	1	5	—	—	2	1	—

Nidification. Nest and eggs were described as early as 1867 by Finsch & Hartlaub, who had received their material from Gräffe. Subsequently Layard appears to have collected a number of nests and eggs, which found their way to private collectors (Crowley, Nehrkorn), and ultimately to museums. Kleinschmidt (1876) made also a contribution. The nest is thoroughly typical (Layard mentions that he saw "never any thing like that wonderful structure figured by Finsch & Hartlaub", which must have been somewhat embellished); the eggs are pale blue, usually three, perhaps sometimes four to a clutch and measure according to Ogilvie-Grant (10 specimens) 16.6 to 17.3 × 12.7 mm (.66 to .68 by .5); figures given by Nehrkorn (1879, 1910) are a trifle larger. Kleinschmidt (1876) recorded a clutch-size of five. Timmermann (1931) recorded an egg of 13.3 × 10.9 mm, weight 0.055 g, and noted rightly that this is remarkably small.

Layard (1875) recorded breeding in September, and Wood saw a pair building a nest on 23 July 1923. The skins examined by me included two pulli, taken 12 November and 5 December 1924, on Kandavu and Kioa Island respectively (AMNH nos. 253011, 253019).

Habits, etc. This subspecies is apparently common in gardens and similar habitat, moving about in flocks in typical *Zosterops*-fashion (Layard, 1875; Bahr, 1912; Wood, 1926).

The food consists of the usual variety of fruits, berries and insects (Kleinschmidt).

The call-note was described by Bahr as a particularly sweet twittering note, and by Wood as a low but distinct twitter. Kleinschmidt (1876) called it: "ein helles gezogenes . . ."Gi" ". Song appears not to have been recorded.

Discussion. For a discussion of the characters of this race I refer to what has been written under *Z. l. tropica*.

Species 39. **Zosterops strenua** Gould

Zosterops strenuus Gould, Proc. Zool. Soc. London 23, 1855 (18 Dec.), p. 165, 166 — Lord Howe's Island.

Zosterops strenuus; Gould, Birds Austr. Suppl., 1859, p. 95, pl. 48 (Lord Howe's Island); G. R. Gray, Ibis 4, 1862, p. 222 (Lord Howe's Island); Gould, Birds Austr. II, 1865, p. 537 (Lord Howe's Island); Bennett, Proc. Zool. Soc. London for 1869, 1870, p. 471 (Lord Howe's Island); Ramsay, Proc. Linn. Soc. N.S.W. 7, 1882, p. 88 (Lord Howe's Island); Palacký, Die Verbr. d. Vögel, 1885, p. 120 (Norfolkinsel); Buller, Hist. Birds N.Z., 2nd ed. I, 1888, p. lviii (Lord Howe's Island); Etheridge. Austr. Mus. Mem. 2, 1889, p. 9, 17 (Lord Howe Island); Stone & Mathews, Austral Av. Rec. 1, 1913. p. 183 (Lord Howe Island).

Zosterops strenua Hartlaub, Journ. f. Orn. 13, 1865, p. 18 (Lord Howe's Island); G. R. Gray, Hand-List Birds I, 1869, p. 162 (Lord Howe's I.); Boucard, Cat. Av., 1876, p. 230 (L. Howe I.); Giebel, Thes. Orn. III, 1877, p. 777 (Lord How.); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 155 (Lord Howe's Island); A. N[ewton], Encycl. Brit., 9th ed., XXIV, 1888, p. 824 (Lord Howe's Island); Tristram, Cat. Coll. Birds, 1889, p. 212 (Lord Howe's Isld.); Finsch, Tierreich 15, 1901, p. 41 (Lord Howe Insel); Dubois, Syn. Av. I, 1902, p. 712 (Ile Lord-Howe); Legge, Rep. Australas. Ass. Adv. Sc. 10, (Dunedin 1904), 1905, p. 252 (Lord Howe); Mathews, Emu 7, Suppl., 1908, p. 90 (Lord Howe Is.); Hull, List Birds Austr., 1909, p. 25 (no locality); Sharpe, Hand-List Birds V, 1909, p. 17 (Lord Howe Is.); Hull, Proc. Linn. Soc. N.S.W. 34, 1910, p. 641, 690 (Lord Howe Island); Cleland, Emu 11, 1911, p. 95 (stomach contents); Mathews, Nov. Zool. 18, 1912 (Jan.), p. 450 (Lord Howe Island); Oliver, Trans. N.Z. Inst. 44, (1911), 1912 (10 June), p. 219 (Lord Howe Island); A. J. Campbell & al., Emu 12, Suppl., 1913, p. 108 (Lord Howe Id.); Page, Bird Notes N.S. 4, 1913, p. 1 (Lord Howe's Island); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 36 (Lord Howe-Insel); Hall, Emu 19, 1920, p. 283, 287 (Lord Howe Island); Rothschild & Hartert, Bull. B.O.C. 43, 1923, p. 118 (Lord Howe's Island); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 205, 229 (Lord Howes Insel); Lack, Ibis 86, 1944, p. 266 (Lord Howe I.); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 335 (no locality); Stresemann, Mitt. Zool. Mus. Berlin 30, 1954, p. 47 (Lord Howes Island); Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1956, p. 172 (Lord Howe); Greenway, Extinct Birds, 1958, p. 6, 71, 427-428, fig. 82 (Lord Howe Island); Berndt & Meise, Naturgesch. d. Vögel I, 1959, p. 290 (Lord-Howe-Insel); Moreau in Thomson, New Dict. Birds, 1964, p. 886 (Lord Howe Island); McKean & Hindwood, Emu 64, 1965, p. 94 (Lord Howe Island); Vincent, Red Data Book, Aves, List extinct birds, 1966, p. 20 (Lord Howe Island); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 318 (Lord Howe Island).

Zosterops strennuus; Wallace, Geogr. Distrib. Anim. I, 1876, p. 454 (Lord Howe's Island).

Zosterops Strenuus; Broinowski, Birds Austr. IV, 1890, pl. IX fig. 3 (Norfolk Island).

Nesozosterops strenua; Mathews, List Birds Austr., 1913, p. 324 (Lord Howe Island); Mathews, Birds Norfolk & Lord Howe Isl., 1928, p. 53 (Lord Howe Island); Mathews, Syst. Av. Australas. II, 1930, p. 712 (Lord Howe Island); Mathews, List Birds Australas., 1931, p. 376 (Lord Howe Island); Mathews, Suppl. Birds Norfolk & Lord Howe Isl., 1936, plate facing p. 10 (no locality); Hindwood, Austr. Mus. Mag. 6, 1938, p. 323 (fig.), 324 (Lord Howe Island); Hindwood, Emu 40, 1940, p. 14, 20, 72, 74 (Lord Howe Island); Mathews, Working List Austr. Birds, 1946, p. 122 (Lord Howe Island); Paramonov, Pacific Sc. 14, 1960, p. 77 (Lord Howe Island).

Zosterops albogularis, also called *strenuus;* Sharland, Emu 29, 1929, p. 10 (Lord Howe Island).

Nezosterops strenua; Hindwood, Emu 32, 1932, p. 27 (Lord Howe Island).

Characters. A very large species which, except for its size, is in appearance very similar to *Z. lateralis familiaris.*

Upper parts. Forehead, crown, nape, sides of head, lower back and upper tail coverts Warbler Green; upper back grey as in *Z. lateralis;* supra loral region slightly yellower, a blackish grey loral streak which is continued to below the posterior part of the eye; eye-ring white, of average width, interrupted in front by a dark spot; primaries, secondaries and rectrices brownish black, all broadly edged with Warbler Green.

Under parts. Chin, throat and upper breast Strontian Yellow; under tail coverts of the same colour but paler; remainder of under parts pale grey, almost white on the middle of the belly, strongly suffused with buff on the flanks.

Unfeathered parts. Iris yellowish brown or brown or bright brown, bill blue-black and grey, legs light blue-grey (Bell).

Measurements. Wing 37 ♂, 68-76 (71.49); 26 ♀, 67-72 (69.92); 74

specimens, 67-76 (71.02); tail 37 ♂, 49-56½ (51.99); 25 ♀, 49-53 (51.22); 73 specimens, 49-56½ (52.03); tarsus 74 specimens, 21-23 (21.76); entire culmen 74 specimens, 18½ (juv.?), 21-25¼ (23.23); exposed culmen 74 specimens, 14½, 16-21 (18.73); culmen from anterior point of nostril 74 specimens, 10-16 (13.83).

Structure. Wings rounded, 2nd primary in length between 7th and 10th; tail relatively long, average index of 73 specimens, 73%.

Distribution. Confined to Lord Howe Island. Extinct.

First collector. John Macgillivray of H. M. Surveying Ship "Herald" in 1853 (Gould, 1855; Hindwood, 1940).

Figures. Gould (1859) plate 48 (coloured plate of two individuals on natural size by Gould and Richter, good, but the yellow of the throat appears too greenish and not quite bright enough. The colour of the iris is shown as pale hazel, almost whitish; at the time only the type specimen was available and the iris colour was unknown, so that Gould and Richter must have guessed. Actually the colour of the iris is brown). Broinowski (1890), plate IV fig. 3 (coloured plate of natural size, very mediocre); Mathews (1928), plate 27, second figure from top (coloured plate on natural size by Grönvold); Mathews (1936), plate opp. p. 10, figs. 5, 6, 7, 8 (black and white drawings of head, bill, leg and wing; the white eye-ring is erroneously shown as not interrupted in front); Hindwood (1938), p. 323 (black and white reproduction of the plate published by Mathews in 1928); Greenway (1958), fig. 82 (pen and ink drawing in black and white).

Type. BM no. 55.10.23.2 (type examined). As the species was apparently based on but a single individual (Gould, 1865, p. 537), this is a holotype (but see discussion).

Moult. See table V; the data are inconclusive, but suggest that some moulting may take place all through the year, and that the main period is perhaps from December till February.

TABLE V

Moult in *Zosterops strenua*

month	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
moult	6 1)	3 2)	—	—	2 3)	—	1 4)	1 5)	—	—	1 6)	2 5)
no moult	8	—	—	—	8	—	1	7	1	7	13	2

1) 3 primaries, 3 primaries and rectrices.
2) primaries; moult almost completed.
3) one primaries, one primaries and rectrices.
4) primaries and rectrices.
5) primaries.
6) secondaries only.

Nidification. Hull (1910), in October 1907, personally only found old nests, but described a nest with two eggs taken by a Mr. H. Wilson on 20-XI-1909. He described the eggs as of the usual *Zosterops* type, dimensions 0.88 × 0.58 and 0.82 × 0.58 inch (= 22.0 × 14.5 and 20.5 × 14.5 mm). This clutch is now in the National Museum of Victoria (H. L. White collection).

Mathews (1928) gave much smaller measurements for eggs ascribed to this species. As it is unlikely that this species, so closely related to *Zosterops l. lateralis,* but so much larger, would have eggs of the same size as the latter, I think that Mathews's eggs were of *Z. l. lateralis.* Mr. Sims (in litt., 23-VIII-1955) has informed me that there are no eggs of *Z. strenua* in the Mathews collection (now in the British Museum), neither are there any in the British Museum main collection.

The only certain breeding record is therefore that of the clutch of two eggs taken in November; as Hull found no evidence of breeding in October, November may have been the beginning of the breeding season.

Habits, etc. All early visitors to Lord Howe Island agreed that the species was plentiful. Etheridge (1889) met with it in small flocks, equally plentiful both in the open spaces and thick scrub, and Hull (1910) spoke of great numbers. In 1913, Bell (quoted by Hindwood, 1940) recorded that the "Big Grinnels" as they were known locally, were in thousands and were highly destructive not only to fruit and other crops, but to other birds, sucking their eggs. The only other note on food is by Cleland (1911) who found an unidentified fruit in a stomach. The habit of sucking eggs, as noted by Bell, is of considerable interest, I am not aware that it has ever been recorded in other members of the family. Etheridge's (1889) observations are interesting inasmuch as they show that, contrary to that other giant of the genus, *Z. albogularis, Z. strenua* had not lost the habit of being social and living in parties.

Voice. Hull (1910) noted: "... its powerful song makes music all day long in the palm-glades and on the wooded hillsides". From this it may perhaps be deduced that the song of the species was stronger than that of *Z. lateralis.*

Discussion. The species was last observed and collected by an ornithologist in May 1914 (several specimens, leg. R. Bell), when it was still plentiful. Sharland (1929) and Hindwood (1940) have related the sad story of the accidental introduction of rats on Lord Howe Island in 1918, with the subsequent disastrous effect on its bird life. The species must have become extinct between 1918 and 1928, presumably in the early 'twenties. Recently Paramonov (1960) has expressed hope about the possible survival of this and other endemic forms. While one would like to be able to be optimistic, Mr. K. A. Hindwood (in litt., 14-X-1962) has informed me that in 1961 Mr. J. McKean during a stay of several weeks on the island, and notwithstanding a thorough search, did not manage to rediscover any of the birds that had previously been regarded as extinct, see also McKean & Hindwood (1965, p. 81).

Because the species is extinct I have attempted a census of material extant in collections; I have traced skins as follows: Berlin, 2 (Stresemann, 1954); Leiden, 2; London, 11, including the type; Harvard, 1 (Greenway, in litt., 24-IX-1955); New York, 57; Australian Museum, Sydney, 11; Macleay Museum, Sydney, 2; Washington, 2. This gives a total of 88 specimens, and there may be a few more in some of the smaller institutions of Europe and the United States. Apart from the type and the bird discussed below, all the material I have seen originated from two sources: the Australian Museum Expedition of 1887, and Roy Bell (July 1913-May 1914). I have examined all specimens with the exception of those in Berlin, Harvard and the Australian Museum.

In view of Gould's (1865) explicit statement that only a single specimen of *Z. strenua* had "yet been transmitted to this country", the presence of an old individual in the Rijksmuseum van Natuurlijke Historie is difficult to explain. This bird has been mounted, and was taken off its stand by Finsch, who copied, as was his custom, any notes that were written on the sockle on to a new label. On this label he has noted: "*Z. strenua,* Gould. Nouv. Zélande Tem. old lab.". Temminck died in 1858, and his handwriting was quite characteristic, so that Finsch is unlikely to have made a mistake. The specimen would therefore have been received before 1858, and if so must have been collected by Macgillivray. Moreover, it would probably have been received through Gould, with whom Temminck stood in continuous lively relation of exchange, though it might possibly have been purchased through the dealer Frank who acquired also material from Macgillivray (cf. p. 136).

Z. strenua is clearly a derivative of *Z. lateralis,* and more in particular of *Z. l. familiaris,* with which it shares the bright yellow throat and rather pale flanks, and my opinion is that it is not a very old species. Mathews (1912), when he based the genus *Nesozosterops* on *Z. strenua,* tried to make much of its bill-length, the bill being proportionally longer than in *Z. lateralis* and other small species. However, there seems to be a tendency for larger species to have proportionally longer bills, and this is therefore only a matter of overall size. The genus *Nesozosterops* as envisaged later by Mathews and other authors, is clearly artificial, as three species, *Z. stre-*

nua, Z. tenuirostris, Z. albogularis, were included in it, each of which has obviously independently developed from *Z. lateralis.* The problem of correlation between size and proportions will be fully discussed in one of the concluding sections of this paper.

Species 40. **Zosterops tenuirostris** Gould

Zosterops tenuirostris Gould, Proc. Zool. Soc. London 4, (1836), 1837 (16 Jan.), p. 76 — Australiâ apud flumen Murrumbidgee (errore!) = Norfolk Island.

Zosterops tenuirostris; Gould, Syn. Birds Austr. I, 1837 (Jan.), p. — (Australia: locality, banks of the Morumbidgee; and other parts of the interior of New South Wales); Lesson, Rev. Zool. Soc. Cuv. 3, 1840, p. 135 (Nouvelle-Hollande; rives de la Murrumbidgie); Strickland, Ann. Mag. Nat. Hist. 11, 1843, p. 336 (no locality); Hartlaub, Verz. Samml. Bremen, 1844, p. 37 (Neuholland); Drapiez, Dict. Sc. Nat. X, 1845, p. 742 (l'Australie); Reichenbach, Handb. spec. Orn., Merop., 1852, p. 95 (am Flusse Murrumbidgee); Gould, Birds Austr. Suppl., 1859, p. 93, pl. 47 (Norfolk Island); Pelzeln, Sitzungsber. Ak. Wiss. Wien 41, 1860, p. 320 (Insel Norfolk); G. R. Gray, Ibis 4, 1862, p. 222 (Norfolk Island); Hartlaub, Journ. f. Orn. 13, 1865 (Jan.), p. 18 (Norfolk Island); Gould, Handb. Birds Austr. II, 1865 (2 Dec.), p. 536 (Norfolk Island); G. R. Gray, Hand-List Birds I, 1869, p. 162 (Moreton Bay); Wallace, Geogr. Distrib. Anim. I, 1876, p. 453 (Norfolk Island); Boucard, Cat. Av., 1876, p. 230 (L. Howe I.); Giebel, Thes. Orn. III, 1877, p. 777 (Ins. Norfolk); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 154 (Norfolk Island); Crowfoot, Ibis (5) 3, 1885, p. 270 (Norfolk Island); Palacký, Die Verbr. d. Vögel, 1885 (after July), p. 120 (Norfolkinsel); A. N[ewton], Encycl. Brit., 9th ed., XXIV, 1888, p. 824 (Norfolk Island); Tristram, Cat. Coll. Birds, 1889, p. 212 (Norfolk Island); Broinowski, Birds Austr. IV, 1890, pl. IX fig. 2 (Norfolk Island); North, Descr. Cat. Birds, (1889), 1890, p. 412 (Norfolk Island); Nehrkorn, Kat. Eiersamml., 1899, p. 79 (Norfolk-Inseln); Finsch, Tierreich 15, 1901, p. 42 (Norfolk-Insel); Dubois, Syn. Av. I, 1902, p. 712 (Ile Norfolk); Metcalfe in North, Rec. Austr. Mus. 5, 1904, p. 338 (Norfolk Island); Mathews, Emu 7, Suppl., 1908, p. 90 (Norfolk Is.); Sharpe, Hand-List Birds V, 1909, p. 17 (Norfolk Is.); Hull, List Birds Austr., 1909, p. 25 (no locality); Hull, Proc. Linn. Soc. N.S.W. 34, 1910, p. 641, 691 (Norfolk Island); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Norfolk Inseln); Iredale, Proc. Linn. Soc. N.S.W. 35, 1911, p. 781 (Norfolk Island); Mathews, Nov. Zool. 18, 1912 (Jan.), p. 450 (Norfolk Island); Oliver, Trans. N.Z. Inst. 44, (1911), 1912 (10 June), p. 220 (Norfolk Island); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. V, 1912 (after 12 Sept.), p. 7 (Norfolk Island); A. J. Campbell & al., Emu 12, Suppl., 1913 (Jan.), p. 108 (Norfolk Island); Stone & Mathews, Austral Av. Rec. 1, 1913 (20 March), p. 182 (Norfolk Island); Page, Bird Notes N. S. 4, 1913, p. 1 (Norfolk Island); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 36 (Norfolk-Insel); Hall, Emu 19, 1920, p. 287 (Norfolk Island); Ashby, Emu 25, 1925, p. 113 (Norfolk Island); Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 6 (Norfolk Island); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 205, 229 (Norfolk-Insel); Meise, Proc. 8th Int. Orn. Congr. (1934), 1938, p. 67 (no locality); Mayr, Am. Nat. 74, 1940, p. 271 (Norfolk Isl.); Mayr, Systematics and the Origin of Species, 1942, p. 158, 173 (Norfolk Island); Lack, Ibis 86, 1944, p. 266 (Norfolk I.); Lack, Occ. Pap. Calif. Ac. Sc. 21, 1945, p. 130 (Norfolk Island); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 335 (Oceania); G. R. Williams, Ibis 95, 1953, p. 685 (Norfolk Island); Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1956, p. 172 (Norfolk Island); Welty, Life of Birds, 1962, p. 494 (Norfolk Island); Mayr, Animal Species and their Evolution, 1963, p. 506 (Norfolk Island); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 318 (Norfolk Island).

Zosterops caerulescens; G. R. Gray, Ann. Mag. Nat. Hist. 11, 1843, p. 191 (Australia).

Nesozosterops tenuirostris; Mathews, List Birds Austr., 1913, p. 324 (Norfolk Island); Mathews, Birds Norfolk & Lord Howe Isl., 1928, p. 52 (Norfolk Island); Mathews, Syst. Av. Australas. II, 1930, p. 712 (Norfolk Island); Mathews, List Birds Australas., 1931, p. 376 (Norfolk Island); Mathews, Suppl. Birds Norfolk & Lord Howe Isl., 1936, p. 8 (no locality = Norfolk Island); Mathews, Working List Austr. Birds, 1946, p. 122 (Norfolk Island); Anonymus, Austr. Encycl. VI, 1958, p. 350 (Norfolk Island); Hindwood, Austr. Zool. 13, 1965, p. 86 (Norfolk Island); Marsh & Pope, Austr. Nat. Hist. 15, 1967, p. 398 (Norfolk Island).

Neozosterops albogularis; Iredale, Austr. Zool. 12, 1955, p. 128 (Norfolk Island).

Characters. A very large species which in general appearance is very close to *Z. lateralis* but differs by having the whole under surface suffused with yellow without sharp boundary between a yellow throat and a paler breast as in other forms of the *lateralis*-group, and by a more brownish, less pure grey tinge of the back.

Upper parts. Forehead, crown, neck, and sides of head varying from Serpentine Green to Warbler Green; back between Deep Grayish Olive and Buffy Olive, this colour not sharply demarcated against the greener colour of head and neck; upper tail coverts slightly to rather distinctly more greenish; lores, and their continuation under and even behind the eye-ring, black; eye-ring white, medium-sized, interrupted in front by the black lores; upper wing coverts, primaries, secondaries and rectrices brownish black, all with broad Serpentine Green outer margins.

Under parts. Throat and upper breast between Lemon Yellow and Lemon Chrome, this colour smoothly fading away to the Massicot Yellow centre of the belly and the Citron Yellow under tail coverts, and the greyish buff flanks.

Unfeathered parts. Iris bright brown, dark bright brown, yellowish brown or (once) light yellow, bill light and dark grey, or light grey tinged yellow, legs light grey tinged blue or light blue-grey or flesh blue tinged yellow (R. Bell); iris brown (Hicks, Correia); bill, upper horngrey, lower dirty white, legs dirty flesh colour (Mees).

Measurements. Wing 8 ♂, 63-71 (67.50); 4 ♀, 64-68 (65.75); 12 specimens, 63-71 (66.92); tail 8 ♂, 46-50 (47.38); 4 ♀, 45½-48 (46.50); 12 specimens, 45½-50 (47.08); tarsus 11 specimens, 20-22¾ (20.95); entire culmen 12 specimens, 17-19 (18.00); exposed culmen 12 specimens, 13-15¾ (14.38); culmen from anterior point of nostril 12 specimens, 10-11½ (10.69).

Structure. This species has a relatively long tail, average tail:wing index of twelve specimens 70.36%, and a fairly long bill. Wing-formula normally 8>2>9, once 2 = 9.

Distribution. Norfolk Island, where common in woodland.

First collector. Unknown, but probably one of the officers in charge of the penal colony, before 1837.

Figures. Gould (1837), coloured fig. of head: the colour of the iris is incorrectly shown as grey instead of brown. Gould (1859) plate 47 (coloured plate of two birds on natural size by Gould and Richter; the reddish tinge shown on the breasts of the birds depicted is not natural and must have been caused by stain of some sort). Broinowsky (1890) plate IX fig. 2 (coloured plate on natural size, poor: for an example, Gould's plate was apparently taken, as the bird is shown with a pinkish breast). Mathews (1928) plate [27] (coloured plate on natural size, by Grönvold, very mediocre).

Type. Stone & Mathews (1913) reported the type to be lost, but they mistakenly believed that it was once in the Gould collection, for Gould, in the original description, made quite clear that the type or types (he did not mention if there were one or more birds) was in the collection of the Zoological Society. In the British Museum is a specimen, BM no. 1855.12.19.116, with two labels, one reads "Norfolk Island Zool. Soc.", the other "N.S.W. (Sturt) Zool. Soc.". This specimen therefore was received from the Zoological Society, and on one, the older label one may assume, its provenance is given as New South Wales, in accordance with the erroneous type-locality originally ascribed to the species. Therefore I see no reason not to accept this bird as the, or anyway a, type of *Z. tenuirostris.*

Moult. Specimens collected in May (11) do not show moult, one other specimen collected in May is moulting its tail, no wing moult.

Nidification. North (1890) described the nests as cup-shaped structures — shallower and not so compactly built as those of certain species of *Zosterops* found on the Australian continent — composed exteriorly of mosses, fibrous roots and grasses, lined inside with hair, and slightly suspended by the rim from the thin twigs of branches of low trees and scrubs not far from the ground. North states that his correspondent, Dr. P. H. Metcalfe, found the species breeding during September, and that the clutch-size is four or five eggs of a uniform delicate pale blue, the texture of the shell being very fine and slightly glossy, length 0.88×0.61 inch [22.4×15.5 mm]. I regard it as likely, however, that the eggs described by him actually belong to *Z. albogularis* (see under that species). Hull (1910) noted a clutch-size of three to six; his description of the eggs is apparently taken from North, but he adds measurements of five eggs, ranging from 0.84-0.92 × 0.59-0.64 [21.3-23.2 × 15.0-16.3 mm]. These eggs belonged to two clutches, taken on 31 October and 12 November respectively, but the large variation in size of these eggs suggests that one of the clutches belonged to *Z. albogularis*. In the H. L. White Collection (National Museum of Victoria) is a clutch of three taken by Guy Buffett at Steel's Point, on 20 October 1908. Mathews (1928) mentioned as breeding season November and December, and listed clutches of 2 to 4 eggs; measurements of 18 eggs, 19.5-21.5 × 13.5-16.3 mm. He repeated this information in a compact form in 1936, and added a description of the nest adapted from North. Other eggs found their way to Nehrkorn (1899, 1910) and the British Museum (Ogilvie-Grant, 1912).

Summarizing it may be said that the species is known to breed from September to December, that the clutch size is from two to six, and that the nests do not appreciably differ from those if its congeners. The eggs, like the birds, are intermediate in size between those of *Z. lateralis* and *Z. albogularis* 1).

Habits, etc. Very few notes concerning this species have been published. Gould (1859) knew nothing, and moreover took a dim view of any information coming forth in the foreseeable future, because: "... it can scarcely be supposed that the Pitcairn Islanders, who now inhabit it [Norfolk Island], can have contracted a taste for natural history". Gould's predictions were none too pessimistic, for though a few notes on nidification were published in between (they have been dealt with above), nothing about status or habits was published for another fifty years when Hull (1910) only noted that it was much less common than "*Z. albigularis*" (misidentification for *Z. lateralis*, cf. discussion of *Z. albogularis)*, but failed to give any further particulars. The publications of Mathews (1928, 1936), finally, add nothing, though it must have been easy for him to obtain some information from Roy Bell, his collector, a resident of Norfolk Island.

In August 1962, I spent a fortnight on Norfolk Island for the express purpose of observing the three species of *Zosterops*. I found *Z. tenuirostris* a common bird, perhaps the most common bird, in woodland. It is a social living species, usually seen in small groups of from three to twenty individuals, wandering through the lower stages of the forest. Though definitely a forest bird, it is not confined to the forest reserves, but apparently manages to survive in secondary growths elsewhere, and can be met with in every part of the island except the strongly denuded centre and south.

1) Clutches of five and six eggs seem very large for any species of *Zosterops*, and I suspect that these figures have been arrived at by inadvertently uniting two or more sets of eggs.

The food, like that of other members of the genus, probably consists of both insect and vegetable matter. I saw the species feed on Lemons *Citrus limon,* and Loquat *Eriobotrya japonica.* Correira, who visited Norfolk Island in May 1926, noted that Guavas are eaten; during my visit these trees were not in fruit.

The behaviour is similar to that of the subspecies of *Z. lateralis* known to me; for example they are not afraid to hang upside down, and I noted them regulary on the ground, at work between dead leaves.

Once, just after rain, I observed an apparent pair, sitting very close and touching, preening. First each bird was preening itself, but after a while one of the birds assumed a posture with the bill pointing upwards, while its mate preened the feathers of its throat, subsequently also the sides of its head, including the eye-ring (during which treatment the eyes were closed), and the nape: all places a bird would not be able to reach with its own bill. Compare Kunkel's (1962, fig. 3) photograph of "Gesellige Gefiederpflege" 1).

Tristram (1889) possessed an albino, collected by or received from E. L. Layard in 1884.

Voice. The various calls of the species are very similar to those of *Z. lateralis.* Unfortunately my visit to Norfolk Island took place in winter, and I never heard song. The following calls were recorded:

The contact-call. Similar to that of *Z. lateralis* (see description under *Z. l. gouldi),* and quite as variable, but perhaps a bit lower and less melodious.

The searching-call. I heard this from a solitary bird that had lost its companions: a loud, very penetrating "kȳēēēēh.... kȳēēēēh ...", not really plaintive but remarkably loud, drawn-out, not pleasing to the ear; lower, louder, and differing in tone from the equivalent call of *Z. l. lateralis.* After some time of intensive calling, the first bird was joined by a second individual, and stopped calling at once.

Call of alarm and agitation. The same short, rather loud hinnying that *Z. lateralis* has: "ti.hi.hi.hi.hi".

Discussion. *Z. tenuirostris* is an obvious derivative of *Z. lateralis*; the great amount of yellow on its under surface suggests that its ancestors belonged to the race *familiaris* of the Australian mainland.

---

1) In a survey of preening in birds, Harrison (1965) has made the generalisation that "allopreening" occurs in all species of Zosteropidae. This is probably true, but at the time it had been recorded from two species only (Kunkel, 1962), to which two more have since been added (Skead, 1967, and *Z. tenuirostris* as mentioned above): a very narrow basis for a generalisation in a group counting over eighty species.

Stresemann (1931) mentioned a supposed hybrid between this species and "*Z. lateralis norfolkensis*". I have also examined this interesting specimen, a male collected near Cascades, 22 May 1913, R. S. Bell no. 1225, now AMNH no. 701139. Measurements are: wing 61, tail 45, tarsus 17½, entire culmen 15, exposed culmen 11, culmen from anterior point of nostril 8½, wing formula $3 = 4 = 5 > 2 = 6 > 7$ (actually the 2nd primary is a little bit longer than the 6th). The bird is nearest to *Z. l. lateralis*, with which it agrees in all measurements except those of the bill. The bill is longer and more slender. On the upper surface the bird is similar to *Z. l. lateralis*, but on the under surface there are striking differences. The throat is deep yellow, between Lemon Yellow and Lemon Chome, sharply defined against the breast and remainder of underparts, which are very pale yellow with the exception of the buffy brownish flanks. The character of the yellow throat causes the bird to look remarkably different from both *Z. tenuirostris* and *Z. l. lateralis* though I have no doubt that it actually is a hybrid.

As the hundreds of individuals of each species I observed on Norfolk Island appeared all pure-blooded, and a hybrid of the appearance just described would be fairly easily recognized in the field, hybridization occurs evidently only as a great exception.

Species 41. **Zosterops albogularis** Gould

Zosterops albogularis Gould, Proc. Zool. Soc. London 4, (1836), 1837 (16 Jan.), p. 75 — Hab. in Australiâ, apud flumen Murrumbidgee dictum (errore!) = Norfolk Island.

Zosterops albogularis; Gould, Syn. Birds Austr. I, 1837 (Jan.), p. — (Australia: locality, banks of the Morumbidgee and the interior of New South Wales); Hartlaub, Verz. Samml. Bremen, 1844, p. 37 (Neuholland); Drapiez, Dict. Sc. Nat. X, 1845, p. 741 (l'Australie); G. R. Gray, Gen. Birds I, 1848, p. 198 (no locality); Heermann, Cat. Ool. Coll. Ac. Nat. Sc. Philad., 1853, p. 11 (Australia); Gould, Birds Austr., Suppl., 1859, p. 91, pl. 46 (Norfolk Island); von Pelzeln, Sitzungsber. Ak. Wiss. Wien 41, 1860, p. 320 (Insel Norfolk); G. R. Gray, Ibis 4, 1862, p. 222 (Norfolk Island); Hartlaub, Journ. f. Orn. 13, 1865, p. 7, 17 (Norfolk-Island); G. R. Gray, Hand-List Birds I, 1869, p. 162 (New S. Wales); Garrod, Proc. Zool. Soc. London, 1873, p. 462 (no locality); Wallace, Geogr. Distr. Anim. I, 1876, p. 435 (Norfolk Island); Boucard, Cat. Av., 1876, p. 230 (L. Howe I.); Giebel, Thes. Orn. III, 1877, p. 774 (Ins. Norfolk); Ridgway, Proc. U.S. Nat. Mus. 4, 1882, p. 320 (no locality); Waterhouse, Zool. Works Gould, 1885, p. 44 (no locality); Finsch, Thierreich 15, 1901, p. 42 (Norfolk-Insel); Dubois, Syn. Av. I, 1902, p. 712 (Ile Norfolk); Iredale, Proc. Linn. Soc. N.S.W. 35, 1911, p. 781 (Norfolk Island); Mathews, Nov. Zool. 18, 1912, p. 450 (Norfolk Island); A. J. Campbell & al., Emu 12, Suppl., 1913 (Jan.), p. 108 (Norfolk Id.); Stone & Mathews, Austral Av. Rec. 1, 1913 (20 March), p. 182 (Norfolk Island); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 36 (Norfolk-Insel); Hall, Emu 19, 1920, p. 287 (Norfolk Island); Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 6 (Norfolk Island); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 205, 229 (Norfolk-Insel); Mayr, Am. Nat. 74, 1940, p. 271 (Norfolk Island); Mayr, Systematics and the Origin of Species, 1942, p. 158, 173 (Norfolk Island); Lack, Ibis 86, 1944, p. 266

(Norfolk I.); Lack, Occ. Pap. Calif. Ac. Sc. 21, 1945, p. 130 (Norfolk Island); R. H. Baker, Univ. Kansas. Publ., Mus. Nat. Hist. 3, 1951, p. 335 (no locality); G. R. Williams, Ibis 95, 1953, p. 685 (Norfolk Island); Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1956, p. 172 (Norfolk Island); Moreau, Bull. Brit. Mus. (Nat. Hist.), Zool. 4, 1957 (Feb.), p. 319 (Norfolk Island); Welty, Life of Birds, 1962, p. 494 (Norfolk Island); Mayr, Animal Species and their Evolution, 1963, p. 506 (Norfolk Island); Atyeo & Braasch, Bull. Univ. Nebraska State Mus. 5, 1966 (May), p. 253, 329 (Norfolk Island); Vincent, Red Data Book, Aves, List extinct birds, 1966 (Sept.), p. 20 (Norfolk Island); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 319 (Norfolk Island).

Zosterops gularis; Lesson, Rev. Zool. Soc. Cuvier, 1840, p. 135 (Nouvelle-Hollande; rives de la Murrumbidgee).

Zosterops albigularis; Reichenbach, Handb. spec. Orn., Merop., 1852, p. 95 (am Flusse Murrumbidgee); Schlegel, Handl. Dierk. I, 1857, p. 274 (Australië); Gould, Birds Austr. II, 1865, p. 535 (Norfolk Island); Salvin, Cat. Coll. Birds Strickland, 1882, p. 172 (Australia = Norfolk-Island); Sharpe, Cat. Birds. Brit. Mus. IX, 1884, p. 154 (Norfolk Island); Palacký, Die Verbr. d. Vögel, 1885, p. 120 (Norfolkinsel); A. N[ewton], Encycl. Brit., 9th ed., XXIV, 1888, p. 824 (Norfolk Island); Tristram, Cat. Col. Birds, 1889, p. 210 (Norfolk Island); Lister, Proc. Zool. Soc. London for 1888, 1889, p. 520 (Norfolk Island); North, Descr. Cat. Birds, (1889), 1890, p. 413 (Norfolk Island); Metcalfe in North, Rec. Austr. Mus. 5, 1904, p. 338 (Norfolk Island); Mathews, Emu 7, Suppl., 1908, p. 90 (Norfolk Is.); Sharpe, Hand-List Birds V, 1909, p. 17 (Norfolk Is.); Hull, List Birds Austr., 1909, p. 25 (no locality); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Norfolk Inseln); Oliver, Trans. N.Z. Inst. 44, (1911), 1912, p. 220 (Norfolk Island); Page, Bird Notes N.S. 4, 1913, p. 1 (Norfolk Island); Glenny, Proc. U.S. Nat. Mus. 104, 1955, p. 605 (no locality).

Zosterops Albogularis; Broinowsky, Birds Austr. IV, 1890, pl. IX fig. 1 (Norfolk Island).

Nesozosterops albogularis; Mathews, List Birds Austr., 1913, p. 324 (Norfolk Island); Mathews, Birds Norfolk & Lord Howe Isl., 1928, p. 51 (Norfolk Island); Mathews, Syst. Av. Australas. II, 1930, p. 713 (Norfolk Island); Mathews, List Birds Australas., 1931, p. 376 (Norfolk Island); Mathews, Suppl. Birds Norfolk & Lord Howe Isl., 1936, p. 7, 8, and plate opp. p. 10 (Norfolk Island); Hindwood, Emu 40, 1940, p. 82 (Norfolk Island); Hindwood, Birds Lord Howe Isl., 1940, p. 82 (Norfolk Island (reprint in bookform of preceding)); Mathews, Working List Austr. Birds, 1946, p. 122 (Norfolk Island); Anonymus, Austr. Encycl. VI, 1958, p. 350 (Norfolk Island); Marsh & Pope, Austr. Nat. Hist. 15, 1967, p. 398 (Norfolk Island).

Nesozosterops caerulescens; Mathews, Suppl. Birds Norfolk & Lord Howe Isl., 1936, p. 8 (no locality).

Characters. A very large species — by far the largest species of the genus — further characterized by the brownish green back, white throat and brownish flanks.

Upper parts. Forehead, crown, sides of head, and upper tail coverts Warbler Green, not sharply demarcated from the remainder of the upper parts which are of a rich brownish tinge, somewhere between Buffy Citrine, Orange-Citrine and Medal Bronze, but brighter than either, through which the green ground-tone is still perceptible; lores and area below and behind eye-ring blackish; eye-ring white, of normal width, interrupted in front by the black lores; cheeks in some individuals more greenish, in others more greyish. Primaries, secondaries and rectrices blackish brown, edged with Warbler Green.

Under parts. Throat, upper breast and middle of belly white; sides of head and sometimes also sides of breast pale grey; flanks brown, slighly duller than Buckthorn Brown; under tail coverts Citron Yellow.

Unfeathered parts. Iris brown, bill black, feet greyish, greenish, greenish grey or greyish green (Correia); iris bright brown, bill black and grey, feet blue grey (Bell).

Measurements. Wing 8 ♂, 77-79 (77.75); 9 ♀, 75-80 (77.00); 19 specimens, 74½-80 (77.21); tail 7 ♂, 52-56 (53.71); 9 ♀, 49-55½ (53.28); 18 specimens, 49-56 (53.42); tarsus 19 specimens, 22-24¾ (23.07); entire culmen 20 specimens, 17¾-20½ (18.83); exposed culmen 20 specimens, 13¾-15½ (14.63); culmen from anterior point of nostril 20 specimens, 9¼-10½ (10.08).

Structure. Characterized by a relatively short second primary (usually $2 = 9$); tail:wing index of 19 specimens, 69.17 %.

Distribution (fig. 9). Confined to the north-western part of Norfolk Island. More particulars on the distribution of the species will be given below.

First collector. Unknown, before 1837.

Figures. Gould (1837), plate, fig. 2 (head only, coloured, on natural size); Gould (1859), plate 46 (coloured plate of two individuals on natural size, colours not quite natural); Broinowsky (1890), plate IX fig. 1 (coloured plate, poor); Mathews (1928), plate [27] (coloured plate on natural size by Grönvold, rather poor); Mathews (1936), plate opp. p. 10 (sketch of head, wing and feet).

Type. According to Stone & Mathews (1913) the type is lost, and I have no evidence to the contrary.

Moult. Specimens collected in April (1), the last week of May (12), and June (2) show no moult; one specimen collected in April is in the last stage of wing moult, in both wings the 2nd primary is still growing out.

Nidification. According to Mathews (1928) the breeding-season is from October to December. The nest as described by him is the usual cup-like structure, perhaps somewhat shallower than in related species, suspended in a fork of a twig. The eggs are like those of other species of the genus, pale blue with little gloss, two to a clutch, measuring 21 to 23.5 × 15 to 16.6 mm. Eggs recorded by Nehrkorn (1910) agree well in size: 22 × 15 mm. North (1890), on the other hand, gives measurements which are smaller than those of *Z. tenuirostris,* and it is likely that he has confused the eggs of the two species. As a certain degree of confusion has taken place,

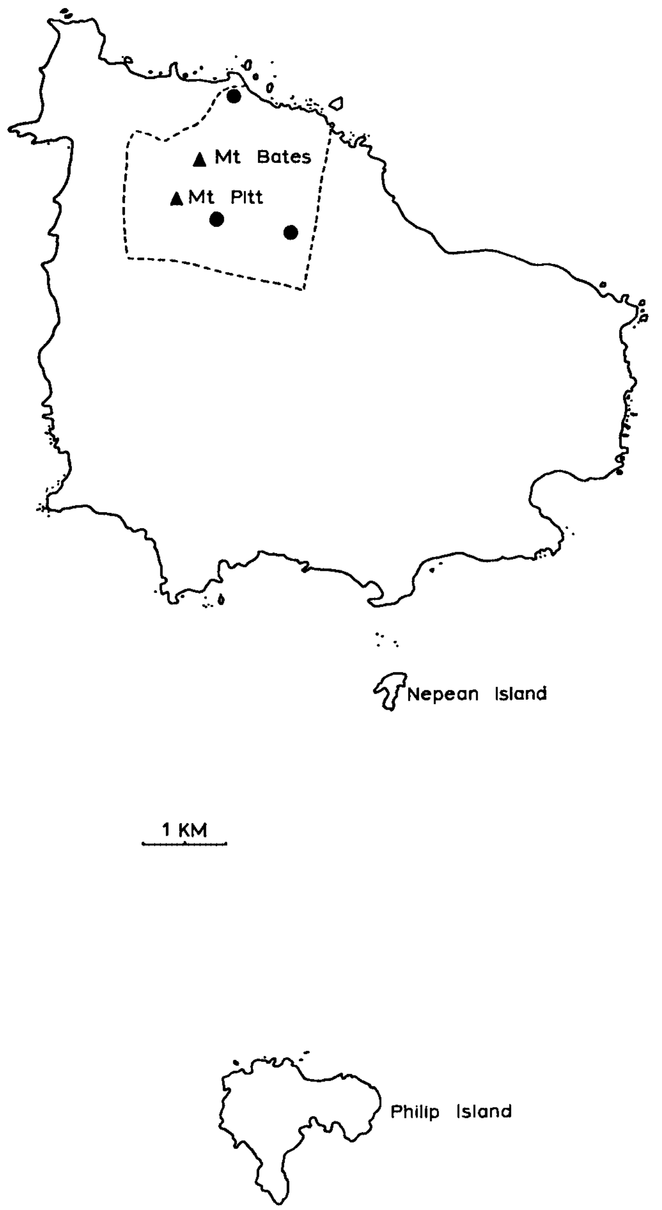


Fig. 9. The distribution of *Zosterops albogularis*; the species appears to be confined to the main forest reserve, the approximate limits of which are indicated by the broken line; dots indicate the three locations where I have observed it.

North's statement that the clutch-size is four or five needs confirmation, especially because Mathews recorded clutches of only two eggs. As I have mentioned on a previous page, Hull's (1910) description under *Z. albogularis* definitely pertains to *Z. l. lateralis*. In the Orton Collection in the Western Australian Museum is a clutch of two eggs labelled "*Zosterops albigularis*", collected by George Menges at Steel's Pt., Norfolk Island, 15 November 1908, which measure 17.3 × 12.3 and 16.8 × 12.2, and are therefore definitely *Z. l. lateralis*.

Habits, etc. The large series taken by earlier collectors, would suggest that at the time this species was not uncommon (though see comments made two paragraphs on), but no field-notes have ever been published. It is true that Hull (1910) gives notes on a species of *Zosterops* which he lists under the name of *Z. albigularis*, but from the habits as described by him and from the small size of the eggs ascribed to the species, it is clear that the birds he took for *Z. albogularis* were actually *Z. l. lateralis*. As late as 1926, Correia and his wife obtained twelve specimens within the week of their stay. In his MS notes Correia does not actually state what the status of the species is, he notes only that the: "three different species of white eyes all live together among the guava trees in the valley. I saw the three species feeding together on the same tree".

In August 1962, during a fortnight of observation in which I paid special attention to the species, I saw it only three times, and each time a solitary individual. Normally, white-eyes, when alone, utter continuously a plaintive searching note to regain contact, but the birds seen by me did not utter any note at all (song is mentioned below) and seemed quite content to be alone, from which I feel it is safe to conclude that, contrary to all its congeners of which the habits are known, *Z. albogularis* normally is solitary.

The three places where I observed the species are shown on the map, they are all within the boundaries of the main forest reserve, to which the species is apparently more or less confined. When on the island, I had the pleasure of meeting Mr. R. S. Bell, a long-time resident of Norfolk Island, who collected for Mathews on Lord Howe and Norfolk Islands in the years 1912-1914; he told me that *Z. albogularis* was never common. It is also significant that Hull (1910) apparently did not meet with it at all. Nevertheless, the species seems now at a dangerously low level; I estimate that at the time of my visit the total population consisted of considerably less than fifty individuals, which makes *Z. albogularis* one of the rarest small birds in the world.

My first observation was of a bird quietly moving from twig to twig in a *Citrus*-tree in the forest on the slope of Mt. Pitt, catching three or four smallish white caterpillars or grubs before, a few minutes later, it flew off.

The second observation was under similar circumstances: quiet and silent a bird moved about through the foliage of a small forest tree, four or five metres up.

The third observation was more interesting. It concerned a bird I located in a growth of Wild Olives *(Olea africana)*. For quite a while the bird was singing, as described below. Later it began to move, picked an olive, perched on a twig and subsequently opened its bill very wide and swallowed the whole olive without much difficulty. These olives are roundish or slightly oval in shape, about 6 mm in diameter, with one large seed surrounded by a thin fleshy mantle. Compare this with the entirely different way the much smaller *Z. l. lateralis* eats olives (p. 62).

The song heard from the bird just mentioned was soft, and probably would not have carried more than about 20 metres. I saw the feathers of its throat vibrate while it was singing, but only during the loudest passages was the bill opened. The song consisted entirely of an excellent, albeit soft, imitation of the songs of *Turdus merula* and *Turdus philomelos* (both common on the island), passages of the one alternating with passages of the other. It was when imitating certain Song Thrush strophes that the bill was opened widest. It is evident that this mid-winter song was only a subsong, and though I admired the imitative powers of the bird, I would have preferred to have heard its own song. Norfolk Island would provide a unique opportunity to study and record the songs of three different but related species of *Zosterops*.

The feather mite *Proctophyllodes ceratophyllus*, described from *Z. c. conspicillata*, was also recorded from this species (Atyeo & Braasch, 1966).

Species 42. **Zosterops inornata** E. L. Layard

Zosterops inornata E. L. Layard, Ann. Mag. Nat. Hist. (5) 1, 1878 (May), p. 375 — Lifu[1]).

Zosterops inornata; E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878 (July), p. 259 (Lifu): Tristram, Ibis (4) 3, 1879, p. 186, pl. IV fig. 2 (Lifu); E. L. Layard & E. L. C. Layard, Ibis (4) 4, 1880. p. 224 (Lifu); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 159 (Lifu); Tristram, Cat. Coll. Birds, 1889, p. 211 (Kepeneche, Lifu); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Lifu, Maré); Finsch, Tierreich 15, 1901, p. 41 (Lifu, Maré); Dubois, Syn. Av. I, 1902, p. 712 (Iles Loyalty); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 473, 499 (no locality); Sharpe, Hand-List Birds V, 1909, p. 17 (Lifu, Maré); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 2, 36 (Lifou: Quépénée, Nathalo); Page, Bird Notes N.S. 4, 1913, p. 1 (Loyalty Island); Brasil, Rev. Fr. d'Orn. 4, 1916, p. 193, 221 (Lifou); Mathews, Syst. Av. Australas. II,

1) Erroneously I have previously (this revision, pt. I, p. 12) ascribed the authorship of the names *Z. inornata* and *Z. minuta* to E. L. Layard & E. L. C. Layard, a mistake also made by Sharpe (1906, p. 473).

1930, p. 711 (Loyalty Islands); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 229 (Lifou); Mayr, Am. Mus. Nov. 912, 1937, p. 2 (Lifu); Mayr, Am. Mus. Nov. 1057, 1940, p. 1 (Lifu); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (no locality); Mayr, Birds Southwest Pacific, 1945, p. 174 (Lifu); Warner, Orn. New Caledonia and Loyalty Isl. (unpubl. thesis), 1947, p. 221 (Lifu); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 335 (no locality); Greenway, Extinct Birds, 1958, p. 69 (Lifu); Delacour, Guide Ois. Nouv. Calédonie, 1966, p. 147, fig. 102, 148 (Lifou); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 319 (Lifu).

Characters. A very large species which is an obvious derivative of *Z. lateralis,* from which it differs mainly in the reduction of the eye-ring, the extent of greenish yellow on the breast, and the colour of bill and legs.

Upper parts. Upper surface of head, including forehead and nape Warbler Green, a colour recurring, mixed with grey, on lower rump and upper tail coverts; back between Dark Olive-Gray and Dark Grayish Olive, but not quite agreeing with either, grey darker than in *Z. lateralis,* sometimes suffused wih green (which does not seem to be a juvenile character); eye-ring vestigial, consisting of extremely small white feathers which would not be visible in the field; lores and region below the eye feathered pale grey; primaries, secondaries and rectrices brownish black, all edged with Warbler Green.

Under parts. Throat and breast Lime Green, without any sharp demarcations on sides of head or lower breast; lower breast pale greyish, flanks pale buffish, centre of belly whitish or very pale yellow, under tail coverts Primrose Yellow.

Unfeathered parts. Iris dull crimson or dark crimson, bill horn and white, legs pale salmon (Layard); iris reddish-hazel, bill black horn and white horn, legs pale salmon (Macmillan). In the skins the legs are orangeish brown, not greyish or brownish as in *lateralis.*

Measurements. Wing 19 ♂, 72-76 (74.05); 11 ♀, 70-74½ (71.90); 31 specimens, 69-76 (73.13); tail 18 ♂, 48-52½ (50.19); 11 ♀, 43½-49 (47.68); 30 specimens, 43½-52½ (49.17); tarsus 31 specimens 20¼-23 (21.72); entire culmen 30 specimens, 19-22 (20.73); exposed culmen 30 specimens 16-18 (16.93); culmen from anterior point of nostril 30 specimens 11-13 (12.07).

Structure. Wing very blunt, rounded, 2nd primary rather short; usually 2 = 8 or 8>2>9. There is a definite difference in size between the sexes, the males being larger. Average tail:wing index of thirty specimens 67.2%.

Weights, ♂: 17.3, 22.85, 23.3, 23.35, 23.5, 23.7, 23.8, 24, 24.1, 24.2, 24.3, 24.8, 25, 25.1, 25.2, 25.3, 25.75; ♀: 20, 20.3, 20.8, 22.4, 22.5, 23.2, 23.5, 23.6, 23.8 g. These weights were taken by Macmillan who noted on the label of the specimen of 17.3 g: "very thin and emaciated, possibly sick; only sign of injury is on right tarsus".

Distribution. Confined to Lifu Island, Loyalty Islands. Has also been recorded from Maré, but apparently in error (cf. Sarasin, 1913).

First collector. The Naval Surgeon E. Deplanche in or before 1868 (the year in which the specimen was registered in the Caen museum).

Figure. Tristram (1879) plate IV, fig. 2 (coloured figure drawn on natural size, by Keulemans).

Type. Not traced. Tristram (1889) claimed the types to be in his collection, but as the name *Z. inornata* was published in May 1878, and as Tristram's pair was collected on 17 August 1878, it is obvious that he erroneously regarded his specimens as types. The only specimen I have seen which was perhaps collected early enough to be a cotype is one in the Macleay Museum: ♂, 9 January 1878, Lifu, tail missing.

Nidification. Warner mentions that Macmillan, apparently in notes that were not available to me, heard from natives that the species nests from November to January, and that the nests are similar to those of *Z. lateralis* but larger and thicker. The clutch-size is said to be two.

Habits, etc. This species is little-known. According to the Layards (1880) it is a forest bird, which frequents the high trees. Macmillan (notes on labels) observed it in the same habitat, but also in low scrubs at a considerable distance from any forest, and concluded that it inhabits almost all types of country. He regarded it as fairly numerous, but shy, generally seen in pairs or in flocks, and sometimes associating with *Z. lateralis* and *Aplonis.* Stomachs mainly contained a variety of fruits and berries, including figs, pineapple, pawpaw, and the blue berries of a species of vine; also the hard seeds of a kind of cane, palm seeds and occasionally insects and small molluscs.

Voice. Macmillan noted that he never heard the *Pachycephala*-like whistle mentioned by the Layards (in Tristram, 1879; Mayr, 1945), but only a low squidley chatter and notes similar to chirps of other members of the genus *Zosterops*: in particular a chirp similar to that of a domestic chicken when lost by its mother, and a low chuckling sound like a parrot which it uses less frequently. These are doubtless homologons of the calls described as "searching-call" and "call of alarm and agitation" by me.

Discussion. The geographical position of Lifu makes it likely that the ancestors of *Z. inornata* have colonised it from New Caledonia rather than directly from Australia. *Z. l. griseonota,* however, is not only smaller but also brighter in colour, and on present eidonomical characters it does not appear possible to reconstruct the past beyond stating that *Z. inornata* has been derived from some race of *Z. lateralis.*

Species 43. **Zosterops explorator** E. L. Layard

Z[osterops] explorator E. L. Layard, Proc. Zool. Soc. London, 1875 (June), p. 29 — Kandavu.

Zosterops provocator Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 6 — nomen nudum (Viti).

Zosterops explorator provocator Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 21 — nomen nudum (Taviuni) [1]).

Zosterops explorator; E. L. Layard, Proc. Zool. Soc. London, 1875 (Oct.), p. 431 (Kandavu); E. L. Layard, Ibis (3) 6, 1876, p. 140, 153, 392 (Vanua Levu, Taviuni, Kandavu); Kleinschmidt, Journ. Mus. Godeffroy 12, 1876, p. 167 (Taviuni und Kandavu); Giebel, Thes. Orn. III, 1877, p. 775 (Fidji); Finsch, Proc. Zool. Soc. London for 1877, 1878, p. 734 (Kandavu); Nehrkorn, Journ. f. Orn. 27, 1879, p. 396 (Taviuni); Finsch, Zool. Challenger Exp. VIII, 1880, p. 48 pl. XIV fig. 2 (Kandavu); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 172 (Kandavu; Levuka, Ovalau); Tristram, Cat. Coll. Birds, 1889, p. 211 (N'Gila, Taviuni, Fiji); Reichenow, Journ. f. Orn. 39, 1891, p. 129 (Viti Lewu); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Vanua Levu and Taviuni, Kandavu, Ovalau, Viti Levu); Finsch, Tierreich 15, 1901, p. 13 (Fidschi-Inseln); Dubois, Syn. Av. I, 1902, p. 706 (Iles Fidji); Sharpe, Hand-List Birds V, 1909, p. 2 (Fiji Is.); Bahr, Ibis (9) 6, 1912, p. 299 (Taviuni); Page, Bird Notes N.S. 4, 1913, p. 2 (Fiji Is.); Wetmore, Ibis (12) 1, 1925, p. 855 (Viti Levu: Naseva, Kandavu: Koro Levu, Vanua Levu, Taviuni); Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 11 (Kandavu, Viti Levu, Ovalau, Vanua Levu, Taviuni); Berlioz, Ois. & Rev. Fr. d'Orn. 10, 1929, p. 585 (Iles Viti); Mathews, Syst. Av. Australas. II, 1930, p. 696 (Fiji Islands (Larger Islands)); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 227 (Kandavu, Viti Levu, Ovalau, Vanua Levu, Taviuni); Timmermann, Beitr. Fortpfl.-biol. Vögel 7, 1931 (July), p. 140 (Kandavu); Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 206 (Fiji); Mayr, Birds Southwest Pacific, 1945, p. 147 (Kandavu, Viti Levu, Ovalau, Vanua Levu and Taviuni); Morgan & Morgan, Notornis 12, 1965, p. 168 (Fiji); Mercer, Field Guide Fiji Birds, 1966, p. 23 (Fiji); Cottrell, Emu 66, 1967 (Feb.), p. 261 (Waiyevo, Taveuni); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 314 (Kandavu, Ovalau, Viti Levu, Vanua Levu, and Taviuni).

Characters. A fairly large species without any striking characters; throat and breast yellow, flanks and belly whitish.

Upper parts generally between Warbler Green and Pyrite Yellow; rump of the same colour as remainder of upper parts; forehead and lores more yellowish; eye-ring well-developed, white, entire; a blackish stripe from the base of the maxilla (under the lores) continued under the eye-ring; primaries and rectrices brownish black, both edged with the colour of the upper parts.

Under parts. Not only throat, chin and under tail coverts but also the whole breast bright Lemon Yellow; under tail coverts of the same colour, but lighter, approaching to Pale Lemon Yellow; remainder of under parts greyish white, usually with a faint yellowish wash particularly along the middle

1) In both citations Pöhl ascribes the name *provocator* to Layard, and it is likely that his use of the name is due to confusion with *Ptilotis provocator* Layard, now *Foulehaio provocator* (Layard), a member of the Meliphagidae which is endemic to Kandavu.

(but no stripe), and an isabelline tinge which I do not know if natural or caused by postmortem discoloration.

Unfeathered parts. Iris brown, bill black, horn below, legs grey (Correia); iris brown, bill brown or black, horn below, legs grey (Beck).

Measurements of 17 specimens (13 ♂, 4 ♀): wing 58-63 (61.00); tail (16 specimens only), 33-38½ (36.22); tarsus 17¼-19¾ (18.51); entire culmen (16 specimens only) 14¼-17 (15.00); exposed culmen (15 specimens only) 11¼-14¼ (11.97); culmen from anterior point of nostril (15 specimens only) 8¼-10½ (9.12).

Structure. The 2nd primary comes in length between the 6th and the 8th; the average tail:wing index of 17 specimens is 59.50%, which is on the short side for a species of its size.

Distribution. The larger islands of the Fiji Group: Kandavu, Viti Levu, Ovalau, Vanua Levu and Taviuni.

First collector. John Murray of the Challenger expedition, between 25 July and 3 August, 1874 on Kandavu (cf. Finsch, 1878).

Figure. Finsch (1880) plate XIV fig. 2 (coloured plate on natural size by J. Smit). Though this plate is beautifully executed, it is not a good representation of the species; the dorsal surface is far too dark and dull green, a yellow neck-band which does not occur in any species of the family is indicated, and forehead, lores and supra loral region are shown concolourous with the back.

Types. The two types are BM nos. 1880.11.25.214 and 215.

Moult. Specimens collected in June (1), September (1), November (7) and December (4) are not in moult. Birds collected in January (1), October (1) and November (1) show primary-moult, and one bird collected in May is moulting rectrices, but shows no wing-moult.

Nidification. Nest and eggs have been described at an early date (Nehrkorn, 1879); apparently these same eggs were redescribed by Timmermann (1931). Nehrkorn's description indicates that both the nest and the bluish-white eggs are typical of the family; the nest examined contained two eggs. Murphy & Mathews (1929) mentioned nestlings taken in November, but did not supply further particulars.

Habits, etc. This species is apparently fairly common in forests and plantations, where it moves about in small parties of ten or more individuals. Layard (1876) mentioned that it utters a "shrill note".

It is likely that *Z. explorator* is a forest bird, with a preference for inland habitats (Murphy & Mathews, 1929; Mayr, 1945), but in my opinion not necessarily in the hills. Nicoll's (1904) observations of common occurrence in gardens in Suva are evidently due to confusion with *Z. lateralis flaviceps*, a species not mentioned by him, but found in the same locality and only a few years later by Bahr (1912). Mercer (1966) mentioned that: "it is interesting to note the distinct geographical distribution of the two species (*Z. lateralis* and *Z. explorator*), one is of the country lowland, the other of the mountain forest; there is little intermingling of the two species".

Discussion. Mayr (1967, p. 314, footnote) states that: "*Z. explorator, flavifrons, minuta* and *xanthochroa* probably belong to a single superspecies". As he gives no explanation, I do not know what led him to this opinion. The facts that these four species have yellow underparts and live in the same general region are certainly not enough, and far from being "probable", I regard Mayr's opinion as highly speculative.

Species 44. **Zosterops flavifrons** (Gmelin)

Characters. An, in its various races, fairly large to large yellow-bellied species of the normal *Zosterops*-type.

Upper parts Warbler Green, with or without a yellow forehead and supra loral region; a rather wide white eye-ring, interrupted in front by a small dusky or blackish spot, a continuation of the loral line which is either dusky or blackish, and is also continued under the eye-ring; primaries, secondaries and rectrices blackish brown.

Under parts generally Lemon Yellow, sometimes, in the centre of the belly, approaching to Lemon Chrome, sides of breast, and flanks suffused with greenish.

Unfeathered parts. Eyes brown, bill brown or black (there is some geographical variation in the colour of the bill).

Measurements are given in table VI.

Structurally the species shows no peculiarities, it is, as stated above, a thoroughly normal member of its genus; the 2nd primary is in length between the 7th and the 9th; tail index variable, from 62-72 % in the various subspecies.

Distribution (fig. 10). New Hebrides, where known from practically all islands with the exception of some in the northern group (Banks Islands) and the Torres Islands.

Ecology. The species inhabits forests and scrub, secondary growths and native gardens, from sea level upwards, and is perhaps more common in hilly country than in lowland. Throughout its range, *Z. flavifrons* co-occurs

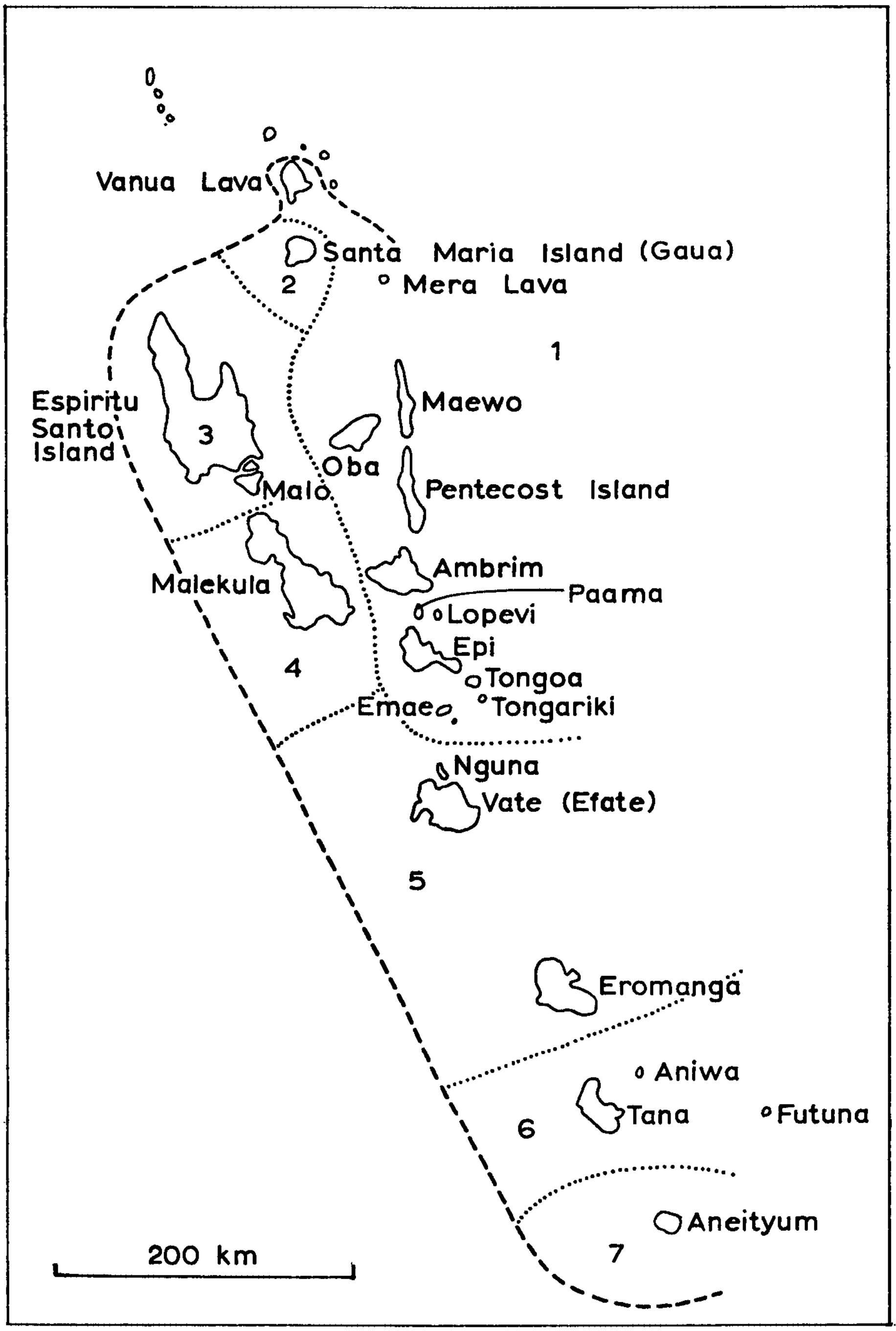


Fig. 10. The distribution of *Zosterops flavifrons* and races; 1, *perplexa*; 2, *gauensis*; 3, *brevicauda*; 4, *macgillivrayi*; 5, *efatensis*; 6, *flavifrons*; 7, *majuscula*.

with *Z. lateralis* and there is no clear indication in literature of any ecological difference between these two very similar species, though the impression one gleans is that possibly *Z. lateralis* favours slightly more open country.

TABLE VI
Zosterops flavifrons

	number of specimens	wing	tail	av. wing	av. tail	tail:wing index
perplexa	44	59-65	36-42	61.52	39.93	64.91%
gauensis	11	62-67	40½-45	64.55	42.86	66.41%
brevicauda	9	57-61	35-38	59.11	36.67	62.03%
macgillivrayi	7	57-62	36-40	59.36	38.29	64.50%
efatensis	24	59-66	37-45	61.63	40.88	66.33%
flavifrons	6	65-67	43½-46	65.83	45.33	68.86%
majuscula	12	60-64	42-47	61.29	44.08	71.92%

Geographical variation. Even though I have recognised all seven described races, the geographical variation is of a minor nature, it exists in brightness of plumage, amount of yellow on the forehead, size and proportions (relative length of tail).

Related species. The affinities of *Z. flavifrons* are obscure.

1. **Zosterops flavifrons perplexa** Murphy & Mathews

Zosterops flavifrons perplexa Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 3 — Ambrym Island, New Hebrides Group.

Zosterops flavifrons; Collett, Christiania Videns. Selsk. Forh. 1892, (13), p. 6 (Tongoa); Seth Smith, Avicult. Mag. (4) 12, 1934 (May), p. 146 (New Hebrides = Shepherd Group); Goodfellow, Avicult. Mag. (4) 12, 1934 (July), p. 182 (Shepherd Group).

Zosterops macgillivrayi; (pt.) Finsch, Tierreich 15, 1901, p. 30 (Epi).

Zosterops flavifrons perplexa; Mathews, Syst. Av. Australas. II, 1930, p. 705 (the entire chain of islands in the New Hebrides proper); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 20 (Ile Ambrym); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 226 (Ost-Kette der Neuen Hebriden von Mai nordwärts bis Maralav; ferner Vanua Levu (Banks Gruppe)); Mayr, Birds Southwest Pacific, 1945, p. 198 (Meralav and Vanua Lava, Banks Isls.; Pentecost, Ambrym, Aurora, Aoba, Pauuma, Lopevi, Epi, Tongoa); Parker, Bull. B. O. C. 87, 1967 (May), p. 91 (Tongoa I.); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 314 (distribution).

Zosterops flairfrons; Drake, Avicult. Mag. (5) 1, 1936, p. 195-196 (New Hebrides).

Subspecific characters. Close to *macgillivrayi*, but with less yellow on the forehead; dorsal surface even slightly brighter, more yellowish. There is variation in the amount of yellow on the forehead, some individuals cannot be distinguished from *efatensis*, others suggest that the race might be united with *macgillivrayi*, while a few specimens are inseparable from *majuscula*, which averages greener above.

Unfeathered parts. Iris brown, bill black, legs greyish (Correia, Hicks).

Measurements. Wing 22 ♂, 59-65 (61.84); 19 ♀, 59-64 (60.97); 44 specimens, 59-65 (61.52); tail 22 ♂, 37-42 (40.16); 19 ♀, 36-42 (39.37); 44 specimens, 36-42 (39.93); tarsus 41 specimens 18-20¾ (19.71); entire culmen 39 specimens, 14-16¼, 17¼ (15.28); exposed culmen 38 specimens, 11-13, 14 (12.23); culmen from anterior point of nostril 39 specimens, 8-9½ (8.53).

Distribution. The northeastern inlands of the New Hebrides, where known from Vanua Lava, Mera Lava (Melapov), Oba (Aoba), Maewo (Aurora), Pentecost, Ambrym, Paama, Lopevi, Epi, Tongoa, Tongariki and Mai. I have examined specimens from all islands.

First collector. Probably the Revd. O. Michelsen on Tongoa in 1890 (Collett, 1892).

Not figured.

Type. AMNH no. 212600, from Ambrym (specimen examined).

Moult. Specimens collected in January (1), August (3), November (3) and December (1) show moult in the primaries, or rectrices, or both; specimens collected in January (8), July (11), August (6), September (1), November (6) and December (2) are not in moult; the January birds are all in a very abraded plumage.

Nidification. Parker (1967) has recorded a clutch of three, taken on Tongoa Island, 1-XII-1933. He described the eggs as pale blue with a faint gloss; measurements 17.7 × 13.65, 18.2 × 13.6, 17.4 × 14.0 mm.

Habits, etc. Not recorded.

Discussion. Drake (1936) claimed to have bred in captivity a cross between *Z. flavifrons* and *Z. lateralis* but the particulars supplied are entirely insufficient, which is regrettable as there is no obvious reason why such a cross could not be produced.

2. **Zosterops flavifrons gauensis** Murphy & Mathews

Zosterops flavifrons gauensis Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 5 — Gaua Island, in the Banks Group of the New Hebrides.

Zosterops flavifrons gauensis; Mathews, Syst. Av. Australas. II, 1930, p. 705 (Gaua Island); Snouckaert, Alauda (2) 3, 1931, p. 20 (Ile Gaua); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 226 (Gaua); Mayr, Birds Southwest Pacific, 1945, p. 198 (Gaua, Banks Isls.); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 314 (Gaua Island).

Subspecific characters. A fairly large race, with a yellow forehead as brownish than in *efatensis* in which the bill is black, but this is a rather *efatensis*. Bill, as noted in the original description, in skins perhaps more doubtful character. Apart from the difference in bill colour this race is identical with *efatensis*.

Unfeathered parts. Iris brown or brownish, bill black or blackish, horn below, legs grey or greyish (Correia, Beck).

Measurements of eleven specimens (5 ♂, 6 ♀): wing 62-67 (64.55), tail 40½-45 (42.86), tarsus (10 specimens only) 19-21 (20.55), entire culmen (10 specimens only) 15½-16¾ (16.05), exposed culmen (10 specimens only) 12½-13¼ (12.98), culmen from anterior point of nostril (10 specimens only) 9¼-10 (9.58).

Distribution. Confined to Gaua Island in the Banks Group, northern New Hebrides.

First collectors. R. H. Beck and J. G. Correia of the Whitney South Sea Expedition, on 18 November, 1926.
Not figured.

Type. AMNH no. 216131 (type examined).

Moult. Of the eleven specimens examined, all collected from 18-22 November 1926, one shows moult of the rectrices, one moult of the primaries, the other nine no moult; their plumage varies from fairly fresh to somewhat abraded.

Nidification. Not recorded. The gonads of a number of the specimens examined were noted to be large.
Habits, etc. Not recorded.

Discussion. As indicated above, this subspecies is scarcely separable from *efatensis* (over which, of course, it has priority). While in skins the bill is more brownish in *gauensis*, the bills in fresh specimens of both subspecies were described by their collectors as black or blackish.

3. **Zosterops flavifrons brevicauda** Murphy & Mathews

Zosterops flavifrons brevicauda Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 3 — Malo Island, New Hebrides Group.

Zosterops flavifrons brevicauda; Mathews, Syst. Av. Australas. II, 1930, p. 705 (Malo and Espiritu Islands); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 20 (Iles Malo et Espiritu); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 226 (Malo, Espiritu Santo); Mayr & Camras, Field Mus. Nat. Hist., Zool. 20, 1938, p. 457 (Espiritu Santo Island); Mayr, Birds Southwest Pacific, 1945, p. 198 (Malo, Santo); W. E. Scott, Auk 63, 1946, p. 363, 368 (Espiritu Santo); R. H. Baker, Smiths. Misc. Coll. 107, no. 15, 1948, p. 5 (Luganville, Espiritu Santo); Mees, Sarawak Mus. Journ. 6, 1955, p. 653 (no locality); M. Laird, Journ. Parasitol. 45, 1959, p. 48 (Aore); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 314 (Espiritu Santo and Malo Islands).

Subspecific characters. Similar to *perplexa,* hence with some yellow on the forehead, but tail shorter than in all other races.

Unfeathered parts. Iris brown or brownish, bill brown, feet grey or brown (Correia).

Measurements of nine specimens, five from Espiritu Santo and four from Malo (8 ♂, 1 ♀): wing 57-61 (59.11), tail 35-38 (36.67), tarsus (8 specimens only), 18¼-20 (19.22), entire culmen (7 specimens only) 14-15¼ (14.64), exposed culmen (7 specimens only) 11½-12½ (11.93), culmen from anterior point of nostril (8 specimens only) 8½-9 (8.78).

Distribution. Espiritu Santo and Malo, New Hebrides.

First collector. J. G. Correia of the Whitney South Sea Expedition, on Malo on 27 August, 1926.

Not figured.

Type. AMNH no. 213604 (specimen examined).

Moult. Specimens collected in January (1), May (2), August (4), and December (1), do not show moult. One specimen taken in August moults primaries.

Nidification. A fledgling with very short tail, and clearly only just out of the nest, was collected by Correia on 4 December 1926, which means nesting in November.

Habits, etc. According to Scott (1946) this is the most numerous bird of Espiritu Santo, especially in lowland open forest and plantations, and moving about in sizable groups.

4. **Zosterops flavifrons macgillivrayi** Sharpe

Zosterops macgillivrayi Sharpe, Ibis (7) 6, 1900, p. 345 — Sandwich Bay, Mallicollo, and Foreland Bay, Epi. As these two islands are inhabited by different subspecies I hereby restrict the type locality, in accordance with general usage over the past 35 years, to Sandwich Bay, Malekula.

Zosterops macgillivrayi; (pt.) Finsch, Tierreich 15, 1901, p. 30 (Mallikollo); (pt.) Dubois, Syn. Av. I, 1902, p. 710 (Mallikollo); (pt.) Sharpe, Hand-List Birds V, 1909, p. 11 (Malicolo); Kinnear in Baker, Ann. Mag. Nat. Hist. (10) 2, 1928, p. 301 (New Hebrides); J. R. Baker, Man and Anim. N. Hebr., 1929, p. 195 (New Hebrides).

Zosterops flavifrons macgillivrayi; Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 2 (Malekula Island); Mathews, Syst. Av. Australas. II, 1930, p. 704 (Mallicollo or Malekula Island); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 226 (Malekula); Mayr & Camras, Field Mus. Nat. Hist., Zool. 20, 1938, p. 457 (Malekula Island); Mayr, Bird Southwest Pacific, 1945, p. 198 (Malekula); Mees, Sarawak Mus. Journ. 6, (1955), 1956, p. 653 (no locality); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 314 (Malekula).

Subspecific characters. Similar to *perplexa,* but practically no yellow on forehead or over lores; measurements on an average smaller. This subspecies is scarcely separable from *perplexa*, over which it has priority.

Unfeathered parts. Iris brownish, bill brownish (Correia).

Measurements of seven specimens (4 ♂, 3 ♀): wing 57-62 (59.36), tail 36-40 (38.29), tarsus (six specimens only) 18½-20 (19.33), entire culmen 14¼-16 (15.21), exposed culmen 11¾-13 (12.54), culmen from anterior point of nostril 8½-9½ (9.07).

Distribution. Confined to Malekula Island, New Hebrides.

First collector. Captain A. M. Farquhar of H. M. S. "Wallaroo" at Sandwich Bay, Malekula, on 17 May, 1899.

Not figured.

Type. The subspecies was based on three specimens of which one, from Epi, as a result of the restriction of the type-locality, has lost its nomenclatural significance. Two others, from Sandwich Bay, Malekula, remain as cotypes in the British Museum (not examined).

Moult. None of seven specimens collected in August shows moult.

Nidification. Not recorded.

Habits, etc. Not recorded. Presumably not different from those of the other subspecies.

5. **Zosterops flavifrons efatensis** Mayr

Zosterops flavifrons efatensis Mayr, Am. Mus. Nov. 912, 1937, p. 2 — Efate Island, New Hebrides.

Zosterops flavifrons; (pt.) G. R. Gray, Cat. Birds Isl. Pacific Ocean, 1859, p. 15 (Erromango); (pt.) Hartlaub, Journ. f. Orn. 13, 1865, p. 23 (Erromanga); G. R. Gray in Brenchley, Cruise of the Curaçoa, 1873, p. 366, pl. 7 fig. 1 (New Hebrides = Erromanga); E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878, p. 270, 280 (Vate); Tristram, Ibis (4) 3, 1879, p. 186 (Vaté); (pt.) Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 187 (Erromango); Sharpe, Ibis (7) 6, 1900, p. 346 (Fila, Efaté); (pt.) Finsch, Tierreich 15, 1901, p. 30 (Vaté, Erromanga).

Zosterops flavifrons flavifrons; (pt.) Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 1 (Efate, Nguna); (pt.) Mathews, Syst. Av. Australas. II, 1930, p. 704 (Erromanga, Efate, and Nguna Islands); (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 226 (Erromanga, Efate, Nguna).

Zosterops flavifrons efatensis; Mayr, Am. Mus. Nov. 986, 1938 (13 May), p. 3 (Erromanga); Mayr & Camras, Field Mus. Nat. Hist., Zool. 20, 1938 (30 Aug.), p. 457 (Vila Island); Mayr, Birds Southwest Pacific, 1945, p. 198 (Efate, Erromanga); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 315 (Efate, Nguna, and Erromango Islands).

Subspecific characters. Very similar to the nominate race, but somewhat smaller, and with distinctly shorter bill. Birds from Erromanga show an approach to *flavifrons*, as noted by Mayr in the description of *efatensis*.

Doubtfully distinct from *gauensis* (for discussion see under that subspecies).

Unfeathered parts. Iris brown, bill black or blackish, feet grey, greyish or bluish (Beck, Correia).

Measurements. Wing 11 ♂, 60-66 (62.32); 12 ♀, 59-63 (61.04); 24 specimens 59-66 (61.63); tail 11 ♂, 39-45 (41.82); 12 ♀, 37½-42 (40.33), 24 specimens 37-45 (40.88); tarsus 23 specimens, 18¼-20¾ (19.61), entire culmen 23 specimens, 14½-17 (16.02); exposed culmen 23 specimens, 11½-14 (12.65), culmen from anterior point of nostril 23 specimens, 8¼-10½ (9.35).

Distribution. Islands of Erromanga, Efate (or Vate; the main town of the island is Vila and it is apparently from this that Mayr & Camras, 1938, have derived the name Vila Island for I have been unable to find an island of that name) and Nguna.

First collector. J. Macgillivray on Erromanga, before 1860, probably in 1859. The first mention of this race is by G. R. Gray (1859, actual date apparently January 1860) and this specimen was later listed as having been collected by J. Macgillivray (Sharpe, 1884). The RMNH has a specimen from Erromanga, purchased from the dealer Frank in 1860 (see also Hartlaub, 1865), and there is little doubt that this also originates from Macgillivray, who lived in those years in the New Hebrides (cf. Whittell, 1954, p. 465).

Figure. Gray (1873), plate 7 fig. 1 (coloured plate on naturel size by J. Smit). The plate is good but shows too much black below the eye, and the very green dorsal surface could do with a bit more yellow. Though Gray (p. 366) did not give an exact locality for his birds, only the general statement that: "This species is found on the various islands forming the group of New Hebrides", it is apparent from the B. M. catalogue (Sharpe, 1884) that Brenchley presented two individuals, a male from Aneityum, and a female from Erromanga. As the figure shows a bird with a very conspicuous yellow forehead, it probably depicts the bird from Erromanga. As all these races are very similar, the matter is not of great importance.

Type. AMNH no. 212597 (type examined).

Moult. Specimens collected in March (2), May (7), June (8) and July (2) show no moult, the March specimens are in very worn plumage. Individuals taken in May (1), June (1) and July (1) are undergoing their main moult; especially the July-bird shows heavy moult in primaries and secondaries; on its label is noted: "caught by hand, almost unable to fly".

Nidification. Not recorded, except that the Layards (1878) mention breeding in cotton-fields. Of specimens examined, two, collected in March and June, are noted as having large gonads, but other specimens taken in the same months had them small.

Habits, etc. Macmillan, collector of the majority of specimens examined, noted them as occurring commonly in scattered bushes, trees and scrub, secondary forests, etc. One individual is marked as having been feeding on the ground in tall forest with scant undergrowth. As stomach contents he recorded insects (including caterpillars, beetles, scales), fruit and seeds.

6. **Zosterops flavifrons flavifrons** (J. F. Gmelin)

[*Muscicapa*] *flavifrons* J. F. Gmelin, Syst. Nat., 13th ed. I, 2, 1789, p. 944 — insula Tanna (based on the Yellow-fronted Fly-catcher of Latham, Gen. Syn. Birds II, pt. 1, 1783, p. 342).

Muscicapa heteroclita I. R. Forster, Descr. Anim. (ed. Lichtenstein), 1844, p. 271— Tanna insula.

Muscicapa flavifrons; Tiedemann, Zoologie III, 1814, p. 430 (Insel Tanna); G. R. Gray, Gen. Birds I, Muscicapinae, 1846 (no locality).

Zosterops heteroclita; Hartlaub, Journ. f. Orn. 2, 1854, p. 168 (Neue Hebriden).

Zosterops flavifrons; (pt.) G. R. Gray, Cat. Birds Isl. Pacific Ocean, 1859, p. 15 (Tanna); (pt.) Hartlaub, Journ. f. Orn. 13, 1865, p. 23 (Tanna); G. R. Gray, Hand-List Birds I, 1869, p. 162 (New Hebrides); Buller, Trans. N.Z. Inst. 3, 1871, p. 16 (the New Hebrides Group); Giebel, Thes. Orn. III, 1877, p. 775 (Novae Hebridae); (pt.) Ramsay, Proc. Linn. Soc. N.S.W. 3, 1878 (1879?), p. 337 (Tanna); (pt.) Schmeltz, Verh. Ver. Naturw. Unterh. 4, (1877), 1879, p. 6 (in reprint) (Aniwa); Crowley, Cat. Birds' Eggs, 1883, p. 16 (no locality); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden 3, (1890/91), 1892, (6), p. 36 (Tanna, Aniwa); (pt.) Finsch, Tierreich 15, 1901, p. 30 (Tanna, Aniwa); Dubois, Syn. Av. I, 1902, p. 710 (Nouv.-Hébrides); Kinnear in Baker, Ann. Mag. Nat. Hist. (10) 2, 1928, p. 301 (New Hebrides); Lysaght, Ibis 103a, 1961, p. 296 (Tanna).

Zosterops flavifrons flavifrons; (pt.) Murphy & Mathews, Am. Mus. Nov. 356, 1929 (2 July), p. 1 (Tanna); (pt.) Mathews, Syst. Av. Australas. II, 1930, p. 704 (Tanna); (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 226 (Tanna); Mayr. Am. Mus. Nov. 912, 1937, p. 3 (Tanna and Aniwa Islands); Mayr, Birds Southwest Pacific, 1945, p. 198 (Tanna, Aniwa); M. Laird, Journ. Parasitol. 45, 1959 (Feb.), p. 47, 48, 49, 52 (Mission Bay, Futuna, New Hebrides); Lysaght, Bull. Brit. Mus. (Nat. Hist.), Hist. 1, 1959, p. 308, 318 (Tanna); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 315 (Tanna).

Subspecific characters. Slightly larger than the other subspecies, with a stronger bill; yellow on forehead and over the lores well-developed.

Unfeathered parts. Not recorded?

Measurements of six male specimens: wing 65-67 (65.83), tail 43½-46 (45.33), tarsus 20½-21 (20.88), entire culmen (four specimens only) 17¼-18½ (17.81), exposed culmen (four specimens only) 13¾-15 (14.38), culmen from anterior point of nostril (four specimens only) 10-11 (10.31).

Distribution. Tanna, Aniwa and Futuna, in the southern New Hebrides.

First collector. J. R. Forster on Tanna in 1774.

Not figured.

Type. Probably lost: the species was based on a drawing (Lysaght, 1959).

Moult. Specimens collected in April (1), July (1), and November (4) do not show moult.

Nidification. Not recorded.

Habits, etc. Macmillan (notes on labels) found this subspecies common on Tanna, where he obtained it in native gardens and secondary growths. The stomachs he examined contained fruitseeds and berries. A specimen from Futuna, taken by the same collector, contained insects and fruit seeds.

7. **Zosterops flavifrons majuscula** Murphy & Mathews

Zosterops flavifrons majuscula Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 5 — Aneitum Island, New Hebrides Group.

Zosterops flavifrons; (pt.) G. R. Gray, Cat. Birds Trop. Isl. Pacific Ocean, 1859, p. 15 (Aneitum); (pt.) Hartlaub, Journ. f. Orn. 13, 1865, p. 23 (Aneiteum); (pt.) Tristram, Ibis (3) 6, 1876, p. 262 (Aneitum); (pt.) Schmeltz, Verh. Ver. Naturw. Unterh. 4, (1877), 1879, p. 6 (Aneityum); (pt.) Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 187 (Aneitum); (pt.) Tristram, Cat. Coll. Birds, 1889, p. 211 (Aneitym); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], (1890/91), 1892, (6), p. 36 (Aneitum); (pt.) Finsch, Tierreich 15, 1901, p. 30 (Aneityum).

Zosterops flavifrons majuscula; Mathews, Syst. Av. Australas. II, 1930, p. 705 (Aneitum Island); Snouckaert, Alauda (2) 3, 1931 (March), p. 2 (Ile Aneiteum); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 226 (Aneiteum); Mayr, Am. Mus. Nov. 912, 1937, p. 3 (Aneiteum); Mayr, Birds Southwest Pacific, 1945, p. 198 (Aneiteum); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959 (15 Feb.), p. 228 (Aneityum); M. Laird, Journ. Parasitol. 45, 1959 (Feb.), p. 47, 48, 49, 52 (Anelgauhat, Aneityum); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 315 (Aneityum).

Subspecific characters. A slightly differentiated race, which averages a little duller green above than all other subspecies (but the extremes overlap); further differs from neighbouring *flavifrons* by having the yellow on the forehead, though present, much less pronounced, and restricted in both extent and intensity, and by slightly smaller size (wing-length); from *efatensis* by the reduced yellow on the forehead and supra loral region; from *perplexa* by slightly longer bill; from *macgillivrayi* by slightly longer bill and the presence of some yellowish on the forehead.

Unfeathered parts. Iris brown, bill black, horn or white below, feet greenish (Correia).

Measurements of 12 specimens (7 ♂, 5 ♀): wing 60-64 (61.29), tail 42-47 (44.08), tarsus (eleven specimens only) 19¼-20¾ (20.07), entire culmen 15-17¾ (16.40), exposed culmen 12-14¼ (13.13), culmen from anterior point of nostril 9-10½ (9.69).

Distribution. Confined to Aneityum, the southernmost island of the New Hebrides.

First collector. J. Macgillivray in 1858. The RMNH has a specimen, purchased from Frank in 1860, collected on 19 October, 1858. Though no collector's name is mentioned on its label, it originates doubtless from Macgillivray. A specimen in the British Museum was collected a few months later, 14 June, 1859 (Sharpe, 1884).

Not figured.

Type. AMNH no. 212612 (type examined).

Moult. Birds collected in June (2), July (5), August (4) and October (1) do not show moult.

Nidification. Not recorded.

Habits, etc. Laird & Laird (1959) found this subspecies parasitized by microfilariae, and Laird (1959) mentioned it as a host of the protozoön *Atoxoplasma paddae.*

Species 45. **Zosterops xanthochroa** G. R. Gray

Zosterops xanthochroa G. R. Gray, Proc. Zool. Soc. London 27, 1859, p. 161 — Island of Nu.

Zosterops xanthochroa; G. R. Gray, Cat. Birds Isl. Pacific Ocean, 1859, p. 16 (New Caledonia (Island of Nu)); J. Verreaux & O. des Murs, Rev. Zool. (2) 12, 1860, p. 435 (Nouvelle-Calédonie, Ile de Nu); J. Verreaux & O. des Murs, Rev. Zool. (2) 14, 1862, p. 134 (la Nouvelle-Calédonie); Hartlaub, Journ. f. Orn. 13, 1865, p. 18, 25 (Neucaledonien mit der benachbarten kleinen Insel Nu); G. R. Gray, Hand-List Birds I, 1869, p. 162 (New Caledonia); Marie, Act. Soc. Linn. Bordeaux 27, 1870, p. 328 (la Nouvelle-Calédonie); Buller, Trans. N.Z. Inst. 3, 1871, p. 16 (New Caledonia); G. R. Gray in Brenchley, Cruise of H.M.S. Curaçoa, 1873, p. 366, pl. 7 fig. 2 (New Caledonia); Marie, Ibis (4) 1, 1877 (July), p. 362 (New Caledonia); Giebel, Thes. Orn. III, 1877, p. 777 (Nova Caledonia); Finsch, Proc. Zool. Soc. London for 1877, 1878 (March), p. 734 (New Caledonia); E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878 (July), p. 259 (round Noumea); *E. L. Layard, Field 52, 1878 (28 Dec.), p. 828 (presumably New Caledonia); Tristram, Ibis 4 (3), 1879, p. 182, 186 (N. Caledonia); Finsch, Zool. Challenger Exp. VIII, 1880, p. 49 (New Caledonia); Ridgway, Proc. U. S. Nat. Mus. 4, 1882 (10 March), p. 320 (no locality); E. C. Layard & E. L. C. Layard, Ibis (4) 6, 1882, p. 508 (New Caledonia); Crowley, Cat. Birds' Eggs, 1883, p. 16 (no locality); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 174 (Port de France, New Caledonia, Isle of Pines); Tristram, Cat. Coll. Birds. 1889. p. 212 (Noumea); Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 290 (la Nouvelle-Calédonie); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Neu-Caledonien); Finsch, Tierreich 15, 1901, p. 13 (Neu-Kaledonien); Dubois, Syn. Av. I, 1902, p. 706 (Nouv.-Calédonie); Sharpe, Hand-List Birds V, 1909, p. 2 (New Caledonia); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Neu-Caledonien); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. V, 1912, p. 2 (New Caledonia); Page, Bird Notes N.S. 4, 1913, p. 2 (New Caledonia); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 33 (Neu Caledonien; auch auf Ile des Pins); Brasil, Rev. Fr. d'Orn. 4, 1916, p. 221 (Canala, Nouvelle-Calédonie); Fuhrmann in Sarasin & Roux, Nova Caledonia, Zool. II, 1918, p. 400, 424 (Nouvelle-Calédonie; Yaté); Leach, Emu 28, 1928, p. 40 (New Caledonia); Leach, Ois. & Rev. Fr. d'Orn. 10, 1929, p. 336 (la Nouvelle-Calédonie); Mathews, Syst. Av. Australas. II, 1930, p. 697 (New Caledonia); Ridley, Dispersal of Plants, 1930, p. 469 (New Caledonia); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 226 (Neu-Caledonien); Fuhrmann, Les Ténias des Ois., 1932, p. 326 (Nouvelle-Calédonie); Mayr, Am. Mus. Nov. 1057, 1940 (15 April), p. 1, 2 (New Caledonia, Mare); Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 210 (New Caledonia, Mare); Mayr, Birds Southwest Pacific, 1945, p. 174 (New Caledonia and Maré); Warner, Orn. New Caledonia and Loyalty Isl. (unpubl. thesis), 1947, p. 217 (New Caledonia and Mare); Yamaguti, Syst. Helminth. II, Cestodes of Vertebrates, 1959, p. 236 (New Caledonia); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 315 (New Caledonia).

Zosterops xanthocroa; Boucard, Cat. Av., 1876, p. 230 (Nova Caledonia).

Zosterops xanthochlora; Anonymus [A. J. Campbell], Vict. Nat. 1, 1884, p. 45 (New Caledonia).

Zosterops xanthomera; Delacour, Guide Ois. Nouv. Calédonie, 1966, p. 146 (la Nouvelle-Calédonie et Maré).

Characters. A fairly large species of thoroughly normal appearance, green above, yellow on throat, breast and under tail coverts, pale grey on flanks and abdomen, and with a rather wide eye-ring.

Upper parts generally Warbler Green; forehead of the same colour, but feathers just above the bill sometimes slightly more yellow; lores and a streak under the eye blackish grey; eye-ring fairly wide, white, anteriorly interrupted by the loral line; primaries, secondaries and rectrices blackish brown, all margined with Warbler Green.

Under parts. Throat and whole breast Lemon Yellow to Lemon Chrome; under tail coverts and a feeble streak down the centre of the abdomen also yellow, but decidedly paler, remainder of under surface pale buffish grey.

Unfeathered parts. Iris dark livid or drab; bill livid grey, tip black, legs grey or blue grey (Layard); iris light brown (Gray in Brenchley, 1873); iris hazel, bill dark slate with a white base to the mandible, legs pale greyish slate (Warner).

Measurements of eight specimens (6 ♂, 2 ♀): wing 59-62 (60.31), tail 41½-47 (44.44), tarsus 19-19¾ (19.19), entire culmen 14½-16¼ (15.06), exposed culmen 11¼-13 (11.81), culmen from anterior part of nostril 8½-10 (9.09).

Weights. ♂ 9.85 and 11.8 g (Macmillan). The weights recorded by Warner (1947) are slightly higher, from 12.0 to 13.8 g.

Structure. There are no structural peculiarities; the 2nd primary is between the 7th and the 8th in length; average tail:wing index of eight specimens 73.68%.

Distribution. New Caledonia, Ile des Pins (Sharpe, 1884) and Maré (Mayr, 1940). I have examined material from New Caledonia only. The old name Nu is the same as New Caledonia, not a different island as Verreaux & des Murs (1860) and Hartlaub (1865) thought.

First collector. Though the type has no collector's name on its label, its registered number shows that it was received in 1859 on the same day as a type of *Z. lateralis griseonota* and other birds from New Caledonia which are known to have been collected by John Macgillivray during the cruise of H. M. S. "Herald" in 1853 (see also Sharpe, 1884, p. 174).

Figure. A good coloured plate on natural size, by J. Smit, appears in Brenchley (1873), plate 7 fig. 2; the only comment I have to make is that the loral line is erroneously shown white.

Type. BM no. 59.4.19.7 (type examined).

Moult. Specimens collected in March (1), August (3), September (1), November (1), and December (1) do not show moult.

Nidification. Layard & Layard (1882) describe the nest as a beautiful structure, composed of soft rootlets, hair, feathers, cobweb, etc., in the fork of some small branches; similar in appearance, therefore, to the nests of other members of the genus. They may be placed in low scrubs as well as in tall trees. The same authors mention a clutch size of from two to four pure turquoise-blue eggs. Measurements 16.5 × 13 mm (Nehrkorn, 1899, 1910, see also Ogilvie-Grant, 1912). The Layards state that the nesting season lasts from August to October, and that the birds may be double brooded. Warner (1947) saw young birds being fed by adults as late as February, and concludes that the nesting season extends to January at least.

Habits, etc. The species is, and has ever been, common in New Caledonia, perhaps particularly in the southern part (F. Sarasin, 1913), and also on Maré (Warner, 1947); it is apparenly less numerous above 3000 feet. It is mainly a forest bird, but native gardens and open glades are also visited. Warner (contrary to the Layards) states that the normal habitat is definitely forest, the species being more or less replaced by *Z. lateralis* in brush and semi-open woodland. Food consists of insects and berries; the fruit of *Lantana* seems to be a favourite (Layard, Warner) and when the *Lantana* berries are ripe, small flocks venture out of the forest, and associate with such species as *Zosterops lateralis*, *Gerygone* and *Erythrura*. Another fruit eaten is that of *Carica papaya*, though Warner does not consider that much damage is done to the native gardens where such trees grow. Flocking begins in January, towards the end of the breeding season, and the size of the flocks increases in the succeeding months.

Parasites. A cestode, *Anomotaenia caledonica*, is known from this species (Fuhrmann, 1918).

Voice. Warner describes the song of the species as a short, clear "tahreeee", practically indistinguishable from the song of *Z. lateralis*; males begin to sing in September, and song becomes less frequent in January.

The single phrase quoted above does certainly not adequately describe the attractive and varied song of *Z. lateralis* on the Australian mainland, and further investigation seems desirable.

Discussion. Warner's observation that in song *Z. xanthochroa* and *Z. lateralis griseonota* are very similar suggests that these species are not too distantly related.

Species 46. **Zosterops minuta** E. L. Layard

Zosterops minuta E. L. Layard, Ann. Mag. Nat. Hist. (5) 1, 1878 (May), p. 375 — Lifu.

Zosterops minuta; E. L. Layard & E. L. C. Layard, Ibis (4) 2, 1878, p. 259 (Lifu); Tristram, Ibis (4) 3, 1879, p. 186, pl. IV, fig. 1 (Lifu); E. L. Layard & E. L. C. Layard, Ibis (4) 4, 1880, p. 225 (Lifu, Maré); Ridgway, Proc. U.S. Nat. Mus. 4, 1882, p. 320 (Loyalty Islands); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 192 (Lifu); Tristram, Cat. Coll. Birds, 1889, p. 211 (Kepenche, Lifu); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 36 (Lifu and Maré); Finsch, Tierreich 15, 1901, p. 30 (Lifu, Maré); Dubois, Syn. Av. I, 1902, p. 710 (Iles Lifu, Maré); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 473, 499 (no locality); Sharpe, Hand-List Birds V, 1909, p. 11 (Loyalty Is. (Lifu, Maré)); F. Sarasin in Sarasin & Roux, Nova Caledonia, Zool. I, 1913, p. 2, 33 (Lifou: Quépénée; Nathalo); Brasil, Rev. Fr. d'Orn. 4, 1916, p. 221 (Lifou); Fuhrmann in Sarasin & Roux, Nova Caledonia, Zool. II, 1918, p. 400, 424, 441 (Iles Loyalty: Lifou: Quépénée); Mathews, Syst. Av. Australas. II, 1930, p. 705 (Lifu); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 226 (Lifu); Fuhrmann, Les Ténias des Ois., 1932, p. 326 (Iles Loyalty); Mayr, Am. Mus. Nov. 1057, 1940 (15 April), p. 1 (Lifu); Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 210 (Loyalty Island); Mayr, Birds Southwest Pacific, 1945, p. 174 (Lifu); Warner, Orn. N. Caledonia and Loyalty Is. (unpl. thesis), 1947, p. 216 (Lifu); Greenway, Extinct Birds, 1958, p. 69 (Lifu); Yamaguti, Syst. Helminth. II, Cestodes of Vertebrates, 1959, p. 236, 316 (Loyalty Isl.); Delacour, Guide Ois. Nouv. Calédonie, 1966, p. 145 (Lifou); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 315 (Lifu).

Characters. A small yellow-bellied species, closely corresponding to the basic pattern, with a wide eye-ring.

Upper parts generally bright Warbler Green; forehead and supra loral region brighter, yellowish; lores and a narrow streak below the eye blackish grey; eye-ring white, well developed, especially under the eye, narrowly interrupted in front by the loral streak; primaries, secondaries and rectrices blackish, broadly margined with the colour of the upper parts. In life there seems to be an impression of white patches on the flanks, as noted by E. L. & E. L. C. Layard (1880) and by Macmillan who wrote: "In life in the field the white side patches of this species are very conspicuous, this white patch lies parallel or slightly covering the black of the wing, giving an impression of a white instead of black wing edge. To arrange in death is exceedingly difficult as porportions turn different".

Under parts. Throat, breast, centre of belly and under tail coverts Lemon Chrome; flanks pale buffish, suffused with yellow, not clearly demarcated against the remainder of the under parts. Notwithstanding the buffish flanks the birds would in the field give an impression of being entirely yellow-bellied.

Unfeathered parts. Iris drab, bill pale brown or corneous, legs blue brown (Layard).

Measurements. Wing 14 ♂, 53-58 (55.54); 15 ♀, 52-56½ (54.27); 29 specimens, 52-58 (54.58); tail 14 ♂, 39-43 (41.21); 15 ♀, 36½-42½ (39.77); 29 specimens, 36½-43 (40.47); tarsus 29 specimens, 16½-19 (18.07); entire culmen 29 specimens, 13-14¾ (13.84); exposed culmen 29 specimens, 10-12 (10.91); culmen from anterior point of nostril 29 specimens, 7½-9 (8.16).

Structure. Tail rather long for the size of the species, average index of 29 specimens, 73.74 %.

Weights. ♂: 7.9, 8.1, 8.5, 8.5, 8.55, 8.6, 8.6, 9, 9.1, 9.5, 10, 10.7; ♀: 7, 7.5, 7.65, 7.95, 8, 8.2, 8.2, 8.25, 8.5, 8.9, 9, 9.3, 9.7, 9.9 g.

Distribution. Known from Lifu, Loyalty Islands. The species has also been recorded from Maré, but Sarasin (1913) has expressly denied its occurrence there, and all material I have examined came from Lifu.

First collector. E. Deplanche in or before 1868 (Brasil, 1916).

Figure. Tristram (1879), plate IV, fig. 1 (good coloured plate on natural size by Keulemans; flanks and belly perhaps shown a trifle too bright, to which E. L. Layard & E. L. C. Layard, 1880, have also drawn attention).

Type. The cotypes, collected in September 1877, were in the Tristram collection, now destroyed. Sharpe (1906) claimed one cotype to be in the British Museum.

Moult. Of thirty specimens examined, collected in the months January (2), June (1), July (13), August (13) and September (1), not a single one is undergoing moult.

Nidification. Warner (1947) states that the species breeds throughout the greater part of the year, though rarely from February to late May, and that several broods are probably raised. He has described the nests as similar to those of other representatives of the genus inhabiting the area, but smaller. The clutch is from two to four eggs, and both sexes are believed to participate in incubation.

Habits. The Layards (1880) report that the species is very common, and that it is very destructive to fruit of all kinds, especially as it moves in large flocks. Warner, on the other hand, regards the species as mainly insectivorous, fruit-eating being generally restricted to paw-paw and banyan.

Macmillan (notes on labels of specimens) in 1938 found large mobs of up to 20 and more, occasionally mixed with other species of *Zosterops*, and spending much time busily searching undersides of leaves, etc., for insects. They would feed at all levels, but mainly under 10 ft. They seemed to inhabit a large variety of habitats, including native villages and gardens, low scrubs and forest. According to Macmillan the species is rather shy and suffers to some extent from persecution by the natives.

Macmillan found as stomach contents insects (including ants, caterpillars and grubs), as well as fruit and seeds. Warner (1947) mentions ants as a favorite food, but noted that beetles and many other kinds of insects are also taken.

The native name according to the Layards is "Warchu-mandra"; Macmillan rendered it: "Watchu-mandah". The Layards also mention a native name on Maré: "Washosso", but their record was probably erroneous.

Parasites. The cestodes *Anomotaenia caledonica* and *Hymenolepis zosteropis* have been recorded from this species (Fuhrmann, 1918, 1932).

Species 47. **Zosterops samoensis** Murphy & Mathews

Zosterops samoensis Murphy & Mathews, Am. Mus. Nov. 356, 1929 (July 2), p. 11 — Savaii Island, Samoan Group.

Zosterops samoensis; Mathews, Syst. Av. Australas. II, 1930, p. 697 (Savaii Island); Snouckaert, Alauda (2) 3, 1931, p. 19 (Savaii); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 227 (Samoa Inseln: Savaii); J. S. Armstrong, Hand-List Birds Samoa, 1932, p. 81 (Savai'i); Meise, Proc. 8th Int. Orn. Congr. (1934), 1938, p. 87, 179 (Savaii, Samoa-Gruppe); Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 206 (Samoa); Mayr, Birds Southwest Pacific, 1945, p. 122 (Savaii Isl.); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 325 (Samoa); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 314 (Savaii).

Characters. A fairly large species of rather dull appearance, greenish above, pale greenish yellow below, and without any bright yellow or white in its plumage. Peculiarities are the colour of eye and bill.

Upper parts, including forehead and supra loral region, Dull Citrine; lores yellowish green; eye-ring narrow, white, interrupted in front; primaries, secondaries, and rectrices brownish black, the primaries and secondaries broadly edged by a green slightly brighter than the Dull Citrine of the mantle; rectrices with rather narrow edges of the same colour.

Under parts. Throat and under tail coverts Barium Yellow; breast and flanks pale yellowish green with a trace of buffish on the flanks, centre of belly very pale yellowish. Neither on the sides of the head nor anywhere else any sharp demarcations exist, which contributes to giving the whole bird a rather dull and nondescript appearance.

Unfeathered parts. Iris light yellow, bill brown, yellow below, feet greyish or greenish (Beck).

Measurements. Wing 11 ♂, 58-61 (59.54); 8 ♀, 58-61 (59.50), 21 specimens, 58-61 (59.52); tail 11 ♂, 35-37½ (36.41), 8 ♀, 34-38 (35.94); 20 specimens, 34-38 (36.20); tarsus 20 specimens, 16¼-18¼ (17.44); entire culmen 18 specimens, 13½-15 (14.17); exposed culmen 19 specimens, 10½-12 (11.25); culmen from anterior point of nostril 19 specimens, 8-8¾ (8.28).

Structure. Wings normal, with the 2nd primary in length between the 7th and the 8th; 1st (rudimentary) primary distinct and perhaps larger than is usual in the genus. Tail relatively short, average index of 20 specimens 60.84 %.

Distribution. Confined to the highlands of Savaii, Samoa.

First collector. R. H. Beck on 19 May, 1924.

Not figured.

Type. AMNH no. 206312 (type examined).

Moult. Of the 22 specimens examined, all taken on 19 or 23 May, 1924, eleven are not in moult, and some of these have a very fresh plumage, showing that the moult is just completed. The other eleven show various stages of wing and tail moult, so that it is clear that the major moult takes place in April and May.

Nidification. Not recorded.

Habits, etc. As far as I know Beck, who collected the type material, is the only ornithologist ever to have observed the species in life. In his diary (Beck's Journal II, Dec. 1923-Aug. 1925, MS in AMNH, p. 41) the following entry appears on May 19, 1924: "Made camp at 2500 feet [above Salailua Bay, Savaii] and worked up to above 5000 feet onto the top of a ridge. I found a small yellowish bird in flocks at 4000 feet and above and got several of them, feeding in leafy trees high up at times".

Discussion. Murphy & Mathews (1929) have stressed the resemblance between this species and *Z. sanctae-crucis*. As I have mentioned under that species (this review, part II, p. 167), I do not think that this similarity is an indication of close relationship. Besides in size and proportions, *Z. sanctae-crucis* differs from *Z. samoensis* as follows: dull under surface more or less the same; upper parts distinctly lighter; bill black, not brown; primaries and rectrices perhaps less dark; iris brown, not yellow; eye-ring rudimentary, and moreover its rudimentary feathers not white but dark grey. Ecologically the two differ in that *Z. samoensis* is a mountain-bird while *Z. sanctae-crucis*, inhabiting an island of which the highest point is only 540 metres, must of necessity inhabit lowlands or hilly country at most.

Species 48. **Zosterops conspicillata** (Kittlitz)

Characters. A small to fairly small species which does not deviate much from the basic pattern.

Because of pronounced geographic variation, a general description of the species can only be given in the broadest terms: three races (*semperi, owstoni, takatsukasai*) are greenish (Yellowish Citrine) above, Citron Yellow below. One race (*hypolais*) represents the other extreme, being Citrine Drab above, Marguerite Yellow below, with a pale buffy suffusion on the flanks. The other three races (*conspicillata, saypani, ?rotensis*) are more or less intermediate. The eye-ring is of moderate width, narrower in *hypolais*.

Unfeathered parts. The colour of the iris is of particular importance, because there is good evidence that it shows geographical variation in colour, as tabulated by Marshall (1949). The occurrence of brown and light grey eyes in the same population noted by that author is not so surprising, because elsewhere, in the species *Z. natalis*, in material personally collected and prepared I found that young birds have light grey eyes, adults light brown. In Marshall's table at least in the specimens from Saipan there is a suggestion that the differences are due to the same cause. The iris of *Z. c. semperi*, however, appears always to be white, though I note that other workers, Finsch and R. Baker, describe it as ocre-yellow and light grey respectively, so that more information is still wanted. See also Baker (1951, p. 324). The interesting point is that geographical variation in iris colour is unknown from any other species of the family, and indeed, in some species (*Z. montana*) it appears to be a reliable specific character.

Measurements are given in table VII.

TABLE VII

Zosterops conspicillata

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
saypani (Saipan)	23	50-54½	33-39	52.46	35.78	67.95%
saypani (Tinian)	42	50-54	33-38	52.26	36.12	69.18%
rotensis 1)	3	51-55	42-43	53	42	—
conspicillata (♂)	12	56-59	38-41	56.67	38.87	68.60%
conspicillata (♀)	14	53-58	35-39	55.46	37.18	67.03%
hypolais	4	56-58	37-38	57.00	37.50	65.8 %
semperi	23	53-59	32-39	56.44	36.24	64.23%
owstoni	11	55-58	31-37	56.14	34.18	60.89%
takatsukasai	16	53-56	31-36	55.00	34.00	61.71%

1) Measurements after Baker (1951, tab. 50); no specimens of this subspecies were personally examined.

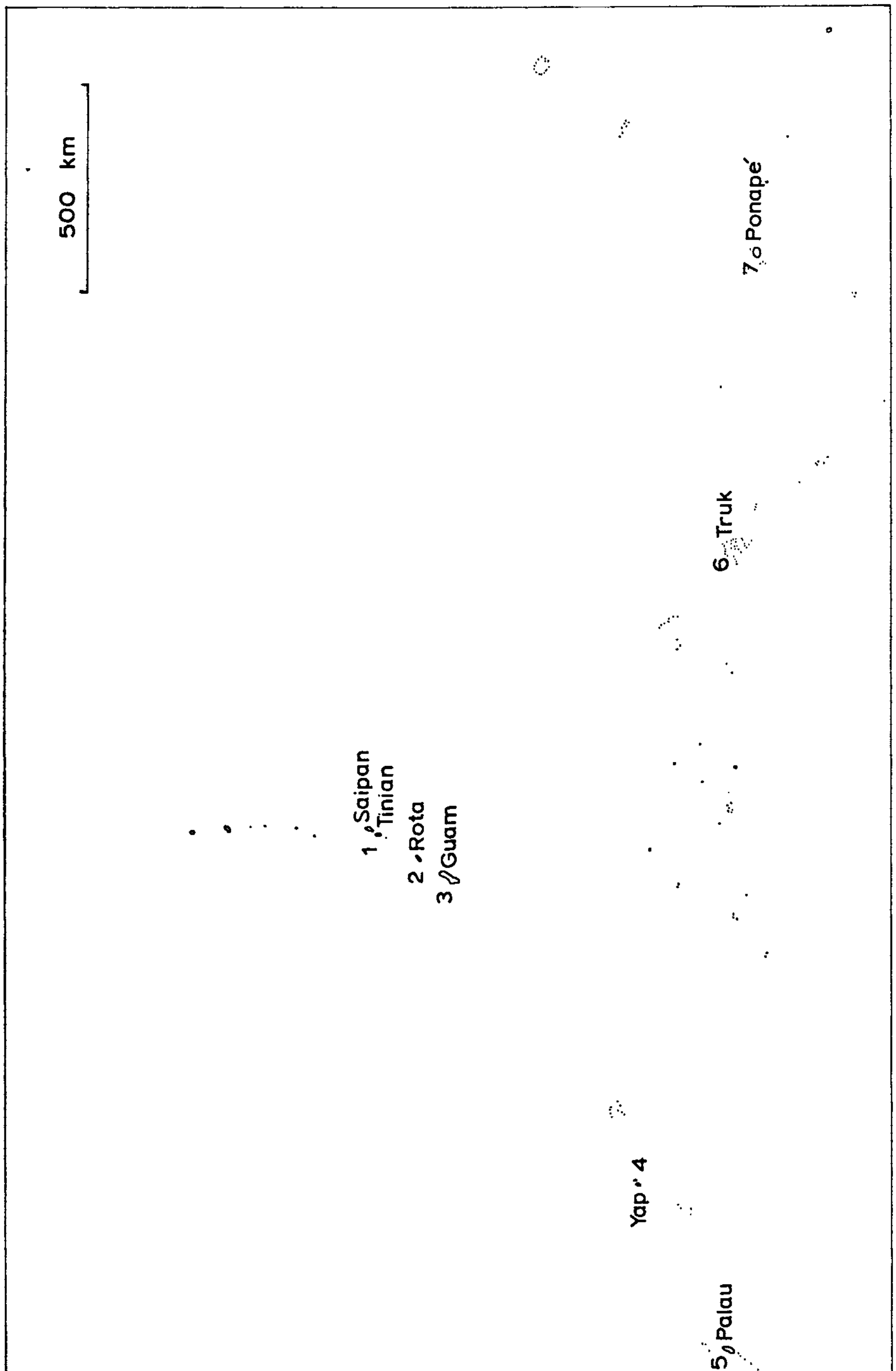


Fig. 11. The distribution of *Zosterops conspicillata* and races: 1, *saypani*; 2, *rotensis*; 3, *conspicillata*; 4, *hypolais*; 5, *semperi*; 6, *owstoni*; 7, *takatsukasai*.

Structure. Wing rounded, 2nd primary usually short, but individually variable, usually 7>2>8 but sometimes 6>2>7 and even 9>2>10.

Distribution (fig. 11). Widely distributed in Micronesia where each of the main islands or island groups has its own endemic subspecies: Saipan, Tinian, Rota, Guam, Yap, Palau Islands, Ponape and Truk.

Geographical variation. Partly considerable, as indicated in the description above. *Z. c. hypolais* stands apart by its colours and narrow eye-ring. The three subspecies *semperi, owstoni* and *takatsukasai* are exceedingly similar to each other, and can be distinguished in series only. The three northern subspecies are slightly more different inter se, but can, without distorting the facts, also be seen as a natural group. Baker (1951) noted that *hypolais* may represent an independent colonisation. Personally I regard the morphological evidence as sufficiently convincing to keep it as a race of *conspicillata,* though recognizing its aberrant position within the species.

Related species. Stresemann (1931), the first to unite the different forms to one species, listed *Z. conspicillata* as a separate species, without speculating about interspecific affinities. Baker (1951) discussed its relations at some length. He expressed himself in a very cautious way, concluding that: "*Z. conspicillata* probably was derived from an ancestral stock which came to Micronesia from the Philippine or Moluccan area". None of the species he mentioned as possible ancestors appears to have a very clear claim to this distinction. Mayr (1965) expressed the opinion that *Z. conspicillata* is related to *Z. japonica,* and placed it accordingly in his sequence. Earlier, however, he believed in affinity between *Z. conspicillata* and *Z. samoensis* (teste Baker, 1951, p. 325). *Z. conspicillata* is a fairly generalized member of its genus, and for this reason morphological resemblance to other species is not helpful in finding its affinities. I believe that Stresemann's view, to place it as a species without apparent close relatives, is in the present stage of our knowledge the best one.

1. **Zosterops conspicillata saypani** Dubois

[*Zosterops conspicillata*] Var. *Saypani* Dubois, Syn. Av. I, 1902, p. 711 — Saypan (Mariannes).

Zosterops Semperi; (pt.) Oustalet, Le Naturaliste (2) 11, 1889, p. 260 (îles Mariannes = Saypan).

Zosterops conspicillata; (pt.) Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 205-207 (Saypan); (pt.) Hartert, Nov. Zool. 5, 1898, p. 57 (Saipan); (pt.) Finsch, Tierreich 15, 1901, p. 37 (Saipan); Prowazek, Die deutschen Marianen, 1913, p. 101 (Saipan); (pt.) Taka-Tsukasa & Kuroda, Tori 1, 1915, p. 64 (Marianne = Saipan); Marshall, Condor 51, 1949, p. 220 (Saipan, Tinian).

Zosterops conspicill. aff.; Matschie, Journ. f. Orn. 49, 1901, p. 112 (Saipan).

Zosterops; Safford, Osprey N.S. 1, 1902, p. 41 (Saipan).

Zosterops saipani; Sharpe, Hand-List Birds V, 1909, p. 16 (Marianne Is. (Saipan)); Mathews, Syst. Av. Australas. II, 1930, p. 706 (Saipan).

Zosterops conspicillatus; (pt.) Kuroda in Momiyama, Birds Micronesia, 1922, p. 76 (Saipan).

Zosterops conspicillatus subsp. nov.?; Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Saipan Id.).

Zosterops conspicillata saypani; Snouckaert, Alauda (2) 3, 1931 (7 March), p. 22 (Ile Saypan); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 318 (Tinian, Saipan); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Tinian and Saipan).

Zosterops conspicillata saipani; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 227 (Saipan); Mathews, Ibis (13) 2, 1932, p. 155 (no locality); Taka-Tsukasa & Yamashina, Dobuts. Zasshi 44, 1932 (15 June), p. 222 (Tenian); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Saipan, Tinian); Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 163 (Saipan); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 192 (Saipan, Tinian); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Saipan, Tinian); Mayr, Birds Southwest Pacific, 1945, p. 299 (Saipan, Tinian); Downs, Trans. Kansas Ac. Sc. 49, 1946, p. 104 (Tinian); Stott, Auk 64, 1947, p. 527 (Saipan); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 73 (Saipan, Tinian); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops consicillatus saipani; Yamashina, Tori 7, 1932, p. 398 (Sonson, Tinian I.).

Zosterops conspicillata saipanensis; Marshall, Condor 51, 1949, p. 217-218 (Saipan, Tinian).

Subspecific characters. Differs fairly conspicuously from the nominate race by the paler under parts, these being pale buffish yellow, the throat not different from the remainder, but under tail coverts Citron Yellow; cheeks green as the mantle, not grey; narrower supra loral line; perhaps slightly narrower white eye-ring; and (in skins) by the brownish black, not brownish, bill; also by slightly smaller size.

Unfeathered parts. Iris chestnut, bill, upper black to black olive, lower grey blue; legs slate blue (Coultas); iris brown or light grey, bill blackish olive, base of mandible grey, legs bluish-grey (Marshall, 1949).

Measurements. Saipan: wing 10 ♂, 51-54 (53.05); 12 ♀, 50-54½ (52.17); 23 specimens, 50-54½ (52.46); tail 10 ♂, 33½-39 (36.35); 9 ♀, 33-37 (35.22); 20 specimens, 33-39 (35.78); tarsus 23 specimens, 17½-19 (18.42); entire culmen 19 specimens, 12-13 (12.43); exposed culmen 19 specimens, 8¾-10¾ (9.79); culmen from anterior point of nostril 19 specimens, 6½-7¾ (7.03).

Tinian: wing 21 ♂, 50½-54 (52.45); 21 ♀, 50-54 (52.07); 42 specimens, 50-54 (52.26); tail 20 ♂, 33-38 (36.25); 19 ♀, 33½-38 (36.03); 39 specimens, 33-38 (36.12); tarsus 41 specimens, 17-19 (18.12); entire culmen 40 specimens, 11-13¼ (12.55); exposed culmen 40 specimens, 8½-11 (9.86); culmen from anterior point of nostril 40 specimens, 6½-7½ (7.16).

Distribution. Saipan and Tinian.

First collector. Alfred Marche on Saipan in May or June 1887 (cf. Oustalet, 1889).

Figure. Kuroda (1933), plate 20 no. 163 (coloured, on two thirds natural size).

Type. The history of naming of this subspecies is somewhat complicated. Dubois' diagnosis: "Diffère des sujets de Gouam par le devant de la tête d'une teinte plus jaune, la tête et les côtés du cou plus gris", is clearly not drawn up from material personally examined, but copied from Finsch (1901), to whom reference is made. Finsch (1901), did not have material either as is clear from his remarks: "Stücke von Saipan etwas abweichend: Zügel und Vorderkopf mehr gelblich, Kopf- und Halsseiten mehr grau; nach Hartert vielleicht eigene Art". Both descriptions therefore go back on Hartert (1898), who mentioned a series of six rather poor skins, collected in July and August (1895) by Owston's Japanese collectors. These six specimens then, are the cotypes of *saypani*. For some reason, but presumably because of their fairly poor condition and because at the time I was not aware that they were types, I have not studied any of these specimens during my visit to New York in 1962, but according to Dr. Vaurie (in litt., 20-IX-1966) there are at present eight specimens, AMNH nos. 700812-700819, ex Tring Museum, obtained by Owston's collectors on August 14 and 20, 1895, and one July 13-25, 1895. Four are males, two are females, and two were not sexed. These eight birds must include the six cotypes: perhaps the two unsexed birds are the ones to be excluded from the type series.

Moult. No moulting season is apparent on the basis of material examined as summarized in table VIII. This is in agreement with Marshall (1949) who found that moult can take place at any time of the year.

TABLE VIII

Moult in *Zosterops conspicillata saypani*

month	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
no moult	3	—	3	19	—	—	1	1	13	1	—	2
moult	5	—	—	7	—	—	—	—	7	1	—	1

Nidification. Oustalet (1895) mentioned that Marche collected nests during his stay from May to July. Yamashina recorded three nests, containing one, two and three eggs respectively, the first two collected on 8 January 1932, the third on 1 August 1932. He described the nests as of the familiar cradle-type, suspended in the fork of a branch, and the eggs as pale blue in colour, measurements: 15.5 × 11.5, 15 × 11.5 and 15 × 11.2 mm. Marshall (1949) considered that the species breeds the year round.

Habits, etc. The various observers who have published their notes on this subspecies, vary in their estimates of its status from fairly common (Stott, 1947) to abundant (Downs, 1946); the behaviour as described is entirely typical, as is the food which consists of seeds, fruit, caterpillars, ants and other small insects; sometimes also grasshopper parts and small snails. Marshall (1949) has recorded flocks of from a dozen to fifty individuals the whole year round, even when some are nesting.

Marshall (1949) reported that individuals of this subspecies were found to be almost universally infected with the blood-parasite *Haemoproteus*, and had microfilariae with an incidence of about 15 per cent. Neither parasite was found in the nominate race of Guam.

Discussion. The annual cycle, or rather the absence of an annual cycle, in this subspecies, with breeding, moulting and flocking taking place throughout the year, deserves further investigation.

2. **Zosterops conspicillata rotensis** Taka-Tsukasa & Yamashina

Zosterops semperi rotensis Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931 (15 July), p. 486 — Rota Island.

Zosterops Semperi; (pt.) Oustalet, Le Naturaliste (2) 11, 1889, p. 260 (iles Mariannes); (pt.) Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 207 (Rota).

Zosterops semperi; Hartert, Nov. Zool. 5, 1898, p. 57 (Rota); (pt.) Finsch, Tierreich 15, 1901, p. 30 (Rota); (pt.) Dubois, Syn. Av. I, 1902, p. 710 (Rota).

Zosterops semperi semperi; (pt.) Kuroda in Momiyama, Birds Micronesia, 1922, p. 75 (Rota).

Zosterops semperi subsp.?; Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Rota Isl.).

Zosterops semperi rotensis; Mathews, Ibis (13) 2, 1932 (1 Jan.), p. 155 (Rota Island); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Rota); Taka-Tsukasa & Yamashina, Dobuts. Zasshi 44, 1932 (15 June), p. 222 (Rota); Yamashina, Tori 7, 1932 (31 Dec.), p. 399 (Rota I.); Snouckaert, Alauda (2) 4, 1933 (30 Jan.), p. 459 (Ile Rota).

Zosterops conspicillata rotensis; Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 193 (Rota); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Rota); Mayr, Birds Southwest Pacific, 1945, p. 299 (Rota); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 73 (Rota: Sosan Isthmus, Mariiru Point); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 319 (Rota); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Rota); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops conspicillatus rotensis; Hachisuka, Tori 11, 1942 (Dec.), p. 343 (Rota).

Zosterops conspillata rotensis; Hachisuka, Tori 11, 1942 (Dec.), p. 348 (Rota).

Subspecific characters. Resembles the nominate race, but with brighter greenish-yellow upper surface; chin and throat yellow, not paler than the rest of the underparts; fronto-loral band tinged with bright yellow; the auriculars similar in colour to the upperparts, not greyish.

No material of this subspecies was examined by me; the above description is adapted from Baker (1951, p. 320). Earlier workers (Oustalet, Hartert) were struck by the close resemblance between this subspecies and *Z. c. semperi,* probably mainly on the basis of brighter colours and all-yellow under surface, but according to Baker *rotensis* differs from *semperi* by its darker yellow lores, and darker yellow underparts.

Measurements. Baker gives for three specimens: wing 51-55, tail 42-43, tarsus 18-19, entire culmen 13-13.5.

Distribution. Confined to Rota.

First collector. A. Marche in June 1888.

Not figured.

Type. Was in the Taka-Tsukasa collection; destroyed by fire, following bombing, in May 1945 (Yamashina, in litt., 21-I-1967).

Moult. Baker (1951, p. 320) records moult in October.

Nidification. A nest with two eggs was found on 7 March, 1931; measurements of the eggs 17 × 13 and 17.2 × 13 mm (Yamashina, 1932).

Habits, etc. Baker (1948, 1951) reported that in 1945 these birds were numerous.

3. **Zosterops conspicillata conspicillata** (Kittlitz)

Dicaeum conspicillatum Kittlitz, Kupfert. Naturg. Vögel, 1833, p. 15, pl. 19 fig. 1 — von der Marianen-Insel Guaham.

Dicaeum conspicillatum; Kittlitz, Mém. Ac. Imp. Sc. St.-Pétersbourg 2, 1835, p. 3, pl. 3 (Guaham); Kittlitz in Lutké, Voyage autour du Monde "Le Séniavine" III, 1836, p. 305 (Ile Guahan).

Zosterops conspicillatum; Bonaparte, Consp. Av. I, 1850, p. 398 (Ins. Mariann.).

Zosterops conspicillata; G. R. Gray, Gen. Birds I, 1848, p. 198 (no locality); Reichenbach, Handb. spec. Orn., Merop., (1851), 1852, p. 92, pl. 461, fig. 3294 (Guaham); Hartlaub, Journ. f. Orn. 2, 1854, p. 167 (Mariannen); G. R. Gray, Cat. Birds Trop. Isl. Pacific Ocean, 1859, p. 16 (Guam); Hartlaub, Journ. f. Orn. 13, 1865, p. 5, 17 (Guaham); G. R. Gray, Hand-List Birds I, 1869, p. 163 (Ladrone I.); Buller, Trans. N. Z. Inst. 3, (1870), 1871, p. 16 (Ladrone or Marian Islands); Hartlaub & Finsch, Proc. Zool. Soc. London, 1872, p. 95 (Guaham); Boucard, Cat. Av., 1876, p. 231 (Ladrone I.); Giebel, Thes. Orn. III, 1877, p. 775 (Ins. Ladronae); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 187 (Guam); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Guam); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 165 (Guam, Marianas); (pt.) Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 205-207 (Guam); (pt.) Hartert, Nov. Zool. 5, 1898, p. 57, 68 (Guam); Hartert, Nov. Zool. 7, 1900, p. 3 (Guam); Matschie, Journ. f. Orn. 49, 1901 (Jan.), p. 112 (Guam); Seale, Occ. Pap. B. P. Bishop Mus. 1 (3), 1901, p. 58-60 (Guam); (pt.) Finsch, Tierreich 15, 1901, p. 37 (Guam); Dubois, Syn. Av. I, 1902 (March), p. 711 (Guam); Safford, Osprey N. S. 1, 1902 (April), p. 69 (Marianne Islands = Guam); Safford, The Plant World 7, 1904, p. 264 (Guam); Safford, Contrib. U.S. Nat. Herb. 9, 1905, p. 79 (Guam); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 458 (Guam); Sharpe, Hand-List Birds V, 1909, p. 16 (Guam); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Ins. Guam); Page, Bird Notes N. S. 4, 1913, p. 2 (Isl. of Guam); Reichenow, Die Vögel II, 1914, p. 469 (Marianen); Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 64 (Mar. = Guam); Cox & al., Isl. of Guam, rev., 1917, p. 21 (Guam); Cox & al., Isl. of Guam, rev., 1926, p. 15 (Guam);

Mathews, Syst. Av. Australas. II, 1930, p. 706 (Marianne Islands, Guam); *Bryan, Guam Rec. 13 (2), 1936, p. 25 (Guam); Strophlet, Auk 63, 1946, p. 540 (Guam); Atyeo & Braasch, Bull. Univ. Nebraska State Mus. 5, 1966, p. 253, 329 (Ritidian Point, Guam Island).

Zosterops Semperi; (pt.) Oustalet, Le Naturaliste (2) 11, 1889, p. 260 (îles Mariannes).

Zosterops conspicillatus; (pt.) Kuroda in Momiyama, Birds Micronesia, 1922, p. 76 (Guam).

Zosterops conspicillatus conspicillatus; Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Guam).

Zosterops conspicillata conspicillata; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 227 (Guam); Mathews, Ibis (13) 2, 1932, p. 155 (no locality); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 192 (Guam); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Guam); Mayr, Birds Southwest Pacific, 1945, p. 299 (Guam); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 72, 73 (Guam: Ritidian Point, Tarague, Agaña Swamp, Pago River, Agat); Marshall, Condor 51, 1949, p. 217-218 (Guam); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 316 (Guam); J. Steinbacher, Senckenbergiana 34, 1954, p. 304 (no locality); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Guam); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops conspicillata cospicillata; Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Guam).

Subspecific characters. Upper parts greenish, as in the southern races, but on an average somewhat duller, often with a greyish tinge, upper tail coverts very slightly brighter; forehead and supra loral region yellowish white; a dark grey line from gape to below eye-ring where it ends as a distinct blackish blotch; eye-ring of average size, white; cheeks greyish; primaries, secondaries and rectrices blackish brown, all broadly margined with the colour of the back; upper pair of rectrices entirely suffused with green.

Under parts. Specimens collected in 1930, throat almost white, under tail coverts fairly bright yellow, remainder of under parts pale buffish yellow; specimens collected in 1895 and 1900, throat pale yellowish, remainder of under parts Amber Yellow (upper parts also brighter). In its combination of a pale throat with yellow remainder of the under parts this subspecies is unique in the genus *Zosterops*. See also footnote 2 on p. 171.

Unfeathered parts. Iris light umber, outer ring white, bill yellow, maxilla with a black-brown tip, legs dark olive green, scutes lighter (Coultas).

Measurements. Wing 12 ♂, 56-59 (56.67); 14 ♀, 53-58 (55.46); tail 12 ♂, 38-41 (38.87); 14 ♀, 35-39 (37.18); tarsus 24 specimens, 18-20 (19.29); entire culmen 24 specimens, 12-14 (13.08); exposed culmen 24 specimens, 9-11½ (10.28); culmen from anterior point of nostril 25 specimens, 6¾-9 (7.54).

Weights. ♂ 10.0; ♀ im. 9.5 g (from examined specimens). Baker (1948) recorded for 11 ♂ 9.5-14.0 (10.5), and 3 ♀ 8.0-10.0 (9.3) g.

Distribution. The island of Guam.

First collectors. J. R. C. Quoy and J. P. Gaimard with the expedition of the "Uranie" in 1819, when Guam, Rota and Tinian were visited: two of their specimens were recorded by Oustalet (1895), who did not, however, make clear from which island these were. At present only a single unsexed individual remains in Paris, the other having been given to the Laboratoire de Zoologie, Faculté des Sciences, Nantes (Jouanin, in litt., 8-XI-1966). Dr. Jouanin has been so kind to send me the remaining specimen on loan. Under the socle the notes apper: "Iles Mariannes / Bresil-Freycinet / 1820 / Zosterops conspicillata / Kittl. / Quoy et / Gaimard / 10285", and on a label stuck on the stand further: "l'Uranie, I. Mariannes". Though the specimen is badly faded, it shows a whitish throat, whereas the remainder of the under parts is dirty yellowish, the colour pattern of the nominate race. Moreover I found as measurements: wings 57, 58, tail 37½, tarsus 20 (bill damaged). These measurements alone place the specimen definitely in the nominate race, as the maximum recorded wing-lengths of *rotensis* and *saypani* do not exceed 55 mm. The measurements of this bird have not been included in the measurements and averages given above.

Figures. Kittlitz (1833), plate 19 fig. 1 (a small but attractive coloured figure); Kittlitz (1835), plate 3 (good coloured plate on natural size); Reichenbach (1852), plate 461 fig. 3294 (coloured figure, copied from Kittlitz but very inferior); Seale (1901), fig. 6 (photograph of nest with eggs).

Type. According to information received from Professor Ivanov, there is at present only one specimen of *Z. conspicillata* collected by Kittlitz in the Zoological Institute, Leningrad. It is now labelled Ualan I. As the species is not known from Ualan (Kusaie), and Guam is the only island visited by Kittlitz where is does occur, it is obvious that a subsequent error in labelling has been made, and that the specimen is actually a type. In the Zoological Institute, Academy of Sciences, Leningrad, it is registered under no. 154906.

Moult. Specimens collected in January (1), March (1), May (8), June (3) and August (7) do not show moult; some of the May to August birds are in very worn plumage. Specimens collected in May (2), June (2), August (1) and September (2) are undergoing their main moult.

Nidification. The breeding season is apparently an extended one, for there is evidence of nesting from February to October. Hartert (1898) described nests found in February and March; Oustalet (1895) referred to nests and young found in May or June; Seale (1901) recorded taking three nests with eggs and one with a nestling in the period from May to July, and Strophlet (1946) saw a fledgling being fed by its parents in October.

The nests as described by Hartert (1898) and Seale (1901, fig. 6) are thoroughly typical; the eggs are pale blue, usually two, sometimes three to a clutch. Measurements given by Hartert are 18 × 13, 17 × 13.2, 17 × 12.2, 15.5 × 12.5 and 17 × 13.5. Compared with these measurements, those provided by Nehrkorn (1910), 15 × 12.5 seem rather small.

Habits, etc. From Kittlitz onwards, all visitors of Guam have recorded *Z. c. conspicillata* as a fairly common and well-distributed species; only Baker (1951) believed it to be more restricted in occurrence. The birds were usually encountered moving about in small flocks of from three to twenty individuals, in thoroughly typical *Zosterops*-fashion. They seem to inhabit the edges of forests and secondary growths rather than true forest country; Seale (1901) for example noted as favourite feeding grounds the small *Linovia trifolia* bushes growing by the roadside, and waste places all over the island, and Strophlet (1946) even observed it on the grasslands in the hills.

Voice. According to Seale (1901), the call, sounded especially in flight, is something like that of the Sparrow, *Passer domesticus*.

A feather mite *Proctophyllodes ceratophyllus* Atyeo & Braasch (1966) has been described from *Z. c. conspicillata*.

Discussion. In the AMNH series which I examined there is a pronounced and most remarkable difference between the material collected in 1895 and that collected in 1931, the older material being uniformly far more yellow on the under surface, including the throat. The difference would be due to discoloration, but warrants special mention because a change from whitish to yellow is not one that would be expected with ageing of skins.

4. **Zosterops conspicillata hypolais** Hartlaub & Finsch

Zosterops hypolais Hartlaub & Finsch, Proc. Zool. Soc. London, 1872, p. 89, 95 — Island of Uap.

Zosterops hypolais; *Gräffe, Journ. Mus. Godeffroy 2, 1873, p. 122 (Yap); Giebel, Thes. Orn. III, 1877, p. 776 (Ins. Carolinae); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 391, footnote 3 (Yap); Pöhl, Mus. Godeffroy Cat. IX, 1884 (May), p. 16 (Yap); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 186 (Island of Uap); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Uap); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 165 (Carolinas, Uap); Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 208 (Uap); Bolau, Mitt. Naturh. Mus. Hamburg 15, 1898, p. 60 (Yap); Finsch, Syst. Uebers. Thätigk., 1899, p. 112 (Yap); Matschie, Journ. f. Orn. 49, 1901, p. 112 (Yap); Finsch, Tierreich 15, 1901, p. 24 (Karolinen-Insel Yap (oder Uap)); Dubois, Syn. Av. I, 1902, p. 708 (Ile Uap); Sharpe, Hand-List Birds V, 1909, p. 7 (Caroline Is. (Uap Isl.)); Page, Bird Notes N.S. 4, 1913, p. 2 (Is. of Uap); Reichenow, Die Vögel II, 1914, p. 469 (Karolinen); Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 64 (Mack.); Kuroda in Momiyama, Birds Micronesia, 1922, p. 76 (Mackenzie); Momiyama, Birds Micronesia, 1922, Jap. text p. 256 (Yap); Mathews, Syst. Av. Australas. II, 1930, p. 700 (Yap Island); Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Yap Ids., Mackenzie Ids.); Kuroda, Birds in Life Col., 1933, pl. 20 no. 164 (Yap); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 192 (Yap); Anonymus, Ill. Enc. Fauna Jap., rev. ed., 1949, p. 89 (Yap); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops conspicillata hypolais; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 227 (Mackenzie, Yap); Mathews, Ibis (13) 2, 1932, p. 154 (no locality); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Yap); Mayr, Birds Southwest Pacific, 1945, p. 299 (Yap); Fisher, Pacific Sc. 4, 1950, p. 62 (Yap); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 323 (Yap); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Yap).

Zosterops hyolais; Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Yap).

Subspecific characters. Upper parts greenish grey, between Grayish Olive and Citrine Drab, slightly more greenish on crown and upper tail coverts; lores dirty white; eye-ring very narrow, white; traces of dusky under eye-ring; primaries, secondaries and rectrices blackish brown with Citrine Drab outer margins.

Under parts. Throat, breast, centre of belly and under tail coverts Marguerite Yellow; flanks suffused with pale buff.

Unfeathered parts. Bill fuscous, basal part of mandible paler, legs plumbeous (Hartlaub & Finsch, 1872).

Measurements of four specimens (3 ♂, 1 ♀): wing: 56½-58 (57.00), tail 37-38 (37.50), tarsus 18½-19¼ (18.81), entire culmen 13¾-14¼ (13.94), exposed culmen 10½-11¼ (11.06), culmen from anterior point of nostril 7½-8¼ (7.94).

Distribution. The island of Yap.

First collector. J. S. Kubary in 1871.

Figure. Kuroda (1933), plate 20 no. 164 (coloured, on two-thirds of natural size).

Type. This form was based on three specimens collected by Kubary; one of these came to the Hamburg Museum (Bolau, 1898), where it is still present (Meise, in litt., 9-IX-1966); the two others have not been traced.

Moult. Of four specimens collected in August, one is moulting primaries; the others show no moult.

Nidification. Not recorded.

Habits, etc. Fisher (1950) described this bird as usually confined to the undergrowth at the edge of the jungle. In almost every such area 100 yards long it could be found in numbers from two to fifteen.

Discussion. As noted in the general discussion of *Z. conspicillata,* the race *hypolais* is well-differentiated from the other subspecies.

5. **Zosterops conspicillata semperi** Hartlaub

Zosterops semperi Hartlaub in Hartlaub & Finsch, Proc. Zool. Soc. London, 1868, p. 117 — Pelew Islands.

Zosterops Semperi; G. R. Gray, Hand-List Birds I, 1869, p. 163 (Pelew I.); Finsch, Journ. Mus. Godeffroy 8, 1875, p. 3, 4, 16, pl. IV fig. 1 (Palau); Giebel, Thes. Orn. III, 1877, p. 777 (Pelew); Nehrkorn, Journ. f. Orn. 27, 1879, p. 396 (Palau Inseln); (pt.) Finsch, Journ. f. Orn. 28, 1880, p. 286 (Paulau); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 407, footnote (Palau); Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 7, 16 (Palau); Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 206 (îles Palaos).

Zosterops semperi; Hartlaub & Finsch, Proc. Zool. Soc. London, 1872, p. 95 (Pelew Islands); Boucard, Cat. Av., 1876, p. 231 (Pelew I.); (pt.) Finsch, Ibis (4) 5, 1881, p. 110 (the Pelews); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 183 (Pelew Islands); Tristram, Cat. Coll. Birds, 1889, p. 212 (Pelew Islands); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Pelew Is.); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 165 (Islas Carolinas, Palaos); (pt.) Hartert, Nov. Zool. 5, 1898, p. 57 (Pelew Islands); Matschie, Journ. f. Orn. 49, 1901 (Jan.), p. 112 (Palau); (pt.) Finsch, Tierreich 15, 1901 (March), p. 30 (Palau); Seale, Occ. Pap. B. P. Bishop Mus. 1 (3), 1901, p. 58 (Pelew Islands); (pt.) Dubois, Syn. Av. I, 1902, p. 710 (Palau); (pt.) Sharpe, Hand-List Birds V, 1909, p. 12 (Palau); (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Pelew Is.); (pt.) Reichenow, Die Vögel II, 1914, p. 469 (Karolinen, Marianen); (pt.) Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 55, 64 (Pelew Is.).

Zosterops semperi semperi; Hartert, Nov. Zool. 7, 1900, p. 2 (Pelew Islands); Momiyama, Birds Micronesia, 1922, p. 23 (Pelew); (pt.) Kuroda in Momiyama, Birds Micronesia, 1922, p. 75 (Pelew Is.); Mathews, Syst. Av. Australas. II, 1930, p. 705 (Pelew Islands); Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Pelew Islands); Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931, p. 486 (Pelew Islands); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 174 (Babelthuap, Koror); Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 162 (Pelew).

Zosterops conspicillata semperi; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 237 (Palau); Mathews, Ibis (13) 2, 1932 (1 Jan.), p. 154 (no locality); Yamashina, Bull. Biogeogr. Soc. Jap. 3 (2), 1932 (Nov.), p. 147 (Palau); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 193 (Babelthuap, Koror, Peliliu); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Palau); Mayr, Birds Southwest Pacific, 1945, p. 299 (Palau); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 73 (Palau Islands: Garakayo Island); Marshall, Condor 51, 1949 (20 Sept.), p. 217, 218 (Palau); Anonymus, in Ill. Enc. Fauna Jap., rev. ed., 1949, p. 90 (Palau); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 320 (Palau Islands: Babelthuap, Koror, Garakayo, Peleliu); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Palau Islands); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops semperi sempri; Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931, p. 487 (Pelew Islands).

Zosterops conspicillata; Marshall, Condor 51, 1949, p. 219 (Palau).

Subspecific characters. Upper parts between Warbler Green and Serpentine Green, rump hardly, if at all, paler; no yellow on the forehead above the bill, but a yellow patch present above the lores; lores yellowish, yellowish white or dirty white; a narrow dusky streak running from gape to below the eye-ring; eye-ring rather narrow, white, more or less interrupted in front; primaries, secondaries and rectrices brownish black, all with outer margins of the same colour as the remainder of the upper parts, iris white, not brown or greyish as in all other subspecies.

Under parts. Entirely yellow, as dark as Lemon Chrome on throat and breast, Citrine Yellow lower down, flanks admixed with some greenish buff. Legs in skin blackish.

Unfeathered parts. Iris ocre-yellow, bill dark horn colour, legs bluish grey (Finsch, 1875, ex Kubary); iris greyish-white (Baker, 1951); iris white (Marshall). The colour of the iris has been recorded on the label of a single specimen only in the series I examined (♀ ad., Mus. Vert. Zool. no. 95421, leg. Marshall), but according to Marshall (1949) all twelve birds he collected, both adults and immatures, had white irides.

Measurements. Wing 10 ♂, 53-59 (56.35); 12 ♀, 54-58½ (56.63); 23 specimens, 53-59 (56.44); tail 9 ♂, 33½-38½ (36.56); 11 ♀ 33-39 (36.36); 21 specimens, 32-39 (36.24); tarsus 23 specimens 17-19½ (18.18); entire culmen 22 specimens 12-14 (12.95); exposed culmen 22 specimens 9½-11 (10.22); culmen from anterior point of nostril 22 specimens 6¾-7¾ (7.25).

Distribution. The Palau islands, where known from Babelthuap and Koror (specimens examined), Peleliu and Garakayo (Baker, 1948, 1951).

First collector. Dr. Semper, some time, probably not long, before 1868.

Figure. Finsch (1875), plate 4, fig. 1 (good coloured plate on natural size by Keulemans).

Type. The type, formerly in the Altona Museum, was donated in 1901 to the Hamburg Museum, where it is now registered under no. 35913 (Meise, in litt., 9-IX-1966).

Moult. All dated specimens (20) which I examined were collected in October (14), November (7) and December (1). All but one of the October birds are in full moult, and so are two November birds. The other specimens are in fresh plumage, so that October is clearly a month in which the main moult takes place.

Nidification. Finsch (1875) recorded that Kubary found two nests, in February and March [1872 or 1873] respectively, each of which contained two pale green eggs. The nest, as described by Finsch, is thoroughly typical of the genus, though Nehrkorn (1879), who presumably described the same nest, stated that it differed from other *Zosterops*-nests in that it was placed on a thick branch, instead of being suspended between twigs.

Habits, etc. *Z. c. semperi* appears to be less common than its congener, *Z. cinerea finschii.*

One of the females examined, Mus. Vert. Zool. no. 95420, has an aberrant feather in one wing. The left wing, with a length of 58 mm is normal, and this is the figure I have counted; in the right wing the 5th primary is excessively long, and gives the wing a length of 61 mm.

Voice. Marshall (1949) reports high clear whistles.

6. **Zosterops conspicillata owstoni** Hartert

Zosterops semperi owstoni Hartert, Nov. Zool. 7, 1900, p. 2 — Ruk.

Zosterops Semperi; (pt.) Finsch, Journ. f. Orn. 28, 1880, p. 286 (Ruck (Hogoleu)); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 353, footnote (Ruk).

Zosterops semperi; Finsch, Proc. Zool. Soc. London, 1880, p. 575 (Ruk); (pt.) Finsch, Ibis (4) 5. 1881, p. 110 (Ruck); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Ruk); (pt.) Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 208 (Ruk); (pt.) Hartert, Nov. Zool. 5, 1898, p. 57 (Ruk); Nehrkorn, Kat. Eiersamml., 1899, p. 80 (Insel Ruk).

Zosterops owstoni; Finsch, Tierreich 15, 1901, p. 31 (Ruk-Gruppe); (pt.) Matschie, Journ. f. Orn. 49, 1901, p. 112 (Ruk); Sharpe, Hand-List Birds V, 1909, p. 12 (Caroline Is. (Ruk Group)); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 375 (Insel Ruk); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. V, 1912, p. 6 (Ruk Island); Reichenow, Die Vögel II, 1914, p. 470 (Karolinen); Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 55, 64 (Ruk).

Zosterops semperi Var. *Owstoni*; Dubois, Syn. Av. I, 1902, p. 710 (Carolines (Ruk)).

Zosterops semperi owstoni; Townsend & Wetmore, Bull. M.C.Z. 63, 1919, p. 164 (Uala); Wetmore, Bull. M.C.Z. 63, 1919, p. 223 (Uala, Truck Group); Hartert, Nov. Zool. 27, 1920, p. 435 (Truk (or Ruk) Island); Momiyama, Birds Micronesia, 1922, p. 24 and Jap. text p. 251 (Ruk); Kuroda in Momiyama, Birds Micronesia, 1922, p. 75 (Ruk); Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Ruk Ids.); Mathews, Syst. Av. Australas. II, 1930, p. 705 (Ruk); Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931, p. 486, 487 (Tuk); *Yamashina, Tori 7, 1932, p. 400 (Truk); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 174 (Truk).

Zosterops conspicillata owstoni; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 227 (Truk); Mathews, Ibis (13) 2, 1932, p. 154 (no locality); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 193 (Truk); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Truk); Mayr, Birds Southwest Pacific, 1945, p. 299 (Truk); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 74 (Moen and Udot); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 321 (Truk); Brandt, Condor 64, 1962, p. 416, 418, 433 fig. 8, 434 (Truk Atoll); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Truk); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Subspecific characters. Very close to *semperi*, but on an average with slightly more yellow on the forehead; perhaps also slightly duller green above and a trifle yellower below, but that is hardly verifiable and there is overlap. Legs in skin more brownish.

Unfeathered parts. Not recorded in literature or specimens examined.

Measurements of eleven specimens (9 ♂, 2 ♀): wing 55-58 (56.14), tail 31-37 (34.18), tarsus 18-20½ (19.25), entire culmen (10 specimens only)

12¼-13½ (12.70), exposed culmen (10 specimens only) 9¼-10¼ (9.83), culmen from anterior point of nostril (10 specimens only) 6½-7½ (7.10).

Distribution. Truk Atoll. The Truk Atoll consists of numerous islands, and from published information and examination of skins it is not clear if *Z. c. owstoni* is widely distributed or confined to a few islands. Baker (1948) mentioned it from Moen and Udot, Wetmore (1919) from Uala. Commander Brandt (in litt., 24-IX-1966) has supplied me with the following information: "Although I did not maintain sight records of *Zosterops conspicillata owstoni* I can maintain with certainty that I never saw it on any of the low coral islands on the Truk reef or within the lagoon. I did see specimens on Moen, Udot, Fefen, Fana, Dublon, Uman and Fanabeguets. It is probably safe to assume that this bird inhabits all of the "high" islands within Truk Atoll. Although I made numerous visits to the Central Carolines, i.e. Puluwat group, Wolei group and the Murillo and Namunoito atolls I did not see *Z. conspicillata* outside of Truk".

First collector. J. Kubary before 1880 (cf. Finsch, 1880).

Figure. Brandt (1962), fig. 8 (attractive black- and white print of painting, showing bird attending nest).

Type. The original description of this subspecies was based on "a large series", all of which have equal status as cotypes even though later Hartert (1920) listed only one bird as type. The eleven specimens of this race I examined in he AMNH all belong to the original type series (nos. 700791, 700793-700800, 700806, 700810).

Moult. Specimens collected in February (1), March (4), May (2) and November (1) show no moult; three other birds taken in November are undergoing their main moult.

Nidification. Nests and eggs taken from May to July, have been recorded by Hartert (1900) and Yasmashina (1932), and eggs found their way to the collections of Nehrkorn (1899, 1910) and the British Museum (Ogilvie-Grant, 1912). More extensive notes were given by Brandt (1962) who reports nests found in January (1), April (2), May (5), June (1), August (3), and October (2) and concludes that the subspecies breeds throughout the year. The nests, as described and figured by Brandt, are thoroughly typical; they are often located at the edge of forests, in gardens and close to houses. Apparently only a single egg is laid, light blue in colour. Average measurements of ten eggs 17.3 × 11.7 mm, with a variation in length from 16.0-19.0 mm, in width from 12.0 to 14.0 mm.

Habits, etc. Presumably not different from other members of the species.

Discussion. More information on the characters and validity of this race is given in the discussion of *takatsukasai*.

7. **Zosterops conspicillata takatsukasai** Momiyama

Zosterops semperi takatsukasai Momiyama, Birds Micronesia, 1922, p. 22, also p. 24 and Jap. text p. 253 — Ponapé.

Zosterops Semperi; Finsch, Journ. f. Orn. 28, 1880, p. 286 (Ponapé); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 281, footnote (Ponapé); Finsch, Vögel der Südsee, Orn. Ver. Wien, 1884, p. 48 (Ponapé).

Zosterops semperi; Finsch, Ibis (4) 5, 1881, p. 115 (Ponapé); (pt.) Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Ponapé); (pt.) Finsch, Tierreich 15, 1901, p. 30 (Ponapé); (pt.) Dubois, Syn. Av. I, 1902, p. 710 (Ponapé); (pt.) Sharpe, Hand-List Birds V, 1909, p. 12 (Ponapé); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Ponapé); (pt.) Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 55, 64 (Ponapé).

Zosterops owstoni; (pt.) Matschie, Journ. f. Orn. 49, 1901, p. 112 (Ponape).

Zosterops semperi takatsukasai; Kuroda in Momiyama, Birds Micronesia, 1922, p. 76 (Ponapé); Mathews, Syst. Av. Australas. II, 1930, p. 705 (Ponapé); Momiyama, Bull. Biogeogr. Soc. Jap. 1, 1930, p. 173 (Ponape Id.); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 22 (Ponapé, Carolines); Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931 (15 July), p. 487 (Ponape); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 174 (Ponapé); Yamashina, Tori 7, 1932 (31 Dec.), p. 400 (Colonia, Ponape I.).

Zosterops conspicillata takatsukasai; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 227 (Ponape); Mathews, Ibis (13) 2, 1932, p. 154 (no locality); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942 (30 June), p. 192 (Ponapé); Hachisuka, Tori 11, 1942 (Dec.), p. 339 (Ponape); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Ponape); Mayr, Birds Southwest Pacific, 1945, p. 299 (Ponape); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 73 (Ponape); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 322 (Ponapé); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Ponape); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops conspicillata; Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 204 (Ponapé).

Subspecific characters. Extremely similar to *owstoni*, and with the same amount of yellow on the forehead, but apparently slightly smaller.

Unfeathered parts. Iris light chestnut, bill, upper brownish black, lower yellowish green, legs greyish green (Riddall). Iris burnt-umber mixed with reddish, with an outer ring of venetian red; bill, upper horny black, lower soiled pale chrome-yellow, legs yellowish slate, claws horny brown (Momiyama, 1922).

Measurements. Wing 6 ♂, 54-56 (55.31); 8 ♀, 53-56 (54.69); 16 specimens, 53-56 (55.00); tail 8 ♂, 32½-36 (34.19); 7 ♀, 31-35 (33.79); 15 specimens, 31-36 (34.00); tarsus 16 specimens, 18-20¼ (19.27); entire culmen 15 specimens, 13-14¼ (13.67); exposed culmen 15 specimens, 10-11 (10.65); culmen from anterior point of nostril 15 specimens, 7½-8 (7.77).

Distribution. The island of Ponape.

First collector. F. H. O. Finsch in March 1880 (cf. Finsch, 1880).

Not figured.

Type. Lost in the earthquake of 1923.

Moult. The specimens examined were all collected in November (11) and December (5); of these, four November birds are in advanced stages of their main moult, the other birds show no moult.

Nidification. Finsch (1880) described a nest, and mentioned a clutch size of one to two eggs; these must have been found in March, unless, and this appears likely, Finsch described nest and eggs not from own observations but from material and information supplied to him by Kubary, with whom he stayed during his visit to the island. The colour of the eggs was given as glossy light blue. Nehrkorn (1910) recorded as measurements 17 × 13 mm. Nests containing a single egg each were taken on 10 and 20 July, 1931 (Yamashina, 1932).

Habits, etc. Presumably not different from those of the other subspecies.

Discussion. The three subspecies *semperi, owstoni* and *takatsukasai* are so similar that I have felt strongly tempted to unite them under one name (*semperi*). Considering the smallish series that were examined of each, I do not believe that there is anything in measurements. See also that Baker (1951, table 50) found in larger series than were available to me measurements for the three subspecies that are practically identical, though both his measurements and mine suggest that in *takatsukasai* the wing averages about a millimetre shorter, the bill a trifle longer than in the two other subspecies. In coloration, *owstoni* and *takatsukasai* differ from *semperi* in averaging slightly duller green above and a trifle more yellow below and having a bit more yellow on the forehead, but the difference is slight, and there is some overlap. As far as differences between *owstoni* and *takatsukasai* are concerned, these are even more dubious. The main reason I am keeping the three subspecies apart is that they have been generally recognized by all previous workers; that because of the great geographical distance separating the three populations, one does expect and want them to be distinct, and that they appear not to be quite identical.

Species 49. **Zosterops cinerea** (Kittlitz)

Characters. A fairly large species characterized by the absence of a white eye-ring and by the total lack of yellow and the nearly total absence of green in its plumage.

The upper parts vary, according to race, from Deep Grayish Olive to Sepia.

Under parts pale, dirty pale greyish or sepia, flanks and sides of breast generally somewhat darker than the remainder of the under parts, showing an approach to the colour of the mantle.

Structurally the species agrees with the majority of tropical members of the genus by its wing formula, the 2nd primary generally being in length between the 7th and the 8th. Tail:wing index of the race *finschii* (19 specimens): 60.7%.

Distribution and variation. The species is confined to three, widely separated, islands in the Carolines, each of which has its own endemic subspecies. These three islands, Palau, Ponape, and Kusaie have in common that, contrary to the majority of islands in the region, they are not atolls, but are high and volcanic in origin. Whilst Ponape and Kusaie are about 350 statute miles apart, the distance from Palau to Ponape is some 1600 miles. Notwithstanding the enormous distances separating the subspecies, and though they are well-marked, I agree with Mayr (1944), who was the first to unite them, that they belong to one species.

Of only one subspecies have I examined enough material for an insight in its size and variation in size, and therefore reference is made to the table given by Baker (1951, table 51), who has measured large series of each subspecies, and shows that *finschii* is the largest subspecies (average wing 65, tail 43, culmen 17.5, tarsus 21), *cinerea* intermediate (average wing 63, tail 37, culmen 15, tarsus 20), and *ponapensis* the smallest (average wing 59, tail 38, culmen 13.5, tarsus 20). Such measurements as I have been able to take, are in accordance with those provided by Baker.

Related species. *Z. cinerea* is one of the most distinct members of its genus, and I do not feel that anything can be said about its origin or relationships. Baker (1951) suggested that it might have been derived from *Z. atriceps* of the northern Moluccas. While from the geographical point of view this would seem quite possible, the morphological evidence brought forward by Baker (nothing more than some similarities in colour) is unconvincing and not of much importance when one realises that the *Z. atrifrons* group to which *Z. atriceps* appears to belong unites amongst its members some of the brightest and some of the dullest forms of the genus.

1. **Zosterops cinerea cinerea** (Kittlitz)

Drepanis cinerea Kittlitz, Kupfert. Naturg. Vögel, 1833, p. 6, pl. 8 fig. 2 — Insel Ualan.

Zosterops Kittlitzi Finsch, Journ. f. Orn. 28, 1880, p. 300, footnote — nomen novum for *Drepanis cinerea* Kittlitz.

Drepanis cinerea; Kittlitz, Mém. Ac. Imp. Sc. St.-Pétersbourg 2, 1835, p. 4, pl. 5 (Ualan); Kittlitz in Lutké, Voy. autour du Monde "Le Séniavine" III, 1836, p. 285 (Ualan); Kittliz, Denkw. Reise russ. Amerika, Micronesien und Kamtschatka I, 1858, p. 367 (Ualan).

Dicaeum cinereum; Reichenbach, Handb. spec. Orn., Scansor., 1852, p. 242, pl. 562b = 607 fig. 4080 (Ualan); Hartlaub, Journ. f. Orn. 2, 1854, p. 168 (Carolinen).

Zosterops cinerea; Hartlaub, Arch. f. Naturgesch. 18, 1852, p. 131 (Ualan); G. R. Gray, Cat. Birds Trop. Isl. Pacific Ocean, 1859, p. 16 (Oualan); G. R. Gray, Hand-List Birds I, 1869, p. 163 (Caroline I.); Buller, Trans. N. Z. Inst. 3, (1870), 1871, p. 16 (Caroline Group); Hartlaub & Finsch, Proc. Zool. Soc. London, 1872, p. 96 (Ualan); Finsch, Journ. Mus. Godeffroy 12, 1876, p. 27 (Ualan); Boucard, Cat. Av., 1876, p. 231 (Caroline I.); Giebel, Thes. Orn. III, 1877, p. 774 (Ins. Carolinae); Finsch, Ibis (4) 5, 1881, p. 107, 108 (Kushai); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 198 (Kushai and Ualau Islands); Tristram, Cat. Coll. Birds, 1889, p. 210 (Kuschai); Hartert, Kat. Vogelsamml. Mus. Senckenb., 1891, p. 31 (Ualan); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 36 (Ualan); Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 208 (Oualan); Finsch, Syst. Uebers. Thätigk., 1899, p. 112 (Kuschaie); Hartert, Nov. Zool. 7, 1900, p. 3 (no locality); Finsch, Tierreich 15, 1901, p. 45 (Kusaie); Dubois, Syn. Av. I, 1902, p. 713 (Ile Kusaie ou Ualan); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 446 (no locality); Sharpe, Hand-List Birds V, 1909, p. 18 (Caroline Is. (Kushai)); Page, Bird Notes N.S. 4, 1913, p. 3, 5 (Kushai and Ualan Is.); Reichenow, Die Vögel II, 1914, p. 469 (Karolinen); Taka-Tsukasa & Kuroda, Tori 1, 1915, p. 55, 64 (Kusaie); Townsend & Wetmore, Bull. M.C.Z. 63, 1919, p. 163 (Kusaie); Wetmore, Bull. M. C. Z. 63, 1919, p. 224 (Kusaie); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 230 (Kusaie (= Ualan)); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Kusaie); Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 166 (Kusaie); Anonymus, in Ill. Enc. Fauna Jap., rev. ed., 1949, p. 89 (Kusaie); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops cinereus; Finsch, Journ. Mus. Godeffroy 8, 1875, p. 17 (Ualan); Finsch, Journ. f. Orn. 28, 1880, p. 286, 300 (Kuschai); Hodek, Mitth. Orn. Ver. Wien 8, 1884 (May), p. 72 (Kuschai); Finsch, Vögel d. Südsee, Orn. Ver. Wien, 1884, p. 48 (Kuschai); Pelzeln & Lorenz, Ann. Naturh. Mus. Wien 1, 1886, p. 264 (Ualan).

Zosterops Kittlitzi; Reichenow & Schalow, Journ. f. Orn. 29, 1881, p. 94 (no locality).

Tephras cinereus; Matschie, Journ. f. Orn. 49, 1901, p. 112 (Ualan); Momiyama, Birds Micronesia, 1922, Jap. text p. 260 (Kusaie).

Tephras cinerea; Kuroda in Momiyama, Birds Micronesia, 1922, p. 77 (Kusaie or Ualan); Mathews, Syst. Av. Australas. II, 1930, p. 712 (Caroline Islands).

Zosterops cinerea cinerea; Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (no locality); Mayr, Birds Southwest Pacific, 1945, p. 300 (Kusaie); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 326 (Kusaie); J. Steinbacher, Senckenbergiana 34, 1954, p. 303 (Insel Ualan (jetzt Kusaie)); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 319 (Kusaie).

Subspecific characters. Upper parts Deep Grayish Olive, on crown and upper wing coverts approaching to Mouse Gray.

Unfeathered parts. Iris reddish brown (Finsch). Kittlitz (1835) described the iris as cinnamon-brown, bill leaden with blackish tip, legs lead colour, bill of young birds conspicuously yellow.

Measurements of two males: wing 63, 64, tail 33½, 35, tarsus 19¾, 20¾, entire culmen 15, 15¼, exposed culmen 11½, 12, culmen from anterior point of nostril 8½, 8¾.

Distribution. Confined to Kusaie (or Ualan), easternmost of the Carolines.

First collector. F. H. von Kittlitz in December 1827.

Figures. Kittlitz (1833, pl. 8 fig. 2) gave a small but useful coloured plate; Kittlitz (1835) plate 5 (a good coloured plate); Kuroda (1933), plate 20 no. 166 (a fairly good coloured plate, two-thirds natural size).

Type. Two cotypes are still present in the Senckenberg Museum, Frankfurt (Hartert, 1891; Steinbacher, 1954, and in litt., 27-II-1958), and two cotypes, nos. 153142 and 154907 remain in the Zoological Institute, Leningrad (Ivanov, in litt., 21-XII-1966).

Moult. Of two specimens collected in February, one is not in moult, the other shows moult in the rectrices, no wing moult.

Nidification. Finsch (1880) mentioned fledglings being fed by their parents in February. There appear to be no other records.

Habits, etc. All ornithologists who have visited Kusaie: Kittlitz (1835), Finsch (1880) and Coultas (M. S. journal and letters in AMNH, vol. II), found *Z. cinerea* very common in all parts of Kusaie, moving about in flocks, even in the tops of high trees.

The food consists of insects, which are searched for and taken in the way of tits, from twigs and leaves.

Kittlitz (1835) described the call as being somewhat Sparrow-like, and evidently the same note was described by Finsch (1880) who, moreover, mentioned several other notes which, however, could not really be described as song and were reminiscent of titmice, especially *Parus palustris*.

2. **Zosterops cinerea ponapensis** Finsch

Zosterops ponapensis Finsch, Proc. Zool. Soc. London for 1875, 1876 (April), p. 643 — Ponape, Seniavin Group.

Zosterops ponapensis; Finsch, Journ. Mus. Godeffroy 12, 1876 (not before July), p. 16, 17, 27, pl. 2 (Ponapé); Giebel, Thes. Orn. III, 1877, p. 777 (Ponapa); Finsch, Proc. Zool. Soc. London for 1877, 1878, p. 778 (Ponapé); Nehrkorn, Journ. f. Orn. 27, 1879, p. 396 (no locality); Finsch, Journ. f. Orn. 28, 1880, p. 286 (Ponapé); Finsch, Ibis (4) 5, 1881 (Jan.), p. 110, 111, 115 (Ponapé); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 281, footnote (Ponapé); Hodek, Mitth. Orn. Ver. Wien 8, 1884 (May), p. 72 (Insel Ponapé); Pöhl, Mus. Godeffroy Cat. IX, 1884 (May), p. 7 (Ponapé); Sharpe, Cat. Birds Brit. Mus. IX, 1884 (after Febr.), p. 198 (Ponapé); Finsch, Vögel der Südsee, Orn. Ver. Wien, 1884, p. 48 (Ponapé); Tristram, Cat. Coll. Birds, 1889, p. 211 (Ponapé Island); Wiglesworth, Abh. Ber. Zool. Mus. Dresden 3, (1890/91), (6), 1892, p. 36 (Ponapé); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 166 (Ponapé, Carolinas); Bolau, Mitt. Naturh. Mus. Hamburg 15, 1898, p. 60 (Ponapé); Nehrkorn, Kat. Eiersamml., 1899, p. 80 (Insel Ponapé); Finsch, Syst. Uebers. Thätigk., 1899, p. 112 (Ponapé); Hartert, Nov. Zool. 7, 1900, p. 3 (no locality); Finsch, Tierreich 15, 1901, p. 46 (Ponape); Dubois, Syn. Av. I, 1902, p. 713 (Ile Ponapé); Sharpe, Hand-List Birds V, 1909, p. 18 (Caroline Is. (Ponapé)); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Ins. Ponapé); Page, Bird Notes N.S. 4, 1913, p. 3, 5 (Is. of Ponape); Reichenow, Die Vögel II, 1914, p. 470 (Ponape); Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 55, 64 (Ponapé); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 230 (Ponape); Yamashina, Tori 7, 1932 (31 Dec.), p. 393, 397 (Colonia, Ponape I.); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Ponapé); Kuroda, Birds in Life Colours I, 1933, pl. 20 no. 167 (Ponapé); Mayr, Proc. 6th Pacific Sc. Congr. IV, 1940, p. 204 (Ponapé); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 192 (Ponapé); Anonymus, in Ill. Enc. Fauna Jap., rev. ed., 1949, p. 89 (Ponapé); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops ponapenensis; Finsch, Journ. Mus. Godeffroy 12, 1876, p. 27 (Ponapé); Townsend & Wetmore, Bull. M. C. Z. 63, 1919, p. 163 (Ponapé); Wetmore, Bull. M. C. Z. 63, 1919, p. 224 (Ponapé).

Tephras ponapensis; Matschie, Journ. f. Orn. 49, 1901, p. 112 (Ponape); Kuroda in Momiyama, Birds Micronesia, 1922, p. 77 (Ponapé); Momiyama, Birds Micronesia, 1922, Jap. text, p. 261 (Ponapé); Mathews, Syst. Av. Australas. II, 1930, p. 712 (Caroline Islands).

Zosterops cinerea ponapensis; Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (no locality); Mayr, Birds Southwest Pacific, 1945, p. 300 (Ponape); R. H. Baker, Univ. Kansas Publ., Nat. Hist. Mus. 3, 1951, p. 327 (Ponapé); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 319 (Ponape).

Subspecific characters. In coloration of upper parts somewhat intermediate between *cinerea* and *finschii*, though nearer to the latter; definitely more sepia, less grey, than *cinerea*, and somewhat less sepia, slightly more greyish and with a more definite olive tinge than *finschii*.

Unfeathered parts. Bill horn black, legs deep leaden (Finsch, 1876); iris red-brown (Finsch, 1884).

Measurements of two males: wing 60,61, tail 35, 36½, tarsus 19, 19¾, entire culmen 13¼, 13¼, exposed culmen 10, 10½, culmen from anterior point of nostril 7¼, 7½.

Distribution. Ponape.

First collector. J. Kubary in 1873 (according to Finsch, 1876, Kubary arrived on Ponape on 19 August, 1873).

Figure. Finsch (1876), plate 2 fig. 1 (coloured, on natural size: not bad, but a narrow white eye-ring is mistakenly shown, and mentioned in the text); Kuroda (1933), plate 20 no. 167 (coloured, on two-thirds of natural size).

Type. *Z. ponapensis* was based on four specimens in the Museum Godeffroy, probably prepared from alcohol. According to Bolau (1898) two, perhaps three of these were in the Hamburg Museum, where they cannot now be found. As the catalogues have been lost, it cannot now be ascertained if these birds were destroyed during the war or have been disposed of in some other way. One bird collected by Kubary, purchased from the Museum Godeffroy in 1886, is in Leiden. As it is undated there is no way of ascertaining if it is a type.

Moult. One specimen, collected in February, does not show moult.

Nidification. Is is peculiar that Nehrkorn (1879) described nest and eggs, from the collection of the Museum Godeffroy, when Finsch (1880) remarked that: "Ueber Eier und Nest vermochte mir Herrn Kubary keinen Aufschluss zu geben". Finsch collected a fledgling just from the nest in March 1880. Yamashina (1932) recorded two nests, each containing a single egg. The nests were found on 4 and 21 August, 1931, respectively. One egg was pale greenish-blue in colour and measured 18.5 × 13.5 mm; the other egg, broken and not measurable was light blue in colour. The nest was described as built on a branch, apparently not suspended.

Habits. etc. Finsch (1880) mentioned having met with solitary individuals, which kept themselves so well concealed in the underwood, that he was not able to make any observations worth mentioning. It appears that Finsch, during his short stay, was unfortunate, for Coultas (MS) found the birds common, in flocks, noisy and quarrelsome, feeding on seeds and insects.

3. **Zosterops cinerea finschii** (Hartlaub)

Tephras finschii Hartlaub in Hartlaub & Finsch, Proc. Zool. Soc. London, 1868, p. 6, pl. 3, and p. 117 — Pelew[1]).

Tephras Finschii; G. R. Gray, Hand-List Birds I, 1869, p. 164 (Pelew I.).

Zosterops finschi; Hartlaub & Finsch, Proc. Zool. Soc. London, 1872, p. 96 (Pelew); Tristram, Cat. Coll. Birds, 1889, p. 211 (Pelew Islands); Wiglesworth, Abh. Ber. Mus. Dresden [3], (1890/91), (6), 1892, p. 36 (Pelew Is.); Hartert, Nov. Zool. 7, 1900, p. 3 (no locality); Finsch, Tierreich 15, 1901, p. 45 (Palau); Dubois, Syn. Av. I, 1902, p. 713 (Ile Pelew); Sharpe, Hand-List Birds V, 1909, p. 18 (Caroline Is. (Palau)); Reichenow, Die Vögel II, 1914, p. 470 (Palauinseln); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 230 (Palau-Inseln); Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 168 (Palau); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 192 (Babelthuap, Koror); van Bemmel, Chron. Nat. (= Nat. Tijdschr. Ned. Ind.) 105, 1949, p. 44 (Peliliul); Yamashina, Proc. 7th Pacific Sc. Congr. 1953, p. 64 (Palau); Yamashina, Misc. Rep. Yamashina's Inst. 4, 1954, p. 136 (Palau); Heim & al., Atlas d. Natuurreservaten, 1956, p. 224 (Peliliul).

Zosterops Finschi; Finsch, Journ. Mus. Godeffroy 8, 1875, p. 3, 4, 17 (Palau); Finsch, Journ. Mus. Godeffroy 12, 1876, p. 27 (Palau); Giebel, Thes. Orn. III, 1877, p. 775 (Ins. Pelew); Finsch, Journ. f. Orn. 28, 1880, p. 300 (no locality); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 407, footnote (Palau).

Tephras finschii; Boucard, Cat. Av., 1876, p. 232 (Pelew I.); Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 7 (Palau).

Zosterops finschii; Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 197 (Pelew Islands); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 166 (Carolinas, Palaos); Bolau, Mitt. Naturh. Mus. Hamburg 15, 1898, p. 60 (Palau Ins.); Page, Bird Notes N.S. 4, 1913, p. 3, 5 (Pelew Is.); Taka-Tsukasa & Kuroda, Tori 1, 1915, p. 55, 64 (Pelew).

Tephras finschi; Matschie, Journ. f. Orn. 49, 1901, p. 112 (Palau); Kuroda in Momiyama, Birds Micronesia, 1922, p. 77 (Pelew Is.); Mathews, Syst. Av. Australas. II, 1930, p. 712 (Pelew Islands).

Zosterops cinerea finschi; Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (no locality); Mayr, Birds Southwest Pacific, 1945, p. 300 (Palau).

1) The plate is lettered *Tephras finschi*.

Zosterops cinerea finschii; R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 74 (Peleliu Island: Eastern Peninsula; small island off Eastern Peninsula; Garakayo Island); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 328 (Palau Islands: Babelthuap, Koror, Garakayo, Peleliu, Ngabad); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 319 (Babelthuap, Koror, Peleliu).

Zosterops cinerea; Marshall, Condor 51, 1949, p. 218, 219 (Palau).

Tephras finsch; Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Subspecific characters. Upper parts almost pure Sepia, only very slightly lighter; rump and upper tail coverts somewhat paler and browner.

Under parts light brownish grey, more tawny on the flanks and under tail coverts.

Unfeathered parts. Not recorded in the specimens examined.

Measurements. Wing 9 ♂, 63-68 (65.94); 10 ♀, 63-70 (66.30); 20 specimens, 63-70 (66.05); tail 8 ♂, 38-43 (40.63); 10 ♀, 38-46½ (40.15); 19 specimens, 37-46½ (40.18); tarsus 20 specimens, 18¾-23¼ (21.35); entire culmen 17 specimens, 15-18½ (16.75); exposed culmen 17 specimens, 12¼-15 (13.32); culmen from anterior point of nostril 17 specimens, 9-10¼ (9.54).

Distribution. Confined to the Palau Islands, where known from the following islands: Peleliu, Garakayo, Ngabad, Koror, and Babelthuap (material from all these islands examined).

First collector. The type, collected by Captain Alfred Tetens in 1867, was received almost simultaneously with an individual obtained by Prof. Semper during his long stay on the Palau Islands. Is is impossible to decide who was the first collector as, apparently, the specimens were not dated.

Figure. Hartlaub & Finsch (1868) plate III (coloured on natural size, by J. Smit, fair, though the bird is given a for a *Zosterops* unlikely attitude. The iris is shown yellow, which is probably incorrect).

Type. Bolau (1898) claimed the type to be in the Hamburg Museum, collected by Capt. Heinsohn. In view of Finsch's (1875) explicit statement that the type was received from Capt. Tetens, and that from Heinsohn no Palau birds were received until 1871, it is evident that the Hamburg specimen is not the type, even though it was: "Als Typus bez." [eichnet] 1).

Throughout its existence, the Museum Godeffroy sold large quantities of material. I have seen two price-lists, Catalog nos. VIII and IX, one

1) In several other instances I found that Bolau's list is not sufficiently critical. For example, the specimen of *Ninox podargina*, collected by Kubary cannot be the type, as the type was collected by Captain Heinsohn. Of the three types listed of *Caprimulgus phalaena*, the specimen collected by Capt. Heinsohn is the holotype, the two specimens collected by Kubary are non-typical. Under *Artamus pelewensis* a specimen collected in 1878 is listed as type, though the subspecies was described in 1876, etc.

of which was circulated with volume 4 of the "Zoologischer Anzeiger", 1884. As no special value was attached to type material in those years it is likely that the types of many species have been sold before in 1886 the remainder of the collections went to the Hamburg Museum. I can mention that the Rijksmuseum van Natuurlijke Historie has purchased much material from the Museum Godeffroy over a number of years, even in 1886, when the whole remaining collection was supposedly sold to Hamburg.

Nidification. Apparently not recorded.

Moult. Specimens collected in August (2) and September (3) are undergoing their main moult; others from August (1) and September (4) do not show moult, they are in abraded plumage. Of 6 November specimens, 3 are in the last stages of moult, 3 have completed their moult and are in fresh plumage. Unfortunately no material from other months of the year is available, but it looks as if the main moult takes place from August till October or early November.

Habits, etc. Coultas (MS notes) calls this subspecies quite common, always in flocks and very noisy, in secondary bush, grasslands, and the low bush of the small islands, though not so plentiful there as on the larger islands of the Palau group. Marshall (1949) on the other hand, saw pairs as often as flocks. He often noted individuals and small groups on long flights, high up in the air. The food is stated by the same authority to consist mainly of berries and fruit, with insects occasionally taken. Coultas (MS), Baker (1948) and Marshall (1949) agree that on the Palau Islands this subspecies is very common in woodland and outnumbers *Z. conspicillata;* it also frequents other kinds of vegetation.

Voice. According to Marshall (1949) the notes are not as sweet as those of *Z. conspicillata semperi,* but are of the same pattern.

Discussion. Apparently Mayr (1945) is responsible for the scare that this subspecies would be extinct; actually Mayr wrote: "No reports have yet been received of the fate of the Peliliul Island white-eye". Van Bemmel (1949) concluded on the basis of this that *Z. cinerea finschii* was: „Vermoedelijk reeds uitgestorven", which was further copied by Heim & al. (1956). However with "the Peleliul Island white-eye", Mayr meant *Megazosterops palauensis* rather than *Z. c. finschii:* a good example of what happens when one uses selfmade vernaculars instead of scientific names for little-known species. Fortunately there seems as yet no need for anxiety for R. H. Baker (1948, 1951) found this form fairly numerous and a dominant bird on various islands, and Marshall (1949) called it abundant in deep woodland. Unless clearing is strictly controlled, of course any woodland bird inhabiting small islands is in continuous danger of extinction.

Genus **Tephrozosterops** Stresemann

Tephozosterops Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 234 — type by original designation and monotypy, *Tephras stalkeri* Ogilvie-Grant.

Generic characters. Structurally similar to *Zosterops* and *Lophozosterops,* but very different in coloration from all species of *Lophozosterops* and practically all species of *Zosterops*: brown above, white below, without any trace of yellow pigment (green or yellow colour). In coloration not too far removed from *Zosterops cinerea,* but upper parts warmer brown, under surface white, not greyish, and more sturdy in appearance.

Distribution. Ceram.

Discussion. Generally authors (Hachisuka, 1941; van Bemmel, 1948; van Bemmel & Voous, 1953) have not accepted the monotypic genus *Tephrozosterops,* but united it with *Oreosterops* auct., or *Apoia* auct., e.g. *Lophozosterops* in this revision. The view that *Tephrozosterops* is closest to that genus goes back to Stresemann (1914) who removed the species *T. stalkeri* from *Tephras* and placed it as *Oreosterops stalkeri,* without, however, giving any real reason for assigning it to that genus. Later, in the description of *Tephrozosterops,* Stresemann (1931) stated that this new genus structurally agrees with "*Oreosterops*", but differs by its coloration.

It will be noted that everybody appeared to agree that *Tephrozosterops* was closest to "*Oreosterops*" (= *Lophozosterops*), until I mentioned that: ". . . . it should be kept in mind that there are no differences of a structural nature between *Lophozosterops* and *Zosterops* either" (Mees, 1953). No additional information that might shed more light on the affinities of *Tephrozosterops stalkeri* has been produced since, in fact the species has not been observed or collected for over fifty years. Therefore the situation as it stands is that *Tephrozosterops stalkeri* agrees with *Lophozosterops* in size, and also inhabitats a region where that genus occurs, but differs entirely in colour. From *Zosterops* of that region, *Tephrozosterops stalkeri* differs by its larger size, but many species of *Zosterops* elsewhere are as large or larger, and also in colour. *Zosterops,* however, has several isolated species which show an approach to it in coloration: *Z. borbonica, Z. modesta, Z. cinerea.* In conclusion I would say that the prevailing opinion that *Tephrozosterops* is closer to *Lophozosterops* than to *Zosterops* is highly questionable, and therefore I prefer to treat *Tephrozosterops* as a direct derivative of *Zosterops* without any special close link with *Lophozosterops.* This brings me very close to Ogilvie-Grant, the describer of *T. stalkeri,* who correctly pointed out the great resemblance between this species and *Z. cinerea.* Therefore I have also modified the sequence of the genera from that proposed previously (this revision, part I, p. 14), to make *Tephrozosterops* follow *Z. cinerea.*

Species 1. **Tephrozosterops stalkeri** (Ogilvie-Grant)

Tephras stalkeri Ogilvie-Grant, Bull. B. O. C. 25, 1910, p. 90 — Karobi Mountain, 2500 ft., Island of Ceram [recte: G. Kakopi, near Manoesela].

Tephras stalkeri; van Dedem, Jaarboekje N. O. V. 8, 1911, p. 100 (Ahiolo, ± 700 m).

Oreosterops stalkeri; Stresemann, Nov. Zool. 21, 1914, p. 137, 138 (Manusela 2000 ft., G. Sofia 4000 ft.); Stresemann, Verh. Orn. Ges. Bayern 13, 1917, p. 138 (Hochebene von Manusela (Mittel-Seran) in 800 m.); Mathews, Syst. Av. Australas. II, 1930, p. 715 (Ceram); Snouckaert, Alauda (2) 3, 1931, p. 26 (Mont Kakopi, Céram central); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Ceram); van Bemmel, Treubia 19, 1948, p. 330 (M. & W. Ceram).

Tephrozosterops stalkeri; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 234 (Seran); Mathews, Ibis (13) 2, 1932, p. 156 (no locality); Mees, Zool. Med. 32, 1953, p. 63 (Manusela, Central Ceram, and Ahiolo, West Ceram); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 321 (mountains of Ceram).

Apoia stalkeri; van Bemmel & Voous, Beaufortia 4, 1953, p. 2 (no locality).

Characters. As given under the genus.

Upper parts, entirely Brussels Brown; outer edges of remiges, rectrices and upper wing-coverts slightly more rufous; these feathers themselves blackish brown; inner edges of primaries basally white, distally more or less strongly tinged cinnamon; no eye-ring; no loral streak: lores and ear-coverts a bit paler, more greyish, than the upper parts, but not clearly defined.

Under parts. White, on flanks and thighs tinged with brown; under tail-coverts in well-made skins with a pale yellowish tinge; axillaries pure white.

Unfeathered parts. Iris brown, bill dark horn colour, legs lead colour (van Dedem); iris red-brown, bill black, legs grey-blue or light grey-blue (Stresemann).

Measurements. Wing 10 ♂, 63, 65, 69-72 (69.15); 4 ♀, 68-72 (70.00); 14 specimens, 63-72 (69.39); tail 10 ♂, 42, 44½-49 (45.55); 4 ♀, 45-47½ (46.38); 14 specimens, 42-49 (45.79); tarsus 13 specimens, 18-19¼ (18.79); entire culmen 12 specimens, 16-17¼ (16.63); exposed culmen 13 specimens, 12½-14½ (13.52); culmen from anterior point of nostril 13 specimens, 9-10¼ (9.85).

Structure. Wing formula with the 2nd primary varying in length between the 7th and the 9th. Tail:wing index of 14 specimens 66.0 %.

Weights. ♂: 15, 16, 17, 18, 18, 18; ♀: 19, 21 g.

Distribution. Ceram. Known from Ahiolo, Manusela, G. Sofia and G. Kakopi, at moderate elevations, from 600 to 1200 m altitude.

First collector. W. Stalker in October 1909. The only subsequent collectors are van Dedem (May 1910) and Stresemann (May-July 1911).

Not figured.

Type. BM no. 1910.12.28.276 (type examined).

Moult. None of the 14 specimens examined, collected in May (3), June (9), July (1) and October (1) shows moult.

Nidification. Not recorded.

Habits, etc. Stresemann (1914) found the species common in the highlands of Manusela, particularly among the edges of open places, in growths of epiphytes and scrub, often in company of *Zosterops atrifrons stalkeri*. Stomachs contained seeds of plants and remains of a beetle.

Discussion. The specimen with a wing of only 63 mm, tail 42 mm, was collected by van Dedem; it is a well-prepared skin, and the primaries and rectrices look fresh. It is therefore not possible to ascribe its remarkably small measurements to wear.

Genus **Madanga** Rothschild & Hartert.

Madanga Rothschild & Hartert, Bull. B. O. C. 43, 1923, p. 117 — type by original designation and monotypy, *Madanga ruficollis* Rothschild & Hartert.

Generic characters. This monotypic genus differs from other genera mainly in colour. The orange throat, and dark grey under surface are rather different from anything found in *Zosterops* or *Lophozosterops*. It is not impossible that *Madanga* is a derivative of *Lophozosterops*, but it is sufficiently different to be kept as a separate genus.

Rothschild & Hartert have drawn attention to the length of the 2nd primary, which is relatively definitely longer than in any species of *Lophozosterops*.

Madanga ruficollis remains known from the original four specimens only, which are not in a particularly good condition. It looks as if the nose-opening is more roundish, less slit-like than in other Zosteropidae, though with an operculum, but as the birds have evidently been tied through their nostrils, this peculiarity may be partly artificial.

Distribution. Boeroe. For details, see below under *Madanga ruficollis*.

Discussion. It is very tempting to regard *Madanga ruficollis* as the representative species on Boeroe of the genus *Lophozosterops*, in the range of which it occupies one blank spot, but as I concluded before (Mees, 1953), the morphological evidence does not really support this. Nevertheless I incline to the opinion that *Madanga* is closer related to *Lophozosterops* than to any other genus.

Species 1. **Madanga ruficollis** Rothschild & Hartert

Madanga ruficollis Rothschild & Hartert, Bull. B. O. C. 43, 1923, p. 117 — Wa Fehat, Buru, 2700 feet.

Madanga ruficollis; Hartert, Nov. Zool. 31, 1924, p. 104, 111 (Wa Fehat 2700 ft, Mada Range 5000 ft); Hartert, Nov. Zool. 34, 1928, p. 208 (Wa Fehat 2700 ft); Siebers, Treubia 7, Suppl., 1930 (May), p. 296 (Buru); Mathews, Syst. Av. Australas. II, 1930 (July), p. 715 (Buru); Snouckaert, Alauda (2) 3, 1931, p. 27 (Monts Madanga, île Bourou); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 235 (Gebirge von NW-Buru (Fogha)); Meise, Proc. 8th Int. Orn. Congr. (1934), 1938, p. 86, 180 (Wa Fehat, Buru); van Bemmel, Treubia 19, 1948, p. 329 (N. W. Buru); Mees, Zool. Med. 32, 1953, p. 63 (Wa Fehat, Boeroe); Berndt & Meise, Naturgesch. d. Vögel II, 1962, p. 551 (Gebirgswälder von Buru); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 321 (mountains of northwestern Buru (Fogha)).

Characters. A summary of the characters has been given in the genus diagnosis.

Upper parts. Crown, sides of head, and nape grey, close to Light Greyish Olive, slightly paler on forehand and lores, shaft streaks very slightly darker; remainder of upper parts near Warbler Green, but darker and at the same time brighter; eye-ring rudimentary, consisting of very short scaly feathers; primaries, secondaries and rectrices dark brownish, all with Warbler Green outer edges; inner edges of primaries pale grey, not white.

Under parts. Throat and upper breast and under tail coverts between Ochraceous-Tawny and Ochraceous-Orange, remainder of under parts of the same darkish grey colour as the head.

Unfeathered parts. Iris, not recorded, bill blackish, legs pale brownish (Pratt).

Measurements of four specimens (1 ♀, 3 —, one of which has "♂" on its label in a later handwriting): wing 70½-74 (72.13), tail (three specimens only) 49½-53½ (52.0), tarsus (two specimens only) 20, 21, entire culmen 14¾-15½ (15.13), exposed culmen 11½-12½ (12.13), culmen from anterior point of nostril 9-10 (9.44).

Structure. See under Generic Characters.

Distribution. Boeroe. The species remains known from the original specimens only: three from Wa Fehat, 2700 ft, one from the Mada Range, 5000 ft. It is likely that it is confined to the mountains.

First collectors. The Pratt brothers on 8 April, 1922, at Wa Fehat.

Not figured.

Type. AMNH no. 701487 (specimen examined). This bird was not sexed by its collectors, but as the only sexed specimen of the four obtained, a female, has a wing of only 70½ mm, Rothschild & Hartert (1923) regarded it as justified to describe the type, with a wing of 74 mm, as a male.

Moult. Specimens collected in April do not show moult.

Nidification. Not recorded.

Habits, etc. Not recorded.

Genus **Lophozosterops** Hartert

Lophozosterops Hartert, Nov. Zool. 3, 1896, p. 567 — type by original designation and monotypy, *Lophozosterops dohertyi* Hartert.

Oreosterops; Hartlaub and Auctorum, nec *Oreosterops* Bonaparte, misapplication [1]).

Oreozosterops; Hartert, Ornis 7, 1891, p. 116, and subsequent publications, lapsus only.

Apoia Hachisuka, Contrib. Orn. Phil. II, 1930, p. 205 — type by original designation and monotypy, *Zosterops goodfellowi* Hartert.

Generic characters. Large, length of wing generally exceeding 60 mm; tail 63-73 % of length of wing; wing-formula normal, 2nd primary in length between 7th and 9th.

The members of this genus differ from *Zosterops* by having a white or pale yellow throat, combined with pale yellow (in one species grey) under surface. When in *Zosterops* the belly and the flanks are yellow, the throat is always yellow too 2). Upper parts olive green or greyish green, head usually differently coloured; feathers of crown uniformly coloured, or mottled, in the latter case with white shaft streaks. Eye-ring varying from very wide to vestigial.

Distribution. Java, Celebes, Mindanao, Ceram, Bali, Soembawa, Flores. The majority of species are mountain birds.

Discussion. The six species comprising this genus evidently form a natural group which, though close to *Zosterops*, differs sufficiently from that genus to make its separation in a distinct genus useful.

Three of the species: *L. javanica*, *L. squamiceps* and *L. goodfellowi* are so similar — both in morphology and in ecology — that uniting them into one species would be an obvious course to take, if not each of these three had broken up in several subspecies. This makes it undesirable to throw them all together as it would obscure the existence of three groups of subspecies. *L. superciliaris* is also very close; the two remaining species, *L. pinaiae* and particularly *L. dohertyi* are more remote, but still obviously belong to the group. The ranges of *L. superciliaris* and *L. dohertyi* are the same, the latter

1) It is not unlikely that Bonaparte actually intended the generic name *Oreosterops* for *L. javanica* and not for *Z. montana*. At the time of Bonaparte's visit, the specimens of *L. javanica* in Leiden were labelled *Zosterops monticola*, and later Bonaparte may have confused the names *montana* and *monticola*.

2) In *Zosterops conspicillata conspicillata* the throat is often paler than the remainder of the under surface.

probably living at on an average lower levels than the former; all other species are allopatric.

Species 1. **Lophozosterops javanica** (Horsfield)

Characters. A typical representative of the genus of, for this genus, average size.

Upper parts. Crown, sides of head, and nape grey, closest to Dark Olive-Gray; remainder of upper parts Warbler Green; frontal area whitish, lores either black or white (in different races); when the lores are white, this colour is continued around the eye; eye-ring white, narrow, below the eye slightly wider than above the eye; the eye-ring is so narrow that the separate little feathers of which it consists can easily be seen; primaries, secondaries and rectrices blackish brown, all with Warbler Green outer margins.

Under parts. Chin dirty yellowish white, gradually changing in greyish on the throat; this greyish is much paler than that of the crown: the throat-feathers are grey on their basal halves, yellowish white distally, which gives the throat a slightly mottled appearance. On the breast the greyish white smoothly changes into Citron Yellow, which covers the whole remainder of the under surface, though more Yellowish Citrine on flanks and sides of breast.

Juvenile birds differ from adults in that there is a greenish tinge to the grey of the crown and nape.

Unfeathered parts. Eyes brown or dark brown, bill black, legs greenish yellow or greenish brown.

There are no structural peculiarities, the 2nd primary has about the same length as the 8th primary, the tail index is 63-71 %.

Distribution (fig. 12). Mountains of Java and Bali with a lower limit of about 900 metres, upper limit the mountain tops.

The species occurs in forest and also in dense secondary growth, neglected tea plantations, etc.

Geographical variation. Not very pronounced; the nominate race has the loral region white, the races *frontalis* from the extreme West of Java, and *elongata* from the extreme East of Java, and Bali, have blackish lores; the difference between the two last-mentioned forms is only a slight one in size of bill.

Discussion. The kind of geographic variation shown by this species can best be explained by assuming that black lores are the original or if one insists on using this much-misused word, the primitive condition, and that later the central populations developed the white face. This is supported by a series of juvenile males of *javanica* from Mt. Slamat, well within the range

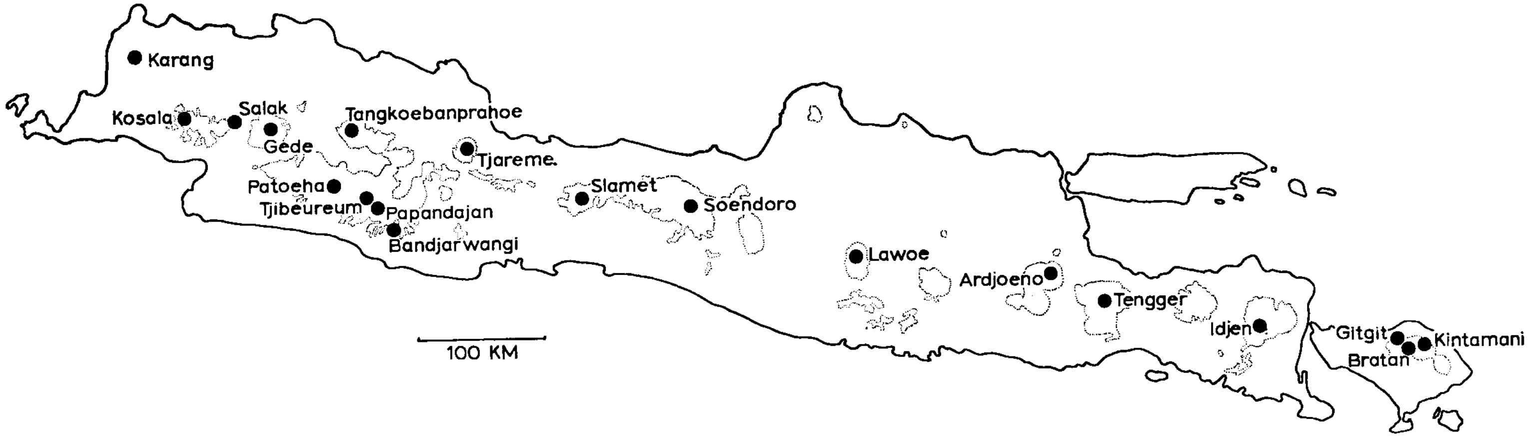


Fig. 12. The distribution of *Lophozosterops javanica* and races; *frontalis*, the four western localities; *elongata*, Idjen and Bali; *javanica*, all other localities. The dotted lines are the 750 m isohypses, below the normal lower limit of the species; they show well the insular character of its distribution.

of this subspecies, which have greyish lores: apparently therefore juvenile males, at least in part of the range, but perhaps always, retain the more "primitive" plumage. Finally, the closely related species *L. squamiceps* and *L. goodfellowi* do also have blackish lores.

1. **Lophozosterops javanica frontalis** (Reichenbach)

Z[osterops] frontalis Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 94, pl. 463 fig. 3307 — Port Essington (errore!) = W. Java: G. Gede (designated by Bartels Jr. & Stresemann, 1929, p. 143).

Sylvia flaviventris S. Müller (ex Kuhl MS), Tijdschr. Nat. Gesch. 2, 1835, p. 331, 334 — Salak, Gede, Patacha; nomen nudum, moreover preoccupied by *Sylvia flaviventris* Vieillot, Nouv. Dict. d'Hist. Nat. XI, 1817, p. 241, and by *Sylvia flaviventris* Burchell, Trav. S. Afr. I, 1822, p. 335.

Zosterops fallax Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 197 — Java and Sumatra.

Sylvia flaviventris; (pt.) P. van Oort & S. Müller, Verh. Bat. Gen. 16, 1836, p. 135, footnote (Gede, Salak).

Oreosterops javanica; Hartlaub, Journ. f. Orn. 13, 1865, p. 26 (Java).

Zosterops javanica; (pt.) Giebel, Thes. Orn. III. 1877, p. 776 (Java, Sumatra); Nicholson, Ibis (4) 6, 1882, p. 66 (Kosala, Bantam, 3100 feet); Vorderman, Nat. Tijdschr. Ned. Ind. 59, 1900, p. 212 (Tjibodas).

Zosterops fallax; Meyer, Zeitschr. ges. Orn. 1, 1884, p. 209 (no locality); Tristram, Cat. Coll. Birds, 1889, p. 211 (Sumatra, Bantam); Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1890, p. 401 (Sumatra); Hartert, Ornis 7, 1891, p. 116 (no locality); Seebohm, Ibis (6) 5, 1893, p. 218 (West Java); Vorderman, Nat. Tijdschr. Ned. Ind. 60, 1901, p. 77, 143 (Java); Bartels, Nat. Tijdschr. Ned. Ind. 61, 1902, p. 148 (Pangerango, 3000 ft); Koningsberger, Med. Dept. Landbouw 7, 1909, p. 5 (Java); Koningsberger, Java Zoöl. Biol., 1912, p. 240 (W. Java); Koningsberger, Java Zoöl. Biol., 1915, p. 591-592, 616 (G. Gedeh); van Balen, Dierenw. Insulinde II, 1915, p. 483 (Java en Sumatra); Karny, Natur (Leipzig) 13, 1922, p. 322 (Pangarango); Docters van Leeuwen, Flora 118/119, 1925, p. 85, 86, 87 (Pangerango-Gipfel, 3020 m); Docters van Leeuwen, Trop. Nat. 15, 1926, p. 63, 64, phot. (top van de Pangerango); Delsman, Trop. Nat. 16, 1927, p. 89 (Tjibodas); Docters van Leeuwen, Trop. Nat. 16, 1927, p. 194 (Pangrango); Dammerman, Fourth Pacific Sc. Congr. Exc. C 3, Tjibodas, 1929, p. 20, pl. 2 fig. 3 (top Pangrango); Dammerman in Sc. and Scient. in the Neth. Ind., Nat. Tijdschr. Ned. Ind. 102, Spec. Suppl., 1945, p. 409 (top Gedeh).

Zosterops montana; Hartert, Kat. Vogelsamml. Mus. Senckenb., 1891, p. 31 (Sumatra, Java).

Zosterops frontalis; Finsch, Tierreich 15, 1901, p. 38 (Java, nicht Sumatra und Australien); Finsch, Notes Leyden Mus. 22, 1901, p. 223 (Java: Gadok, Gedégebirge); Dubois, Syn. Av. I, 1902, p. 711 (Java); Finsch, Journ. f. Orn. 54, 1906 (April), p. 319 (Java); Bartels, Journ. f. Orn. 54, 1906 (July), p. 406 (Pangerango); Ogilvie-Grant, Ibis (8) 6, 1906 (July), p. 473 (mountains of Java); van Oort, Mus. d'Hist. Nat. Pays-Bas 10, pt. 1, 1907, p. 261 (Java); Sharpe, Hand-List Birds V, 1909, p. 16 (Java); van Oort, Notes Leyden Mus. 32, 1910, p. 159 (summit of Goenoeng Karang); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 270 (Java); van Oort, Notes Leyden Mus. 34, 1911, p. 48 (no locality).

Oreosterops javanica frontalis; Stresemann, Nov. Zool. 20, 1913, p. 366, 367 (West-Java); Stresemann, Nov. Zool. 21, 1914, p. 138 (Westjava); Dammerman & Siebers in Dammerman, Treubia 11, 1929, p. 63 (W. Java); Bartels Jr. & Stresemann, Treubia 11, 1929, p. 143 (W.-Java); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 231 (Westjava:

G. Gedeh); Docters van Leeuwen, Trop. Nat. 21, 1932, p. 144 (Kandang Badak, Gedeh); Docters van Leeuwen, Verh. Kon. Ak. Wetensch. (2) 31, 1933, p. 70, 76, 133 (Pangrango-Gedeh); Kuroda, Birds Isl. Java I, 1933, p. 128 (W. Java); Kuroda, Birds Isl. Java II, 1936, p. 698, 700, 704 (Gedeh, Pangerango); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (W. Java).

Oreozosterops frontalis frontalis; Robinson & Kloss, Treubia 5, 1924, p. 298 (Tjibodas, Kandang Badak).

Zosterops javanica frontalis; Chasen, Bull. Raffl. Mus. 11, 1935, p. 266 (Java (west)); Hoogerwerf, Zool. Med. 28, 1947, p. 272-274 (West-Java); Hoogerwerf, Treubia 19, 1948, p. 134 (Java: Tjiomas Estate, Mt. Salak, Nature Reserve Tjibodas-Mt. Gede, Nature Reserve Tjimungkat, Koleberes Estate).

Apoia javanica frontalis; Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (W.-Java); Delacour, Birds Malaysia, 1947, p. 320 (Java (west)); Hoogerwerf, Limosa 22, 1949, p. 250 (W. Java); Hoogerwerf, Bijdr. Oöl. Java, 1949, p. 250 (W. Java); Hoogerwerf, Avif. Tjibodas, 1949, p. 140 (Tjibodas); Hoogerwerf, Limosa 23, 1950, p. 140 (Tjibodas); Wynne, North W. Nat. N. S. 2, 1954, p. 635 (no locality); Wynne, Key-List Birds, 1956, p. 91 (no locality).

Lophozosterops javanica frontalis; Mees, Zool. Med. 32, 1953, p. 58-60 (Mt. Karang, Mt. Pangrango-Gedeh); Hellebrekers & Hoogerwerf, Zool. Verh. 88, 1967 (31 May), p. 148 (West Java); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 323 (mountains of extreme western Java (Mt. Karang, Mt. Pangrango-Gedeh)).

Apoia (Zosterops) javanica frontalis; Docters van Leeuwen, Beaufortia 4, 1954, p. 180 (Java).

Apoia javanica; (pt.) Sody, Madj. Ilmu Alam (= Nat. Tijdschr. Ned. Ind.) 112, (1956), 1957, p. 162 (Java, 900-3000 m).

Subspecific characters. Characterized by the blackish loral patch, which is narrow anteriorly, but posteriorly becomes as wide as the eye, and broadly interrupts the narrow eye-ring; a narrow band of pale feathers runs from the forehead to above the anterior part of the eye, but the supercilium is grey as the crown.

Unfeathered parts. Iris brown, bill grey, legs grey (Jacobson); iris dark brown, bill black, legs green-yellow or yellow-green (Lieftinck).

Measurements. Wing 40 ♂, 60½-67 (63.91); 31 ♀, 60-66 (62.65); 86 specimens, 60-68 (63.45); tail 40 ♂, 39-48 (43.03); 28 ♀, 39-46 (41.91); 83 specimens, 39-48 (42.63); tarsus 84 specimens, 18-20½ (19.41); entire culmen 77 specimens, 12-15½ (13.64); exposed culmen 78 specimens, 9½-11½ (10.72); culmen from anterior point of nostril 77 specimens, 7-9 (7.88).

Distribution (fig. 12). This subspecies has a very restricted distribution; it is limited to the extreme west of West Java, where it has been recorded from the following localities: G. Karang, Salak (Tjianten), Kosala, and various localities on the Pangerango-Gedeh. A minority of birds from G. Tangkoeban Prahoe are intermediate between this race and *javanica*, they have the loral patch grey or dusky.

First collectors. Probably H. Kuhl and J. C. van Hasselt in 1821, as the name *Sylvia flaviventris* was given by Kuhl.

Figures. Reichenbach (1852), p. 463 fig. 3307 (coloured, poor); Docters van Leeuwen (1926), p. 64 fig 15 (photograph of stuffed bird at nest); Hoogerwerf (1949), plate XX fig. 220 (coloured, by Abdoel Kadir, small but fair).

Type. This subspecies was described from a specimen in the Dresden Museum that must have disappeared long ago as there is no evidence that it has ever been registered (Hebig, in litt., 12-VII-1967). Unless it is an old specimen in that institute now labelled: "*Zosterops fallax*, Java?".

Moult. Specimens collected in January (4), February (10), March (10), April (6), May (1), June (3), September (5), October (2), November (1) and December (2) do not show moult. Birds obtained in January (1), March (2), June (2) and September (1) are moulting primaries or rectrices or both. Evidently not enough moulting birds have been examined for a certain conclusion to be drawn, but judging also from the state of wear I would expect that the main moult takes usually place towards the end of the year. See also under the next subspecies.

Nidification. Nests and eggs are similar to those of other Zosteropidae. Hoogerwerf (1949) mentioned breeding in all months except January, February and July. The eight clutches in the RMNH (coll. Bartels), are from January (1), April (2), May (1), June (2), July (1), and August (1), so that the only month still lacking is February. Therefore it appears evident that breeding takes place throughout the year. All eight clutches consist of two eggs, and the same was the case with the clutches examined by Hoogerwerf (1949). The eggs are pale greenish blue, almost without gloss. Measurements are: 17.8 × 14.0 and 17.3 × 13.9, 17.1 × 13.0 and 17.0 × 13.0, 17.8 × 13.4 and 17.2 × 13.3, 19.4 × 13.1 and 19.6 × 13.3, 20.5 × 13.7 and 19.7 × 13.4, 17.3 × 13.4 and 18.2 × 13.7, 20.0 × 14.3 and 19.2 × 14.0, 17.5 × 13.8 and too damaged to measure. Average of fifteen eggs, 18.4 × 13.6: this agrees very well with the figures and average for 28 eggs measured by Hoogerwerf.

Habits, etc. The behaviour of this subspecies is not different from that of other members of its family; the birds go about in pairs or small flocks.

My impression, gained, however, from very few observations is that this bird is perhaps to a larger extent vegetarian than is usual in the family, and this is confirmed by Docters van Leeuwen (1932, 1933, p. 134-137) who could record, from personal observation and examination of stomachs, fruits and berries of the following species of plants as food: *Rubus* *lineatus, Rubus hasskarlii, Schefflera lutescens, Vaccinium varingifolium.* Besides, the same author (1926, 1933, p. 76) mentions insects and nectar, the nectar especially from *Vaccinium*-flowers.

Voice. Docters van Leeuwen (1933, p. 76) mentioned a high long drawn-out cheeping, perhaps the same as the loud hoarse notes recorded by Hoogerwerf (1949). There does not appear to be a description of song, but see under *L. j. elongata.*

2. **Lophozosterops javanica javanica** (Horsfield)

Sylvia Javanica Horsfield, Trans. Linn. Soc. London 13, 1821, p. 156 — Java[1]).

sylvia Javanica; Lesson, Manuel d'Orn. I, 1828, p. 296 (Java).

Sylvia Javanica; Vigors & Horsfield in Sophia Raffles, Mem. Raffles, 1830, p. 661 (Java).

Zosterops Javanica; Swainson, Fauna Bor.-Am. II, 1831, p. 205, 222 (no locality).

Sylvia flaviventris; (pt.) S. Müller, Tijdschr. Nat. Gesch. 2, 1835, p. 331, 334 (Patacha); (pt.) P. van Oort & S. Müller, Verh. Bat. Gen. 16, 1836, p. 135 (Tankoeban Prahoe).

Zosterops javanicus; Hartlaub, Verz. Samml. Bremen, 1844, p. 37 (Java); Horsfield, Cat. Birds Mus. East-India Comp. I, 1854, p. 263 (Java); Schlegel, Handl. Dierk. I, 1857, p. 274 (Java en Sumatra); von Rosenberg, Malayische Archipel, 1878, p. 106 (Tbg., Sumatra).

Zosterops javanica; G. R. Gray, Gen. Birds I, 1848, p. 198 (no locality); Bonaparte, Consp. Gen. Av. I, 1850, p. 398 (Java); Cabanis, Mus. Heineanum I, 1851, p. 115 (Java); Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 96 (Java); (pt.) Giebel, Thes. Orn. III, 1877, p. 776 (Java, Sumatra); Meyer, Sitzungsber. Abh. Ges. Isis, 1884, Abh. 1, p. 42 (Java); Meyer, Zeitschr. ges. Orn. 1, 1884, p. 209 (no locality); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 196 (Java); Heine & Reichenow, Nomencl. Mus. Hein. Orn., 1890, p. 72 (Java); Hartert, Ornis 7, 1891, p. 116 (Pengalengan); Seebohm, Ibis (6) 5, 1893, p. 218-219 (West Java); Hartert, Nov. Zool. 3, 1896, p. 540 (Mt. Arjuno at nearly 10000 feet); Meyer & Wiglesworth, Birds Celebes, 1898, p. 485 (no locality); Finsch, Tierreich 15, 1901, p. 37 (Java); Vorderman, Nat. Tijdschr. Ned. Ind. 60, 1901, p. 77 (Java); Koningsberger, Med. 's Lands Plantentuin 50, 1901, p. 93 (Java); Dubois, Syn. Av. I, 1902, p. 711 (Java); Finsch, Journ. f. Orn. 54, 1906, p. 319 (Java); Bartels, Journ. f. Orn. 54, 1906, p. 406 (Pangerango, 3000 f.); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 396 (note on type); Spennemann, Gefied. Welt 36, 1907 (Feb.), p. 44 (Java = Central Java); Sharpe, Hand-List Birds V, 1909, p. 16 (Java); van Oort, Notes Leyden Mus. 34, 1911, p. 48 (Tengger); Page, Bird Notes N.S. 4, 1913, p. 3 (Java); Nehrkorn, Nachtr. Nehrk. Eierkat., 1914, p. 26 (Java); van Balen, Dierenw. Insulinde II, 1915, p. 483 (Java); Stresemann, Orn. Monatsber. 30, 1922 (1 July), p. 87 (no locality).

Orosterops javanica; G. R. Gray, Hand-List Birds I, 1869, p. 164 (Java); Boucard, Cat. Av., 1876, p. 232 (Java).

Oreosterops javanica; Vorderman, Nat. Tijdschr. Ned. Ind. 44, 1885, p. 194 (Java); Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1890, p. 401 (Sumatra, Java); Rensch, Gesch. des Sundabogens, 1936, p. 97 (Java).

Zosterops fallax; Page, Bird Notes N.S. 4, 1913, p. 3, 5 (Java and Sumatra); Ridley, Dispersal of Plants, 1930, p. 469 (Mt. Papandayan, Java).

1) From Blyth (1849) onwards the name *Sylvia javanica* Horsfield has sometimes been applied mistakenly to *Phylloscopus borealis* (Blasius).

Oreosterops javanica javanica; Stresemann, Nov. Zool. 21, 1914, p. 138 (Ostjava, vereinzelt auch in Westjava); Dammerman & Siebers in Dammerman, Treubia 11, 1929, p. 63 (W. Java, M. Java); Bartels Jr. & Stresemann, Treubia 11, 1929, p. 143 (W.- und M.-Java); Stresemann, Treubia 12, 1930, p. 430 (Papandajan); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 232 (Vulkane Mitteljavas sowie G. Papandajan in Westjava); Docters van Leeuwen, Verh. Kon. Ak. Wetensch. (2) 31, 1933, p. 135, 136, 137, 157 (Mts. Sumbing and Sindoro); Kuroda, Birds Isl. Java I, 1933, p. 129 (volcanic mountains of West and Mid Java); Kuroda, Birds Isl. Java II, 1936, p. 698 (West and Mid Java); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (W. & Middle Java).

Zosterops javanica javanica; Snouckaert, Jaarber. C. N. V. 17, 1927, p. 32 (Tankoeban Prahoe, 1800 m); Chasen, Bull. Raffl. Mus. 11, 1935, p. 266 (Java (central)); Hoogerwerf, Treubia 19, 1948, p. 134 (Tjimungkat, Mt. Papandajan).

Oreosterops javanica elongata; Kuroda, Tori 6, 1930, Eng. col. p. 75 (Mt. Ardjoeno); (pt.) Kuroda, Birds Isl. Java I, 1933, p. 130, pl. VI fig. 15 (Mt. Ardjuno, Mt. Tenger).

Oreosterops javanica frontalis; E. Bartels, Nat. Tijdschr. Ned. Ind. 91, 1931, p. 346 (Kole Beres).

Zosterops javanica elongata; (pt.) Hoogerwerf, Zool. Med. 28, 1947, p. 272-274 (Tengger-complex); (pt.) Hoogerwerf, Treubia 19, 1948, p. 134 (Tengger Highland).

Zosterops (Oreozosterops) javanica javanica; H. Docters van Leeuwen, Treubia 10, 1929, p. 445 (Sindoro, 2000 m, 2500 m).

Apoia javanica javanica; Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (M.-Java); Delacour, Birds Malaysia, 1947, p. 320 (Java (center)); Voous, Limosa 21, 1948, p. 100 (Slamat ± 2000 m, Lawoe ± 1600-2000 m); Wynne, Key-List Birds, 1956, p. 91 (no locality).

Lophozosterops javanica javanica; Mees, Zool. Med. 32, 1953, p. 58-60 (Java); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 323 (mountains of central and eastern Java, from Papandajan and Bandung district eastward).

Apoia javanica; (pt.) Sody, Madj. Ilmu Alam (= Nat. Tijdschr. Ned. Ind.) 112, (1956), 1957, p. 162 (Java, 900-3000 m).

Oculocincta javanica; McClure, Malayan Nat. Journ. 17, 1963, p. 116 (no locality).

Subspecific characters. Similar to the preceding race in general appearance and measurements, but differs by having forehead, lores and supercilium creamy white. Juvenile males have, sometimes or always, the lores dusky and lack the conspicuous white area above and around the eye; therefore they resemble the preceding and the following subspecies, though they never have the lores as dark as in those races (see also the discussion on p. 172).

Unfeathered parts. Iris brown, dark brown or blackish brown, bill black or greyish black, legs yellowish grey or greyish yellow (van der Weele); iris sepia, bill black, legs grey-green (de Vos); iris brown or dark brown, bill dark brown, legs olive greenish-yellow (Soeparma); iris brown or dark brown, bill black, legs yellow-green or olive green (Wegner); iris dark brown, bill blackish grey, legs grey (Biesenbach).

Measurements. Wing 44 ♂, 60-67½ (63.55); 43 ♀, 59-65 (62.35); 93 specimens, 59-67½ (63.00); tail 44 ♂, 40-47 (43.41); 43 ♀, 39-46 (42.64); 93 specimens, 39-47 (42.98); tarsus 89 specimens, 17½-21 (19.23); entire culmen 91 specimens, 12, 13-15½ (13.95); exposed culmen 91 specimens, 9½-12½ (10.85); culmen from anterior point of nostril 91 specimens, 7-9 (7.92).

Distribution (fig. 12). Mountains of Java with the exception of those of the extreme West (where replaced by *frontalis*), and the extreme East (where replaced by *elongata*). Material was examined from the following localities: Pangerango (very rare), Tangkoeban Prahoe, Malabar (Tjinjiroewan), Tjibeureum, Papandajan (Kamodjan, Tegal Aloen-Aloen), Bandjarwangi, Telagapatengan, Tjareme (= Tjerimai), Slamet (Kali Goea), Sindoro (Sikatok), Lawoe (Tjilokodringo), Tengger (G. Seroek, Kletak, Djambangan, Nongkodjadjar, Ranoe Pani, Ngadas), Idjen (rare). In addition this subspecies has been recorded from the Ardjoeno (Hartert, 1896; Kuroda, 1930, 1933). Birds from Patoeha, recorded by Müller (1835) and E. Bartels (1931) would also be referable to this race, though there might be an influence of *frontalis* in this western locality.

The recorded vertical range agrees with that of the preceding subspecies, roughly from 1000 to 3000 m.

First collector. Thomas Horsfield on Java, not after 1819, the year in which he left the island. From his published work (Zool. Res. Java), I learn that the locality where Horsfield obtained at least a large proportion of his mountain birds was "Mount Prahu" (= Tankoeban Prahoe), West Java, but that he also climbed Mt. Merbaboe, Central Java [1]). Either of these mountains might be the type-locality. I do not know on what evidence, if any, Seebohm (1893) could state that the type was brought from West Java, but if he is right, the type-locality would almost certainly be Tankoeban Prahoe.

1) Of *Scolopax saturata* and *Brachypteryx montana* the type-locality is very definitely stated to be Mount Prahu; *Pomatorhinus montanus* was recorded from both Mts. Prahu and Merbaboo. The type-locality of *Brachypteryx montana*, given as "Java" by Ripley (1964) can be precised accordingly. According to Ripley, the type-locality of *Turdus Javanicus* has been restricted to Mount Tjerimai by Stresemann, but actually Stresemann (1930) wrote "Nur vom G. Tjerimai bekannt" which was perfectly true at the time as far as exact published evidence went, but only because Bartels (1915), who had a large series from Mt. Sindoro in his collection, did not mention more precise localities than "die hohen Vulkane Zentraljavas", and because H. Docters van Leeuwen (1929) misidentified his Sindoro specimens as *T. p. whiteheadi*. Anyway, Stresemann certainly did not intend his remark as a formal restriction of type-locality, and there is no evidence that Horsfield ever climbed the G. Tjareme (Tjerimai). On the other hand, Horsfield did climb the G. Merbaboe, which would be a more likely type-locality. Admittedly *Turdus poliocephalus javanicus* is not, at present, known to occur on that mountain, but that is only because nobody since Horsfield appears to have studied it ornithologically. As specimens from Soembing-Sindoro, not far away, definitely belong to this subspecies (I have examined a large series), it is likely that it also occurs on the G. Merbaboe.

Figure. Kuroda (1933), plate VI fig. 15 (a good coloured figure, on half natural size, by S. Kobayashi; under the name *Oreosterops javanica elongata*).

Type. BM no. 60.4.16.173 (specimen examined). The type has no original label, and the oldest one present only gives "Java", without other information; it shows the subspecific character of a broad white supercilium conspicuously.

Moult. In material examined, moult of the main feathers was found as shown in table IX.

TABLE IX
Moult in *Lophozosterops javanica javanica*

month	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
no moult	2	4	7	6	5	9	8	1	3	—	3	5
moult	—	—	1	—	1	2 [1]	1 [1]	—	—	—	6	1

The figures of the table suggest that the main moult usually takes place during the last months of the year, and this is confirmed by the fact that the majority of specimens taken in the first quarter of the year is in fresh plumage.

Nidification. Nests and eggs collected by Schierband were described by Meyer (1884), but though he gives them the name *Zosterops javanica* there is no way to find out if the material actually belonged to the nominate race, or to *frontalis*. The same uncertainty as to subspecific identity pertains to Nehrkorn's (1914) record. As Hoogerwerf (1949) has not mentioned this subspecies, and as there are no eggs in the RMNH, I have concluded with some surprise that its nidification remains unrecorded.

Habits, etc. In behaviour and ecology this subspecies does not differ from the preceding one.

H. Docters van Leeuwen (1929) found in stomachs from Mt. Sindoro, besides insects, the berries of *Viburnum coriaceum, Myrica javanica*, and *Rubus fraxinifolius*. W. M. Docters van Leeuwen (1933, p. 135, 136) added *Vaccinium varingifolium, Polygonum chinense,* and *Rubus lineatus*.

Discussion. Mt. Pangerango is included in the range of this subspecies on the basis of a female collected on 7 November 1901 (Bartels no. 1001), an individual previously recorded by Bartels (1906). Phenotypically this specimen is indistinguishable from pure *javanica* and it may be a stray from a more eastern locality. A second Pangerango specimen (Bartels no. 1557) looks intermediate between *javanica* and *frontalis*.

1) Tail only.

Mt. Tangkoeban Prahoe is inhabited by the nominate race, but four specimens collected by F. C. van Heurn in June 1926 (RMNH) are intermediate: they have greyish or dusky lores, and lack a white supercilium. These birds are all males and it is possible that they are not hybrids between two subspecies, but have the normal immature plumage of *javanica*. Two birds from Tjinjiroewan (♂ and ♀) are also intermediate. It looks therefore as if a slight influence of *frontalis* extends as far east as Bandoeng.

In eastern Java, all specimens examined from the Tengger Mountains are typical *javanica*, and Idjen specimens are generally *elongata*, but one Idjen bird (♂ juv., 5 May 1938, leg. J. G. Kooiman, RMNH no. 23121) is indistinguishable from the nominate race, and a second bird of unknown sex, obtained by the same collector at Ngadiwono, 13 October 1938 (RMNH no. 23123), is so aberrant that it deserves some description. The bird shows the white face-mask of *javanica*, but the yellowish white is extended to cover chin and throat, sides of face, on to the nape and the posterior part of the crown; moreover on both sides, more or less symmetrically, the feathers of the alula are yellowish white. The specimen therefore has a tendency to albinism, but the interesting point is that though it belongs to a population that ought to be *elongata*, it shows characters of *javanica*. To which of the two subspecies this bird belongs genetically is of course impossible to say, but the occurrence of this mutant shows how, perhaps, the nominate race may have been derived from *frontalis-elongata*-like ancestors.

As I have mentioned previously (Mees, 1953), Kuroda (1933) and Hoogerwerf (1947) appear to have taken the statement that in East Java *L. j. elongata* occurs too literally, and have therefore applied the name *elongata* to eastern populations of the nominate race. On the basis of this misidentified material Hoogerwerf had obviously to arrive at the conclusion that *elongata* is much closer to *javanica* than to *frontalis*, and further, as his "*elongata*" series included ten specimens of *javanica* and four of *elongata*, that *elongata* is neither from *frontalis* nor from *javanica* satisfactorily separable. At the time of my earlier comment I had not examined specimens of *elongata* from East Java, but now I have done so, and found that it is confined there to the Idjen Plateau, though even there an influence of the nominate race is felt, as mentioned above.

3. **Lophozosterops javanica elongata** (Stresemann)

Oreosterops javanica elongata Stresemann, Nov. Zool. 20, 1913, p. 366 — Gunung Bratan (Bali), 4000 f.

Zosterops fallax; Hartert, Nov. Zool. 3, 1896, p. 546 (Gilgit, Bali, between 2000 and 3000 ft).

Oreosterops javanica elongata; Stresemann, Nov. Zool. 21, 1914, p. 138 (Bali); Stresemann, Verh. Orn. Ges. Bayern 13, 1917, p. 138 (Bali); von Plessen, Journ. f. Orn. 74, 1926, p. 552 (Kintamani, Bali); Dammerman & Siebers in Dammerman, Treubia 11, 1929, p. 63 (E. Java, Less. Sd. I.); Bartels Jr. & Stresemann, Treubia 11, 1929, p. 143 (O.-Java); Rensch, Mitt. Zool. Mus. Berlin 16, 1930, p. 541 (Bali); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 26 (Ile Bali. Habite aussi la partie orientale de Java); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 232 (Vulkane Ostjavas, sowie Bali); (pt.) Kuroda, Birds Isl. Java I, 1933, p. 130 (East Java and Bali); Kuroda, Birds Isl. Java II, 1936, p. 699, 704, 723 (E. Java, Bali); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (E. Java and Bali).

Oreozosterops javanica elongata; Hartert, Nov. Zool. 27, 1920, p. 437 (Gunong Bratan, Bali).

Oreozosterops frontalis elongata; Robinson & Kloss, Treubia 5, 1924, p. 298 (Ongop Ongop, Sodong Jerok, Tamansari).

Zosterops javanica elongata; Chasen, Bull. Raffl. Mus. 11, 1935, p. 267 (Java (east), Bali); (pt.) Hoogerwerf, Zool. Med. 28, 1947, p. 272-274 (Idjen-Hoogland); (pt.) Hoogerwerf, Treubia 19, 1948, p. 134 (Idjen Highland).

Apoia javanica elongata; Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (O.-Java); Delacour, Birds Malaysia, 1947, p. 320 (Java (east) and Bali); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (no locality); Wynne, Key-List Birds, 1956, p. 91 (no locality).

Lophozosterops javanica elongata; Mees, Zool. Med. 32, 1953, p. 59-60, fig. 1 b (Bali); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 323 (mountains of Bali and extreme eastern Java (Idjen Plateau)).

Subspecific characters. This form is very close to *frontalis*, from which it differs only in having a slightly larger bill, a character which is most pronounced on Bali.

Measurements. Bali: wing 9 ♂, 62-68 (64.72); 6 ♀, 60-65 (62.33); 15 specimens, 60-68 (63.77); tail 9 ♂, 41-49 (44.78); 6 ♀, 40½-46 (43.00); 15 specimens, 40½-49 (44.07); tarsus 15 specimens, 91-21 (20.13); entire culmen 14 specimens, 14½-16½ (15.52); exposed culmen 14 specimens, 11-12½ (11.79); culmen from anterior point of nostril 14 specimens, 8-10 (8.89).

East Java: wing 18 ♂, 61-67 (64.19); 11 ♀, 61-66 (63.82); 29 specimens, 61-67 (64.05); tail 18 ♂, 40-47 (43.50); 10 ♀, 40-45½ (43.45); 28 specimens, 40-47 (43.48); tarsus 28 specimens, 17¾, 19-21 (19.59); entire culmen 26 specimens, 14-15½ (14.64); exposed culmen 27 specimens, 10-12½ (11.49); culmen from anterior point of nostril 27 specimens, 7¾-9½ (8.54).

Distribution. Mountains of Bali and the extreme eastern part of Java, where this form occurs on Idjen and extends a slight influence to Tengger. Lower limit of distribution about 900 m (3000 ft). According to Hartert (1896) specimens have even been collected at between 2000 and 3000 ft, but the material examined by me was from 1000 to 1800 metres.

First collector. W. Doherty in March or April 1896, at Gilgit, Bali.

Figure. Mees (1953), fig. 1b (sketch of head, showing diagnostic features).

Type. AMNH no. 701406 (type examined).

Moult. Specimens collected in January (2), February (1), May (1), October (8), and November (4) do not show moult. Specimens collected in January (5), February (2), and November (2) are undergoing their main moult. This indicates that a least the months January and February, in which the majority of specimens show moult, are in the main moulting season.

Nidification. Not recorded.

Habits, etc. According to Stresemann (1913) this form is very common on Bali above 3000 ft. The song reminded him of *Carduelis carduelis,* and he further mentions the call-note, a finch-like pink, and a ringing note uttered in flight.

Discussion. While topotypical examples of this race have distinctly larger bills than *frontalis,* many birds from East Java have bills as small as *frontalis,* from which they are indistinguishable. As, however, their bills average a trifle longer it is, also from the geographic point of view, preferable to call them *elongata.*

Species 2. **Lophozosterops squamiceps** (Hartert)

Characters. Very similar to the preceding species in both size and coloration, and differs only in the striped or scalloped appearance of the crown-feathers, the even further reduction of the eye-ring, and the absence of white on the forehead and over the lores.

Upper parts. Crown, sides of head, and nape greyish to sepia; the feathers with white shaft streaks and often with paler edges, the actual pattern differing from race to race; remainder of upper parts Warbler Green; lores dusky to dark grey; a pale frontal area absent or at most indicated; the eye-ring is complete, but its white feathers are so small that in the field it would be no longer visible as such; primaries, secondaries, and rectrices blackish brown, all with Warbler Green outer margins.

Under parts. Throat and upper breast whitish; the feathers of this area are distally whitish, basally to a varying degree dark grey, and in some subspecies this gives the throat and breast a mottled grey appearance; sometimes (the nominate race) the feathers of the throat have very narrow sepia outer edges. On the lower breast the greyish white smoothly changes into Pinard Yellow or Citron Yellow which covers the whole remainder of the under surface, though the flanks are distinctly greener and show an approach to the colour of the mantle.

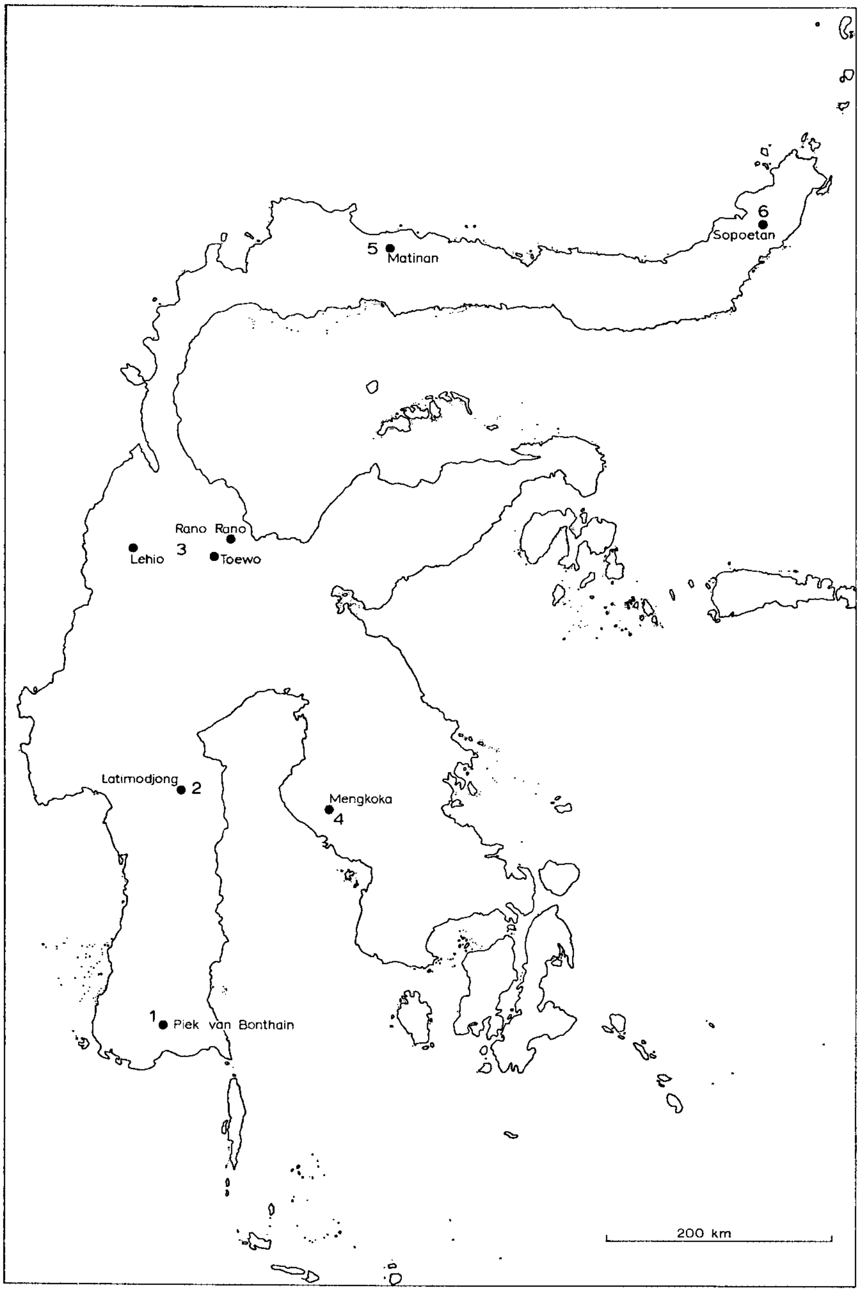


Fig. 13. The distribution of *Lophozosterops squamiceps* and races; 1, *squamiceps*; 2, *stachyrina*; 3, *striaticeps*; 4, *analoga*; 5, *heinrichi*; 6, *stresemanni*.

Juvenile birds have the crown tinged greenish, though with essentially the same pattern as the adults, and the yellow of the under surface is perhaps slightly paler.

Unfeathered parts. Iris brown, dark brown or red-brown, bill black, legs grey, green or horn colour.

Measurements and tail:wing index are given in table X. The 2nd primary is short, 8>2>9 or 9>2>10 being the usual formula.

TABLE X

Lophozosterops squamiceps

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
squamiceps	9	60½-64	40-46	62.44	43.22	69.29%
stachyrina	9	63½-67	40-47	65.28	45.11	69.11%
striaticeps	9	63-67	41-46	64.39	43.44	67.47%
analoga	21	59-65	39-44	61.64	41.77	67.68%
heinrichi	35	60-66	38-45	63.06	42.22	66.92%
stresemanni	1	62	43	—	—	69.4 %

Distribution (fig. 13). Mountains of Celebes, with a lower limit of about 1000 m.

Geographical variation. Pronounced; every mountain or group of mountains hitherto explored has yielded its own subspecies, and there is little doubt that several more subspecies remain to be discovered. The differences between the subspecies exist mostly in the colour of the crown-feathers, whose complicated colour-pattern is strongly subjected to geographical variation.

Related species. As has been stressed in the introduction to the genus *Lophozosterops*, the closest affinities exist between *L. squamiceps*, *L. javanica* and *L. goodfellowi*.

1. **Lophozosterops squamiceps squamiceps** (Hartert)

Chlorocharis squamiceps Hartert, Nov. Zool. 3, 1896, p. 70 — Bonthain Peak, Celebes.

Chlorocharis squamiceps; Hartert, Nov. Zool. 3, 1896, p. 149, 153 (Bonthain Peak, 6000 to 7000 ft).

Zosterops squamiceps; Hartert, Nov. Zool. 4, 1897, p. 157 (Bonthain Peak 5000 to 6000 ft); Meyer & Wiglesworth, Birds Celebes II, 1898, p. 484, 485 (Mount Bonthain); P. & F. Sarasin, Reisen in Celebes II, 1905, p. 248 (Bowonglangi).

Pseudozosterops squamiceps; Finsch, Tierreich 15, 1901, p. 47 (Bonthain Pik); Dubois, Syn. Av. I, 1902, p. 713 (Célèbes S.); Sharpe, Hand-List Birds V, 1909, p. 20 (Mt. Bonthain); Hartert, Nov. Zool. 27, 1920, p. 437 (Bonthain Peak, 6000 ft); Riley, Proc. U.S. Nat. Mus. 64 (16), 1924, p. 90 (no locality); Mathews, Syst. Av. Australas. II, 1930, p. 714 (Celebes (South)).

Lophozosterops squamiceps; Riley, Proc. Biol. Soc. Washington 31, 1918, p. 159 (no locality).

Pseudozosterops squamiceps squamiceps; Stresemann, Orn. Monatsber. 39, 1931 (4 May), p. 82 (Lompo-Batang); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 233 (Bonthain-Pik); Stresemann, Orn. Monatsber. 40, 1932, p. 107 (Lompo-Batang); Stresemann, Ibis (13) 6, 1936, p. 360 (S. Celebes); Stresemann, Journ. f. Orn. 88, 1940 (Jan.), p. 66 (Lombasang 1100 m, Wawe Karaeng 2500 m); van Marle, Limosa 13, 1940 (Aug.), p. 69 (Zuid-Celebes); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (South Celebes).

Lophozosterops squamiceps squamiceps; Mees, Zool. Med. 32, 1953, p. 61 (Bonthain Peak); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (mountains of southern Celebes (Lombasang)).

Subspecific characters. Crown feathers with white shaft-streaks and white edges to the tips, remainder dark sepia, very dark outwards, lighter towards the centres of the feathers, basal parts grey.

Unfeathered parts. Iris brown, bill black, legs green, greenish grey or dark grey (Heinrich); iris dark chestnut or dark brown, bill black, legs bluish grey, soles yellow (Hartert, 1897, ex Everett).

Measurements of nine specimens (5 ♂, 4 ♀): wing 60½-64 (62.44), tail 40-46 (43.22), tarsus 18½-21 (19.94), entire culmen 15-16¾ (15.61), exposed culmen 11-13 (12.06), culmen from anterior point of nostril 9-9¾ (9.33).

Distribution. Confined to the Bonthain Peak or Lompo Batang, south Celebes, with a recorded vertical range of from 1100 to 2100 m.

First collector. A. Everett in October 1895.

Figure. Meyer & Wiglesworth (1898), plate XXIX upper figure (coloured on natural size by Geisler: colour of mantle of an unnatural green); Mees (1953), plate IV fig. 1 (photograph of crown-feathers, showing diagnostic features).

Type. This subspecies was based on "a large series", of which the greater part would now be in the AMNH. I have examined three cotypes: BM nos. 96.6.10.33 and 96.6.10.42, and AMNH no. 701459.

Moult. Three specimens collected in October do not show moult.

Nidification. Not recorded.

Habits, etc. Not recorded, except that at levels of from 1500 to 1800 m these birds are common.

2. **Lophozosterops squamiceps stachyrina** (Stresemann)

Pseudozosterops squamiceps stachyrina Stresemann, Orn. Monatsber. 40, 1932 (9 July), p. 107 — Latimodjong-Gebirge, 2200 m.

Pseudozosterops squamiceps stachyzina; Snouckaert, Alauda (2) 4, 1933 (30 Jan.), p. 459 (Monts Latimodjong (Sud de Célèbes central)).

Pseudozosterops squamiceps stachyrina; Stresemann, Ibis (13) 6, 1936, p. 360 (Cs. Celebes); Stresemann, Journ. f. Orn. 88, 1940 (Jan.), p. 67 (Latimodjong-Gebirge 1600 bis 2200 m); van Marle, Limosa 13, 1940 (Aug.), p. 69, 70 (Zuidelijk Centraal-Celebes); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Central Celebes).

Lophozosterops squamiceps stachyrina; Mees, Zool. Med. 32, 1953, p. 61 (Latimodjong Mts.); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (mountains of south-central Celebes).

Subspecific characters. Crown feathers with broad white shafts, but without differently coloured edges. Therefore the crown looks very dark, as the feathers are all sepia to the tips (an occasional feather shows traces of a greyish margin).

Unfeathered parts. Iris brown (once dark red), bill black, legs grey or greenish grey (Heinrich).

Measurements of nine specimens (6 ♂, 3 ♀): wing 63½-67 (65.28), tail 40-47 (45.11), tarsus (8 specimens only) 17½-19 (18.59), entire culmen 14-17 (16.00); exposed culmen 11-14 (12.78), culmen from anterior point of nostril (8-9¾ (9.11).

Distribution. Only known from the Latimodjong mountains, south-central Celebes, at elevations of from 1600 to 2200 m.

First collector. G. Heinrich, on 29 June, 1930.

Figure. Mees (1953), plate IV fig. 2 (photograph of head, showing diagnostic features).

Type. AMNH no. 461240, Heinrich coll. no. 583 (specimen examined).

Moult. Specimens collected in June (3) and July (3) do not show moult.

Nidification. Not recorded.

Habits, etc. Heinrich (in Stresemann, 1940) found this subspecies in flocks, associating with *Zosterops montana* and many other small birds.

3. **Lophozosterops squamiceps striaticeps** Riley

Lophozosterops striaticeps Riley, Proc. Zool. Soc. Washington 31, 1918, p. 157 — Goenoeng Lehio, Celebes.

Pseudozosterops striaticeps; Riley, Proc. U. S. Nat. Mus. 64 (16), 1924, p. 89 (Goenoeng Lehio; Toewo Mountains, Besoa; Rano Rano); Mathews, Syst. Av. Australas. II, 1930, p. 714 (Celebes (North)); Snouckaert, Alauda (2) 3, 1931, p. 26 (Célèbes); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (North Celebes).

Pseudozosterops squamiceps striaticeps; Stresemann, Orn. Monatsber. 39, 1931 (4 May), p. 82 (Central-Celebes); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 233 (Nördliches Central-Celebes); Mathews, Ibis (13) 2, 1932 (1 Jan.), p. 155 (no locality); Stresemann, Orn. Monatsber. 40, 1932 (9 July), p. 107 (Rano-Rano); Stresemann, Ibis (13) 6, 1936, p. 360 (Cn Celebes); Stresemann, Journ. f. Orn. 88, 1940, p. 67 (G. Lehio); van Marle, Limosa 13, 1940 (Aug.), p. 69 (Noordelijk Centraal-Celebes); Deignan, U. S. Nat. Mus. Bull. 221. 1961, p. 510 (Gunong Lehio (lat. 1°33'S., long. 119°53'E.)).

Lophozosterops squamiceps striaticeps; Mees, Zool. Med. 32, 1953, p. 61, pl. IV fig. 3 (Central Celebes); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (mountains of north-central Celebes).

Subspecific characters. Crown feathers with white shaft-streaks which are narrow but much more disinct than in *squamiceps,* sharply limited; sepia as in the preceding races, with narrow greyish edges.

Unfeathered parts. Not recorded.

Measurements of nine specimens (5 ♂, 4 ♀): wing 63-67 (64.39); tail 41-46 (43.44); tarsus 18½-20 (19.28); entire culmen 13½-15½ (14.67); exposed culmen 11½-12 (11.83); culmen from anterior part of nostril 8-9½ (8.78).

Distribution. Mountains of northern Central-Celebes, where known from Goenoeng Lehio, Toewo Mountain (Besoa), and Rano Rano.

First collector. H. C. Raven at the type locality on 13 January, 1917.

Figure. Mees (1953), plate IV fig. 3 (photograph of crown feathers, showing diagnostic features).

Type. USNM no. 251151.

Moult. Not checked.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Riley (1918) mentioned that the type, the only specimen known from Goenoeng Lehio, is more yellowish above and brighter below than series from Besoa and Rano Rano.

4. **Lophozosterops squamiceps analoga** (Stresemann)

Pseudozosterops squamiceps analoga Stresemann, Orn. Monatsber. 40, 1932 (9 July), p. 107 — Südost-Celebes: Tanke Salokko im Mengkoka-Gebirge, 1500-2000 m.

Pseudozosterops squamiceps analoga; Snouckaert, Alauda (2) 4, 1933 (30 Jan.), p. 459 (Monts Mangkoka); Stresemann, Ibis (13) 6, 1936, p. 360 (S. E. Celebes); Stresemann, Journ. f. Orn. 88, 1940 (Jan.), p. 67 (Tanke Salokko 1500-2000 m); van Marle, Limosa 13. 1940 (Aug.), p. 69 (Zuidoost-Celebes); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (South & East Celebes).

Lophozosterops squamiceps analoga; Mees, Zool. Med. 32, 1953, p. 62, 68, pl. IV fig. 4 (Mengkoka Mts.); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (mountains of southeastern Celebes).

Subspecific characters. Very similar to the nominate race, and crown-feathers identical, but differs by the practical absence of blackish edges to the white feathers of the throat: these feathers are white with grey bases, whereas in the nominate race they have dark edges, giving the throat a scaly appearance.

Unfeathered parts. Iris red-brown, bill black, legs green (Heinrich).

Measurements. Wing 9 ♂, 60-65 (62.39); 12 ♀, 59-63 (61.08); 21 specimens, 59-65 (61.64); tail 8 ♂, 39-44 (41.88); 12 ♀, 40-44 (41.71); 20 specimens, 39-44 (41.77); tarsus 21 specimens, 18¼-20 (19.08); entire culmen 20 specimens, 13½-16¼ (14.98); exposed culmen 20 specimens, 10½-13 (12.01); culmen from anterior point of nostril 20 specimens, 8-9¼ (8.85).

Distribution. Confined to the Mengkoka mountains, on the south-eastern peninsula of Celebes, at 1500 to 2000 m.

First collector. G. Heinrich on 13 December, 1931.

Figure. Mees (1953), plate IV fig. 4 (photograph of crown feathers, showing diagnostic features).

Type. AMNH no. 300339, Heinrich coll. no. 6399 (specimen examined).

Moult. Three specimens collected in December and nine collected in January do not show moult. Of two specimens collected in December one moults primaries and rectrices, the other rectrices only; one specimen collected in January shows wing-moult.

Nidification. Not recorded.

Habits, etc. Not recorded.

5. **Lophozosterops squamiceps heinrichi** (Stresemann)

Pseudozosterops squamiceps heinrichi Stresemann, Orn. Monatsber. 39, 1931 (4 May), p. 78, 82 — Matinang-Gebirge bei 1700 m.

Pseudozosterops squamiceps heinrichi; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 233 (Matinang-Gebirge); Mathews, Ibis (13) 2, 1932 (1 Jan.), p. 155 (Matinang Mts.); Snouckaert, Alauda (2) 4, 1932 (28 May), p. 110 (Monts Matinang); Stresemann, Orn. Monatsber. 40, 1932 (9 July), p. 108 (Matinang-Gebirge); Stresemann, Ibis (13) 6, 1936, p. 360 (Nw Celebes); Stresemann, Journ. f. Orn. 88, 1940 (Jan.) p. 67 (Ile Ile 1700 m); van Marle, Limosa 13, 1940 (Aug.), p. 69 (Noord-Celebes); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (North Celebes).

Lophozosterops squamiceps heinrichi; Mees, Zool. Med. 32, 1953, p. 62, 68, pl. IV fig. 5 (Matinan Mts.); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 219 (Matinan Mountains).

Pseudozosterops squamiceps subsp.; Kuroda Jr., Misc. Rep. Yamashina's Inst. 10, 1957, p. 394 (N. Celebes).

Subspecific characers. This race has the smoothest crown, hence comes nearest to *L. javanica* in general appearance. The feathers of the crown are greyish-sepia with broad grey edges; the shaft-streaks are inconspicuous, yellowish-white.

Unfeathered parts. Iris brown, bill black, legs green (Heinrich).

Measurements. Wing 22 ♂, 60-66 (63.50); 12 ♀, 61-64 (62.33), 35 specimens, 60-66 (63.06); tail 22 ♂, 40-45 (42.59); 12 ♀, 38-44 (41.54); 34 specimens, 38-45 (42.22); tarsus 23 specimens, 18½-20½ (19.61); entire culmen 33 specimens, 13¼, 14-16 (14.96); exposed culmen 33 specimens, 11-12¼ (11.70); culmen from anterior point of nostril 33 specimens, 7¾-9 (8.54).

Distribution. Only known from the locality Ile-Ile, 1700 m, on the slope of Mount Matinan (rather than Matinang), northern peninsula of Celebes.

First collector. Gerd Heinrich at the type locality on 4 November, 1930. Heinrich is also to date the only collector of this subspecies.

Figure. Mees (1953), plate IV fig. 5 (photograph of crown feathers, showing diagnostic features).

Type. AMNH no. 293138, Heinrich coll. no. 2566 (specimen examined).

Moult. All specimens examined were collected in November; of these, sixteen are not in moult, ten are in various stages of primary moult. It looks therefore as if November is a month in which the main moult takes place.

Nidification.Not recorded.

Habits, etc. Heinrich (in Stresemann, 1940) found this subspecies in travelling flocks with *Phylloscopus* and flycatchers.

Discussion. Kuroda Jr. (1957) mentions a single specimen of *Lophozosterops squamiceps* subsp. without exact locality. I have not examined this skin, but as its date of collecting is 16 November 1930, hence within the period Heinrich spent on Mt. Matinan, it is likely that it came from the Heinrich collection, and belongs to the present subspecies.

The almost smooth grey crown brings this subspecies very close to *L. javanica.*

6. **Lophozosterops squamiceps stresemanni** (van Marle)

Pseudozosterops squamiceps stresemanni van Marle, Limosa 13, 1940, p. 69 — vulkaan Sopoetan, westelijke Minahasa.

Lophozosterops squamiceps stresemanni; Mees, Zool. Med. 32, 1953, p. 62, 68, pl. IV fig. 6 (Sopoetan, Minahassa); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 323 (Soputan).

Subspecific characters. Crown-feathers medially white, which colour is very conspicuous because not only the shafts but also the inner parts of the feathers are white; outwards the feathers are sepia, as in other races, broadly bordered with grey.

Unfeathered parts. Iris dark brown, bill black, legs light horn colour (Coomans de Ruiter).

Measurements of one male: wing 62, tail 43, tarsus 19½, entire culmen 15½, exposed culmen 11½, culmen from anterior point of nostril 8.

Distribution. Known from the type locality only, the mountain forests of Mt. Sopoetan, near Toemaratas, Minahasa, at altitudes of 1000 to 1350 metres. Van Marle (1940) states: "Ondanks grondig onderzoek mocht het niet gelukken deze vogels op andere gebergten in de Minahasa te verzamelen". As no previous collector in the comparatively well-worked Minahasa has met with the species, it is likely that its occurrence is somewhat restricted.

First collector. L. Coomans de Ruiter in September 1939.

Figure. Mees (1953), plate IV fig. 6 (photograph of crown feathers, showing diagnostic features).

Type. Collection van Marle-Coomans de Ruiter no. 980, now Collection van Marle no. 141 (type examined).

Moult. Not checked.

Nidification. Unknown.

Habits, etc. Nothing has been recorded. The subspecies is only known from the three specimens taken by Coomans de Ruiter, who, on the label of the type specimen, noted as stomach contents seeds. As local name he mentions: tjoei. If this is a specific local name, and not one used to design any small bird, its existence might point to the species being fairly common in the general area of the type locality.

Species 3. **Lophozosterops goodfellowi** (Hartert)

Characters. Extremely close to the black-lored races of *L. javanica,* but differs by the even more reduced eye-ring, absence of white on the forehead, and not so clear grey crown. Forehead and crown are grey to brownish grey, with a more or less distinct greenish tinge, in two subspecies, and greenish, concolorous with the back, in the third race. The yellow of the belly is perhaps slightly brighter. The iris is reddish brown rather than dark brown.

Upper parts. Either forehead and supra loral region Drab, crown, sides of head and nape greenish grey, or crown Warbler Green like the back, and only ear-coverts greyish; remainder of upper parts Warbler Green; lores, continued to below the eye black; eye-ring reduced to vanishing point; primaries, secondaries and rectrices blackish, all with Warbler Green outer margins, and the remiges with whitish inner margins.

Under parts. Chin and throat dirty white, gradually changing in greenish grey on the breast and this into the Pale Lemon Yellow of the flanks and the Yellowish Citrine of the flanks. The throat appears slightly whiter than in *L. javanica,* but as in that species and in *L. squamiceps,* the featherbases are dark grey.

Structure. Wing moderately rounded, the 2nd primary in length between the 7th and the 8th; average tail:wing index in the nominate race (7 specimens) 69.6 %, in *malindangensis* (15 specimens) 69.6 %, in *gracilis* (5 specimens) 67.3%.

Distribution. Mountains of Mindanao.

Discussion. This species is so similar to *L. javanica* and *L. squamiceps* that a close relationship is evident. It is only for the reasons stated in the introduction to the genus *Lophozosterops* that I keep it specifically separated.

In a former contribution (Mees, 1953), I tentatively retained the monotypic genus *Apoia* for this species, but with grave doubts, and only because nothing but a single damaged specimen was at the time available and no wing-formula and tail-index could be taken. After receiving additional material I restored the mistake (1957).

1. **Lophozosterops goodfellowi goodfellowi** (Hartert)

Zosterops goodfellowi Hartert, Bull. B. O. C. 14, 1903, p. 13 — Apo Volcano, Mindanao, 8000 feet.

Zosterops goodfellowi; Ogilvie-Grant, Bull. B. O. C. 16, 1905, p. 19 (South-east Mindanao); McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 96 (Mindanao); Ogilvie-Grant, Ibis (8) 6, 1906, p. 473 (Mt. Apo, 8000 ft); Sharpe, Hand-List Birds V, 1909, p. 15 (Mts. of Mindanao); McGregor, Manual Phil. Birds, (1909), 1910, p. 620 (Mount Apo); McGregor, Phil. Journ. Sc. 16, 1920, p. 428 (Mindanao); Riley, Proc. U. S. Nat. Mus. 64 (16), 1924, p. 90 (Mindanao); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 207 (Mindanao); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 18 (Mont Apo); Hachisuka, Birds Phil. Isl. I, 1931 (16 March), p. 41 (Apo); Hachisuka, Ois. Rev. Fr. d'Orn. N. S. 1, 1931, p. 589 (mont Apo).

Zosterops goodfellowi goodfellowi; Mearns, Proc. U. S. Nat. Mus. 36, 1909, p. 443 (Mount Apo).

Oreosterops goodfellowi goodfellowi; Stresemann, Nov. Zool. 21, 1914, p. 138 (Mt. Apo); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 232 (Mt. Apo); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Mt. Apo).

Oreozosterops goodfellowi; Hartert, Nov. Zool. 27, 1920, p. 437 (Mt. Apo, 8000 ft).

Apoia goodfellowi goodfellowi; Hachisuka, Contrib. Orn. Phil. 2, 1930 (Jan.), p. 206 (Mt. Apo); Delacour & Mayr, Birds Phil., 1946, p. 237 (Mt. Apo); Mees, Zool. Med. 32, 1953, p. 64 (Mt. Apo); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (no locality); Wynne, Key List Birds, 1956, p. 91 (Mindanao); Ripley & Rabor, Postilla 50, 1961, p. 12 (Mount Katanglad 4200 to 7400 ft).

Oreosterops goodfellowi; Hachisuka, Tori 11, 1942, p. 283 (Mt. Apo).

Lophozosterops goodfellowi goodfellowi; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (Mt. Apo).

Subspecific characters. This subspecies has the crown greenish like the back; ear coverts greyish; for other characters I refer to the description of the species.

Unfeathered parts. Iris dark red or crimson, bill black, legs greyish olive (Goodfellow); iris reddish brown, bill plumbeous-black, legs pale olive (Mearns).

Measurements of seven specimens from Mt. Apo (4 ♂, 3 ♀): wing 70-74 (72.00), tail 45½, 49-52 (49.93), tarsus 20¼-23 (21.18), entire culmen (five specimens only) 15-17 (16.15), exposed culmen (five specimens only) 11½-12½ (12.10), culmen from anterior point of nostril (five specimens only) 8-9 (8.80).

Mt. Katanglad, five specimens (3 ♂, 2 ♀): wing 68½-74 (70.90), tail 48-51 (49.70), tarsus 19½-21 (20.30), entire culmen 15¼-16½ (15.75), exposed culmen 11¾-13 (12.35), culmen from anterior point of nostril 7½-8¾ (8.25).

Distribution. Mts. Apo and Katanglad, central Mindanao, with a recorded vertical range of from 1250 to 2400 m.

First collector. W. Goodfellow on Mt. Apo in April 1903.

Not figured.

Type AMNH no. 701415.

Moult. Specimens collected in February (3), June (3) and December (4) do not show moult. One bird collected in November is in full moult of primaries and rectrices.

Nidification. Not recorded.

Habits, etc. No field-observations of any kind appear to have been published, though several reputable ornithologists, in past and more recent years, have seen and collected specimens.

Discussion. A juvenile which I examined in the Copenhagen Museum, differed from adults by its much paler yellow under parts and duller upper surface.

Though I have examined and measured specimens from Mt. Apo and Mt. Katanglad, I have been unable to make a direct comparison between individuals of these two mountains. Ripley & Rabor (1961), however, considered them identical. Dr. Salomonsen (in litt., 23-1-1967) has informed me as follows: "The birds from Katanglad differ from those from Mt. Apo by having fore-head and crown more green, more like upper parts, and earcoverts of the same colour, and the supercilium much reduced. The throat is greyish white without the buffish wash of the Mt. Apo birds. These latter birds have fore-head and supercilium drab-brown. I found however the differences too small and variable to describe a new subspecies on them".

2. **Lophozosterops goodfellowi malindangensis** (Mearns)

Zosterops goodfellowi malindangensis Mearns, Proc. U. S. Nat. Mus. 36, 1909, p. 443 — Summit of mount Lebo (Malindang group), altitude 5750 feet, Misamis Province, northwestern Mindanao.

Zosterops malindangensis; Sharpe, Hand-List Birds V, 1909 (after 24 Aug.), p. 632 (Malindang Mts.); McGregor, Manual Phil. Birds, 1910, p. 621 (Mindanao); McGregor, Phil. Journ. Sc. 16, 1920, p. 411, 428 (Mt. Malindang 1800 m); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 207 (Mindanao); Snouckaert, Alauda (2) 3, 1931, p. 18 (Mindanao).

Oreosterops goodfellowi malindangensis; Stresemann, Nov. Zool. 21, 1914, p. 138 (Malindang-Gebirge, N. W. Mindanao); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 232 (Malindang-Gebirge); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Mt. Malindang).

Apoia goodfellowi malindangensis; Hachisuka, Contrib. Birds Phil. 2, 1930, p. 206 (Mount Malindang); Delacour & Mayr, Birds Phil., 1946, p. 237 (Mt. Malindang); Mees, Zool. Med. 32, 1953, p. 64 (Mt. Malindang); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (no locality); Wynne, Key-List Birds, 1956, p. 91 (Mindanao); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 262, 280, 305 (Mt. Malindang, 3400-7450 ft); Deignan, U. S. Nat. Mus. Bull. 221, 1961, p. 511 (summit of Mount Lebo (elev. 5750 ft), Mount Malindang).

Zosterops goodfellowi malindangensis; E. E. Hume, Ornithologists of the U. S. Army Medical Corps, 1942, p. 320 (no locality).

Apoia goodfellowi; Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 279, 282 (Mt. Malindang).

Lophozosterops goodfellowi malindangensis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (Mt. Malindang).

Subspecific characters. Close to the nominate race, but differs by having the crown greenish grey, not concolorous with the back; the ear coverts darker; on the forehead and above the lores he grey does have a slightly brownish (Drab) tinge. Size smaller.

Juvenile birds have the crown strongly tinged with green.

Unfeathered parts. Iris reddish brown, bill black, legs pale olive, soles yellowish (Mearns, 1909).

Measurements. Wing 7 ♂, 66-72 (68.57); 8 ♀, 65½-70 (67.56); 15 specimens, 65½-72 (68.03); tail 7 ♂, 45-50 (48.14); 8 ♀, 45-50 (46.63); 15 specimens, 45-50 (47.33); tarsus 15 specimens, 19¾-21 (20.53); entire culmen 15 specimens, 14¾-16½ (15.40); exposed culmen 15 specimens, 11¼-13½ (12.38); culmen from anterior point of nostril 15 specimens, 8-9 (8.70).

Weights. ♂ 19, 19.5, 20 g; ♀ 18.2, 20.3, 22.2, 22.2 g.

Distribution. The Malindang Mountains, western Mindanao.

First collector. E. A. Mearns on the summit of Mt. Lebo, 5750 ft, Malindang mountains, 21 May 1906.

Not figured.

Type. USNM no. 202401.

Moult. Of ten specimens collected in April, two are undergoing their main moult; the others show no moult.

Nidification. Not recorded.

Habits, etc. Not recorded.

3. **Lophozosterops goodfellowi gracilis** subspecies nova

Subspecific characters. Similar to the preceding race, but the crown is tinged brownish (Drab) rather than grey; there is a more distinct light supercilium; the upper parts tend to a darker green; the measurements, with the exception of those of the bill, average smaller.

Measurements of five specimens (4 ♂, 1 ♀): wing 65-67 (66.40), tail 43-46 (44.90), tarsus 19¾-21 (20.15), entire culmen 14¼-16¼ (15.30), exposed culmen 11¾-13 (12.55), culmen from anterior point of nostril 8-9 (8.75).

Distribution. Only known from Mt. Hilong-Hilong in the Diuata Mountains, north-eastern Mindanao.

First collector. Dr. F. Salomonsen on 30-I-1952.

Not figured.

Type. ♂, 30-I-1952, Mt. Hilong-Hilong, 1350 m. Danish Philippine Expedition no. 1388, Universitetets Zoologiske Museum, Copenhagen.

Moult. Of the five specimens examined, collected on 30 January and 3 February, four are in fresh plumage, no moult, the fifth is in the last stage of wing-moult, the 2nd primaries on each side being not fully grown.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Five specimens of this subspecies, collected in 1952, were compared with ten specimens of *malindangensis*, collected in 1956. The differences are comparatively slight, but on the basis of the character of crown-colour, all specimens could be subspecifically assigned without difficulty. Since Dr. Salomonsen had, some years ago, compared specimens of *malindangensis* with material of the new race, and regarded the differences as too slight for subspecific separation, I forwarded some of my specimens of *malindangensis* to him for comparison with his Hilong-Hilong series, and he now agrees (in litt., 12-IV-1967) that the morphological differences between the Diuata and Malindang birds are certainly great enough for subspecific separation.

As an explanation for the fact that *malindangensis* and *gracilis* are more similar to each other than either is to the nominate race, I suggest that theirs is the more ancient plumage, and that the green head and larger size of the intervening nominate race was secondarily acquired. The fact that juveniles of both subspecies, as well as of the related *L. javanica* tend to have greenish heads, indicates that by retardation this plumage stage might have become esablished in the adult birds. The opinion that the greyish head is the more ancient plumage in *L. goodfellowi* finds support in the fact that it is also found in *L. javanica* and, with modifications, in *L. squamiceps*.

Species 4. **Lophozosterops superciliaris** (Hartert)

Characters. Resembles the preceding three species, but mantle and under parts duller, and with distinctive colours and markings on the head, the most conspicuous one of which is a broad yellow superciliary stripe.

Upper parts, including crown, dull Olive-Green; forehead and anterior part of the crown tinged with fuscous; lores and a broad superciliary stripe, continued to far behind the eye, pale to dark yellow; the superciliary stripe is accentuated by an ill defined blackish stripe which separates it from the fuscous-olive-green of the crown; sides of head, more in particular the area below the eye and the auriculars, Light Greyish Olive; eye-ring narrow but complete and not interrupted in front, white; remiges and rectrices blackish brown, all broadly edged with dull Olive-Green.

Under parts. The whole under parts, including chin and throat, are yellowish green, more or less Lime Green; of this area throat and centre of under parts are yellowest, the flanks greenest, but the differences are slight and the appearance of the under parts is dull.

Unfeathered parts. Iris red or brown-red, bill black, legs grey.

Structure. In size and proportions this species is a typical member of its genus. Wing rounded, with the 2nd primary in length between the 7th and the 9th; average tail:wing index in the nominate race (16 specimens) 70.47 %.

Distribution. Mountains of Soembawa and Flores, with a recorded vertical range of from 800 to 1500 m.

Geographical variation. Slight; the nominate race from Flores has a pale yellow superciliary stripe, the race *hartertiana* from Soembawa has this stripe darker yellow.

Discussion. This is a better differentiated species than the preceding trio, but still obviously close. Its duller coloration may be indicative of an approach to *L. dohertyi*. It is interesting to see here, fully developed, the superciliary streak also present in *L. j. javanica*.

1. **Lophozosterops superciliaris superciliaris** (Hartert)

Zosterops superciliaris Hartert, Nov. Zool. 4, 1897 (April), p. 172 — South Flores.

Zosterops superciliaris; Hartert, Bull. B. O. C. 6, 1897 (30 April), p. xl (Flores); Hartert, Ibis (7) 3, 1897 (July), p. 443 (Flores); Hartert, Nov. Zool. 4, 1897 (Dec.), p. 520, pl. III fig. 1 (hills of South Flores, 3000 to 3500 ft); Hartert, Ibis (7) 3, 1897 (July), p. 443 (Flores); Finsch, Tierreich 15, 1901, p. 33 (Flores); Dubois, Syn. Av. I, 1902, p. 710 (Flores); Sharpe, Hand-List Birds V, 1909, p. 13 (Flores); Rensch, Sitzungsber. Ges. Naturf. Freunde Berlin, (1928), 1929, p. 5 (Kleine Sunda Inseln).

Oreosterops superciliaris; Stresemann, Nov. Zool. 21, 1914, p. 138 (Flores).

Oreozosterops superciliaris; Hartert, Nov. Zool. 27, 1920, p. 437 (South Flores above 3000 ft).

Oreosterops superciliaris superciliaris; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 232 (Flores); Rensch, Mitt. Zool. Mus. Berlin 17, 1931 (Sept.), p. 623 (Flores: Rana Mesé, Kempoh, Geli Moetoe); Kuroda, Birds Isl. Java II, 1936, p. 734 (Flores); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Flores).

Oreosterops superciliosa; Mayr, Bull. Am. Mus. Nat. Hist. 83, 1944, p. 174 (Lesser Sunda Islands).

Lophozosterops superciliaris superciliaris; Mees, Zool. Med. 32, 1953, p. 60 (Flores); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 323 (mountains of Flores).

Subspecific characers. See description of the species. Supercilium pale yellow.

Unfeathered parts. Iris dark red or brown-red, bill black, legs yellowish grey or lead colour (Rensch).

Measurements. Wing 10 ♂, 67-71 (68.45); 6 ♀, 64½-69 (66.25); tail 10 ♂, 46-50 (48.60); 6 ♀, 46-50 (47.75); tarsus 16 specimens, 19½-23¾ (20.67); entire culmen 14 specimens, 14-17 (15.52); exposed culmen 14 specimens, 11½-13½ (12.39); culmen from anterior point of nostril 14 specimens, 8-10 (9.00).

Distribution. Mountains of Flores, with a known vertical range of from 1000 to 1500 m.

First collector. A. Everett's native collectors in October 1896, in South Flores, inland from Nanga Ramau.

Figure. Hartert (1897), plate IV fig. 1 (coloured, on natural size by Keulemans; off-colour, especially green much too bright).

Type. As no type was indicated in the original description, all specimens collected by A. Everett and his hunters in October-November 1896 are cotypes. I have examined six in the AMNH, three in London and one in Leiden. This includes the specimen listed as type by Hartert (1920), which is now AMNH no. 701420.

Moult. Two specimens collected in July moult rectrices, three collected in October moult primaries, one collected in October moults rectrices and upper wing-coverts, one collected in November moults upper wing coverts, no main moult. Birds collected in June (3), July (2), October (3) and November (2) show no moult.

Nidification. A fledgling was collected in November 1896 (specimen examined; this is the bird previously mentioned by Hartert, 1897). On 11 July 1927, Rensch (1931) found an apparently empty nest that he ascribed to this species. It was built in the fork of a branch in *Casuarina*-forest, and consisted mainly of narrow strips of bark and winged seeds of *Casuarina*.

Habits, etc. Rensch (1931) found this subspecies very common in the mountains, both in rain-forest and *Casuarina*-forest.

2. **Lophozosterops superciliaris hartertiana** (Rensch)

Zosterops superciliaris hartertiana Rensch, Orn. Monatsber. 36, 1928, p. 8 — Batoe Doelang (1000-1200 m), Sumbawa.

Zosterops superciliaris hartertiana; Mathews, Syst. Av. Australas. II, 1930, p. 702 (Sumbawa); Snouckaert, Alauda (2) 3, 1931, p. 20 (Sumbawa).

Oreosterops superciliaris hartertiana; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 232 (Sumbawa); Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 624 (Sumbawa: Batoe Doelang); Mathews, Ibis (13) 2, 1932, p. 154 (no locality); Kuroda, Birds Isl. Java II, 1936, p. 729 (Sumbawa); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Sumbawa).

Lophozosterops superciliaris hartertiana; Mees, Zool. Med. 32, 1953, p. 60 (Soembawa); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 323 (mountains of western Sumbawa).

Subspecific characters. Very similar to the nominate race, but differs by its deep yellow superciliary stripe, which above the lores is Lemon Chrome, changing to Lemon Yellow over the eye. There appear to be no other distinguishing characters, but the one mentioned is very conspicuous.

Unfeathered parts. Iris dark red, bill black, legs yellowish grey.

Measurements of one male: wing 69, tail 45, tarsus 20½, entire culmen 15¼, exposed culmen 12½, culmen from anterior point of nostril 9¼.

Distribution. Known from the type locality only, Batoe Doelang on Soembawa, at 1000-1200 m. It is not quite clear why in the diagnosis Rensch (1928) first lists his material as having been collected at 800 m, and subsequenly mentions the type as being from 1000-1200 m altitude. Later (1931) he recorded the subspecies as having been observed between 1000 and 1300 m.

First collector. B. Rensch on 9 May, 1927.

Not figured.

Type. Zool. Mus. Berlin no. 30.1027 (type examined).

Moult. The single specimen examined, collected in May, does not show moult.

Nidification. Not recorded.

Habits, etc. Not recorded, except that, according to Rensch (1931) this subspecies is much rarer than the nominate race is on Flores.

Species 5. **Lophozosterops pinaiae** (Stresemann)

Oreosterops pinaiae Stresemann, Bull. B. O. C. 31, 1912, p. 5 — Gunung Pinaia, Middle Ceram, 7500 ft.

Oreosterops pinaiae; Stresemann, Nov. Zool. 21, 1914, p. 138, pl. IV fig. 1 (G. Sofia 4000 ft, G. Pinaia 7000 and 7500 ft); Stresemann, Verh. Orn. Ges. Bayern 13, 1917, p. 138 (Seran); Stresemann, Sitzungsber. Ges. Naturf. Freunde Berlin, (1925), 1927, p. 10 (Seran); Mathews, Syst. Av. Australas. II, 1930, p. 715 (Ceram); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 26 (Mount Pinaia, Céram central); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 232 (Gunung Pinaja); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Ceram); van Bemmel, Treubia 19, 1948, p. 330 (M. Ceram).

Oreozosterops pinaiae; Hartert, Nov. Zool. 27, 1920, p. 437 (Gunong Pinaia, 7500 ft).

Apoia pinaiae; R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 335 (Ceram); van Bemmel & Voous, Beaufortia 32, 1953, p. 1 (no locality).

Lophozosterops pinaiae; Mees, Zool. Med. 32, 1953, p. 62 (Ceram); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 322 (mountains of Central Ceram).

Characters. The largest species of the genus (wing 71-77½ mm), characterized by the predominance of grey, which is not confined to the crown and sides of the head, but extends over the whole head, sides of breast and flanks, and by the corresponding reduction of the amount of yellow on the under parts.

Upper parts. Mantle, including sides of neck, Warbler Green. Forehead and supra loral region dirty white, lores pale grey, head, and sides of breast with the exception of the chin, which is somewhat paler, Deep Grayish Olive; this colour is purest on the sides of the head and breast, and has a slight brownish tinge on the crown and ear coverts. On the nape appears a slight admixture of Warbler Green, into which colour the grey of the crown smoothly intergrades farther backwards. Eye-ring wide, white, just interrupted in front by the pale grey loral streak; primaries, secondaries and rectrices blackish brown, with the exception of the 2nd primary, all broadly margined with Warbler Green.

Under parts. The grey of throat and sides of breast becomes paler on the flanks, where a buffish tinge appears. The centre of the abdomen is dirty whitish, a colour changing into buffish grey towards the flanks. The under tail coverts are Picric Yellow.

Unfeathered parts. Iris light reddish brown, bill black, base of mandible dark yellowish brown, legs brown-grey (Stresemann).

Measurements of 7 specimens (4 ♂, 3 ♀): wing 71-77½ (74.36), tail 45½-52 (48.21), tarsus (six specimens only) 22½-24 (23.08), entire culmen 16½-18½ (17.39), exposed culmen 13-14½ (13.61), culmen from anterior point of nostril 9½-11 (10.25).

Weights. ♂: 28, ♀: 28 g. According to Stresemann (1914): 25-30 g.

Structure. The 2nd primary is short, in length between the 9th and the 10th. Average tail:wing index of seven specimens 64.84%.

Distribution. Only known from the mountains of Central Ceram, where the species has been recorded from G. Sofia at 4000 ft, and G. Binaia (incorrectly called Pinaia in ornithological literature) at altitudes of 7000 to 7500 ft.

First collector. E. Stresemann on 13 June, 1911, on the G. Sofia.

Figure. Stresemann (1914), plate IV fig. 1 (coloured, on natural size, by Grönvold). A fairly good plate, but the forehead is shown much too buffish; I suspect that the forehead feathers normally are whitish and that buff is no more than a discoloration. Also the white on the under surface is not a patch as shown on the plate, but a longitudinal streak.

Type. AMNH no. 701424 (type examined).

Moult. Specimens collected in June (3) and August (1) do not show moult, the June-birds are in very abraded plumage. Another bird collected in June is moulting rectrices, no wing-moult, and two birds collected in August are in full moult of primaries as well as rectrices.

Nidification. Unknown

Habits, etc. Stresemann (1914) mentions the species as of fairly common occurrence on Mt. Binaia at 7000 ft, at the limits of the treefern-forest, where it lived in flocks. At lower levels (4000 ft) it was uncommon and lived solitary or in pairs in the dense crowns of trees or in the thick growths of epiphytes covering the trees. Stomachs contained remains of fleshy fruits, and seeds.

Species 6. **Lophozosterops dohertyi** Hartert

Characters. A species of for the genus normal size (wing 60-66 mm), with a fuscous crown with white striae, greenish grey upper parts, and yellow under surface.

Upper parts. Mantle greenish grey, between Deep Olive-Grey and Dark Olive-Grey, but slightly greener than either; feathers of forehead and crown Mummy Brown, with pale shaft streaks which, especially in the nominate race, widen out into elongated white drop-shapes covering the bases of the barbules; lores black; eye-ring narrow, mainly white, but its antero-dorsal feathers are blackish, and it is widely interrupted in front by the black loral streak; a short superciliary stripe running from the postero-dorsal edge of the eye-ring backwards, yellowish white; primaries, secondaries and rectrices blackish brown, all with greenish outer edges (which are decidedly greener, less greyish than the back).

Under parts. Chin and upper throat yellowish white, smoothly intergrading with the remainder of the under surface which is yellow, ranging from Citron Yellow to Pale Lemon Yellow; the yellow colour most intense on the centre of the belly, less so on sides of breast and flanks.

Unfeathered parts. Iris brown, bill black, legs yellowish grey.

Structure. The outstanding character of this species is its crest, which is much better developed in the nominate race than in *subcristata*. The 2nd primary is short, agreeing in size with the 9th or 10th. Tail:wing index of 14 specimens of the nominate race 68.74 %, of nine specimens of *subcristata*, 71.0 %

1. **Lophozosterops dohertyi dohertyi** Hartert

Lophozosterops dohertyi Hartert, Nov. Zool. 3, 1896, p. 568 — Volcano of Tambora, 1000-3000 feet high, Sambawa.

Lophozosterops dohertyi; Hartert, Nov. Zool. 3, 1896, p. 575 (Satonda); Hartert, Nov. Zool. 4, 1897, p. 157 (no locality); Rothschild, Nov. Zool. 4, 1897, p. 169, pl. II fig. 1 (Sambawa and Satonda); Hartert, Nov. Zool. 4, 1897, p. 171 (mountains of Sawbawa); Finsch, Tierreich 15, 1901, p. 48 (Sumbawa und Satonda); Dubois, Syn. Av. I, 1902, p. 713 (Sumbawa, Satonda); Sharpe, Hand-List Birds V, 1909, p. 20 (Sumbawa, Satonda); Riley, Proc. U. S. Nat. Mus. 64 (16), 1924, p. 90 (no locality); Rensch, Sitzungsber. Ges. Naturf. Freunde Berlin, 1928, p. 5 (Kleine Sunda-Inseln); (pt.) Stresemann in Kükenthal & Krumbach, Handb. Zool. VII (2), Aves, 1931, p. 654 (Sumbawa).

Lophozosterops dohertyi dohertyi; Stresemann, Nov. Zool. 20, 1913, p. 381, 387 (Sumbawa); Hartert, Nov. Zool. 27, 1920, p. 438 (Tambora, Sumbawa, 1000 ft); Mathews, Syst. Av. Australas. II, 1930, p. 714 (Sumbawa and Satonda); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 233 (Sumbawa); Mees, Zool. Med. 32, 1953, p. 60, 61 (Soembawa); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 324 (mid-mountain forest (600-1100 m) of Sumbawa).

Zosterops dohertyi dohertyi; Rensch, Das Prinzip geogr. Rassenkreise, 1929, p. 178, 179, fig. 26, 27 (Sumbawa).

Oreosterops dohertyi dohertyi; Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 625 (Sumbawa: Batoe Doelang); Kuroda, Birds Isl. Java II, 1936, p. 729 (Sumbawa); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Sumbawa).

Orcosterops dohertyi; Rensch, Gesch. des Sundabogens, 1936, p. 139 (Sumbawa); Mayr, Bull. Am. Mus. Nat. Hist. 83, 1944, p. 174 (Lesser Sunda Islands).

Subspecific characters. See description of the species; crown-feathers long, to about 13 mm; each crown-feather with a sharply defined white dot in its centre.

Unfeathered parts. Iris dark brown, bill black (except base of mandible), legs yellowish-slate (Doherty); iris brown, bill black, legs grey-yellow (Rensch).

Measurements of 14 specimens (9 ♂, 2 ♀, 3 sex?) : wing 58, 62-66 (62.11), tail 40-47 (43.68), tarsus (13 specimens only) 17¾-19 (18.35), entire culmen (10 specimens only) 13½-16¼ (14.60), exposed culmen (10 specimens only) 11-13¼ (11.98), culmen from anterior point of nostril (10 specimens only) 8-9 (8.45).

Distribution. Soembawa and the adjacent small island of Satonda, with a known vertical range of from 300 to 1100 m.

First collector. W. Doherty in April/May 1896 at Tambora.

Figure. Rothschild (1896) plate II fig. 1 (coloured plate on natural size by Keulemans).

Type. This subspecies was based on a series from Tambora, of both sexes, all of which have equal status as cotypes (I have examined six of these, AMNH nos. 701429-701434), though much later Hartert (1920) has listed one as type.

Moult. Four specimens collected in April or May, and eight collected in May do not show moult. One bird taken in April or May shows moult in both primaries and rectrices. Rensch (1931) mentioned that of his nineteen specimens collected in May (of which I examined seven, non-moulting), eight were moulting rectrices.

Habits, etc. Rensch (1931) reported that this species is fairly common in light rain forest, and that in voice and behaviour (flocking) it is similar to other Zosteropidae.

2. **Lophozosterops dohertyi subcristata** Hartert

Lophozosterops (ad potius *Zosterops*) *subcristatus* Hartert, Nov. Zool. 4, 1897, p. 171 — hills of South Flores, 3000-3500 feet.

Lophozosterops (ad potius *Zosterops*?) *subcristata*; Hartert, Nov. Zool. 4, 1897, p. 521 (South Flores).

Lophozosterops subcristata; Finsch, Tierreich 15, 1901, p. 48 (Süd-Flores); Dubois, Syn. Av. I, 1902, p. 713 (Flores S.); Sharpe, Hand-List Birds V, 1909, p. 20 (Flores).

Lophozosterops dohertyi subcristatus; Hartert, Nov. Zool. 27, 1920, p. 438 (South Flores, above 3000 ft); Mathews, Syst. Av. Australas. II, 1930, p. 714 (Flores).

Lophozosterops subcristatus; Riley, Proc. U. S. Nat. Mus. 64 (16), 1924, p. 90 (no locality).

Zosterops dohertyi subcristata; Rensch, Das Prinzip geogr. Rassenkreise, 1929, p. 178, 179, fig. 26, 27 (Flores).

Lophozosterops dohertyi subcristata; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 233 (Flores); Mees, Zool. Med. 32, 1953, p. 61 (Flores); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 324 (Flores).

Lophozosterops dohertyi; (pt.) Stresemann in Kükenthal & Krumbach, Handb. Zool. VII (2), Aves, 1931 (10 Sept.), p. 654 (Flores).

Oreosterops dohertyi subcristata; Rensch, Mitt. Zool. Mus. Berlin 17, 1931 (Sept.), p. 460, 625 (Flores: Sita); Rensch, Treubia 13, 1931 (Dec.), p. 400 (W. Flores: Wai Sano); Kuroda, Birds Isl. Java II, 1936, p. 734 (Flores); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Flores); J. A. J. Verheijen, Ardea 52, (1964), 1965 (Jan.), p. 200 (Flores).

Oreosterops dohertyi; J. A. J. Verheijen, Ardea 49, 1961, p. 186 (no locality = Flores).

Subspecific characters. Crown less dark brown in colour than in the nominate race, crown feathers shorter, up to about 11 mm in length, white spots only on anterior part of crown distinct, on posterior part vague.

Unfeathered parts. Iris brown, bill black, legs yellowish grey (Rensch).

Measurements of 10 specimens (5 ♂, 4 ♀, 1 sex?): wing 60-64 (61.60), tail (nine specimens only) 36½, 40-47 (43.70), tarsus 16¾-19½ (18.58), entire culmen (nine specimens only) 12½-15 (13.69), exposed culmen (nine specimens only) 10¼-12¼ (11.11), culmen from anterior point of nostril (nine specimens only) 7¼-8 (7.69).

Distribution. Flores, where known from altitudes of 600 to 1100 m.

First collector. A. H. Everett in October 1896.

Not figured.

Type. This subspecies was based on a series of unstated length, all ot which are cotypes. I have examined the following: BM nos. 98.5.4.73, 98.5.4.74, and 98.5.4.75; AMNH nos. 701436-40. AMNH no. 701436 is kept als type, and was listed as such by Hartert (1920).

Moult. Specimens collected in June (1) and October (6) are undergoing their main moult; one other specimen collected in June is not in moult, and one collected in October (the bird kept as type) is not in moult, but is in a very abraded plumage.

Nidification. Verheijen (1965) has recorded an amazing number of 141 nest-finds in February (3), March (6), April (25), May (26), June (45), July (14), August (12), September (6), and October (4). This shows that there is a main breeding period from April to July. Father Verheijen has given me a clutch of two eggs, probably the usual number, for description. They are the most remarkable eggs known from the family inasmuch as they are heavily spotted. The eggs, collected at Potjong, Flores, 29-VI-1959, measure 16.3 × 13.2 and 16.8 × 13.3 mm, average weight 0.085 g. The ground colour is Etain Blue, almost without gloss; there is a moderate number of coffee brown spots of various sizes, denser on the blunt half than on the apical half, and superimposed on these some darker, chocolate brown spots; besides these there are some less clear spots, violet-grey in tinge: these are probably originally brown spots, subsequently overlaid with the blue ground-colour.

Habits, etc. Rensch's notes given under the preceding subspecies pertain equally to this one.

Genus **Oculocincta** Mees

Oculocincta Mees, Zool. Med. 32, 1953, p. 64 — type by original designation and monotypy, *Zosterops squamifrons* Sharpe.

Generic characters. The single species of this genus is characterized by olive brown upper parts, pale yellow under parts, greyish on the throat; white edged frontal feathers, small size and a relatively short tail; it shows a similarity to *Acanthiza*. From *Zosterops* it differs mainly by the scaly appearance of the frontal feathers and the pale greyish yellow throat, combined with a more clear yellow breast and belly; from *Lophozosterops,* to which it seems nearest, by small size and different proportions, particularly the short tail, and also by having a whitish iris (brown or reddish in *Lophozosterops).* The eye-ring is very narrow, but distinct.

Distribution. Confined to Borneo; as the genus is monotypic, further particulars are given under the heading Distribution of the species *O. squamifrons.*

Species 1. **Oculocincta squamifrons** (Sharpe)

Zosterops squamifrons Sharpe, Ibis (6) 4, 1892, p. 323 — Mt. Dulit, N. W. Borneo.

Zosterops squamifrons; Sharpe, Ibis (6) 4, 1892, p. 436 (Dulit, 3500 feet); J. Whitehead, Ibis (6) 5, 1893, p. 281 (Kina-Balu); Hose, Ibis (6) 5, 1893, p. 401 (Mt. Dulit, 3500 feet); Sharpe, Ibis (6) 5, 1893, p. 552, 561 (Penrisen Mt., 3500 ft; Mt. Kina Balu); Meyer & Wiglesworth, Birds Celebes, 1898, p. 485 (Mt. Dulit, Borneo); Shelford, Journ. Straits Br. R. As. Soc. 33, 1900 (Jan.), p. 16 (Penrissen); Büttikofer, Notes Leyden Mus. 21, 1900 (March), p. 218-219 (Mount Kenepai); Finsch, Tierreich 15, 1901, p. 43 (Borneo (Berge Dulit, Kenepai und Kinabalu); Dubois, Syn. Av. I, 1902, p. 712 (Bornéo (Mont.)); Sharpe, Hand-List Birds V, 1909, p. 18 (Mts. of N.W. Borneo); Moulton, 9th Rep. Sarawak Mus., 1910, p. 40 (Borneo); Moulton, Journ. Straits Br. R. As. Soc. 67, 1914, p. 172 (Borneo); Banks, Proc. Zool. Soc. London, 1933, p. 275, 276 (Kina Balu, Dulit, Penrissen, Mt. Kenepai); Chasen, Bull. Raffl. Mus. 11, 1935, p. 267 (Borneo); Banks, Sarawak Mus. Journ. 4, 1937, p. 481, 482, 488, 500, 501, 515 (Kinabalu, Dulit, Kenepai, Penrissen); Glenister, Birds Malay Peninsula, 1951, p. 261 (Borneo).

Pseudozosterops squamifrons; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 233 (Gebirge von Borneo).

Apoia squamifrons; Delacour, Zoologica 31, 1946, p. 4 (no locality); Delacour, Birds Malaysia, 1947, p. 320 (Mt. Kinabalu, Borneo); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (Mt. Kinabalu); Wynne, Key-List Birds, 1956, p. 91 (Mt. Kinabalu); Pfeffer, Ois. & Rev. Fr. d'Orn. 31, 1961, p. 23 (Long-Laat, Bangau).

Oculocincta sqamifrons; Mees, Zool. Med. 32, 1953, p. 64 (North Borneo, Sarawak, and West Borneo).

Oculocincta squamifrons; Mees, Sarawak Mus. Journ. 6, 1955, p. 653 (no locality); Smythies, Sarawak Mus. Journ. 7, 1957, p. 767 (Kinabalu to Mt. Kenepai, Mt. Magdalena at 4000 ft); Smythies, Birds Borneo, 1960, p. 486, pl. XXXII fig. 9 (Borneo, distribution); McClure, Malayan Nat. Journ. 17, 1963, p. 116 (no locality); Smythies, Proc. R. Soc. (B) 161, 1964 (Nov.), p. 77 (Borneo); Fogden, Sarawak Mus. Journ. 11, 1964, p. 606 (Hose Mountains); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 324 (distribution).

Characters. As given under the genus.

Unfeathered parts. Iris greyish or yellowish white, bill black, feet greyish green (Büttikofer, 1900); iris buff white, bill brownish-black, feet pale greenish (Smythies, 1960).

Measurements. Wing 9 ♂, 47½-52 (50.33); 6 ♀, 47-51½ (49.83); 15 specimens, 47-52 (50.13); tail 9 ♂, 30-32 (31.17); 6 ♀, 28-33½ (30.58); 15 specimens, 28-33½ (30.93); tarsus 15 specimens, 14-15¾ (14.42); entire culmen 13 specimens, 11-12 (11.48); exposed culmen 13 specimens, 8½-9¾ (9.13); culmen from anterior point of nostril 13 specimens, 6¼-7 (6.65).

Structure. The species has a normal, rounded wing, with a 2nd primary in length between the 7th and the 9th. Tail relatively short, average index of 15 specimens, 61.70%.

Distribution (fig. 14). Hills and mountains of Borneo, where known from Mt. Magdalena, Mt. Kina Balu, Kelabit Plateau (Pa Main), Mt. Dulit, the Hose Mountains, Mt. Penrissen, Mt. Kenepai, from Long-Laat and Bangau. Contrary to statements sometimes found in literature (e.g. Stresemann, 1931; Delacour, 1947) the species is not confined to the higher parts of the mountains as Büttikofer collected it at an altitude of 600 m. According to Banks (1937), a specimen has even been taken by Chasen on Mt. Kinabalu at an elevation of only 600 feet. As far as the upper limit is concerned, I have not seen material or literature references to observations or material, from over 4000 feet, so that the species definitely gives an impression of being an inhabitant of hills rather than of the mountains.

First collector. Charles Hose on Mt. Dulit at 3500 feet, on 20 September, 1891.

Figure. A small coloured figure which, however, depicts the generic characters very well, was given by Smythies (1960) plate XXXII fig. 9 (drawing by A. M. Hughes).

Type. BM no. 92.4.29.4 (type examined).

Moult. Specimens collected in January (1), August (1) and September (1) show primary moult. Specimens taken in January (2), and June (2) are not in moult.

Nidification. Unknown.

Habits, etc. Virtually nothing has been published about the habits of this inconspicuous species. According to Pfeffer (1961) it occurs mainly in open forest and in the secondary forests of the hills, where it moves in small parties through the crowns of tall trees. Harrisson (in Smythies, 1960) knows it from moss forest, village clearings and scrub jungle.

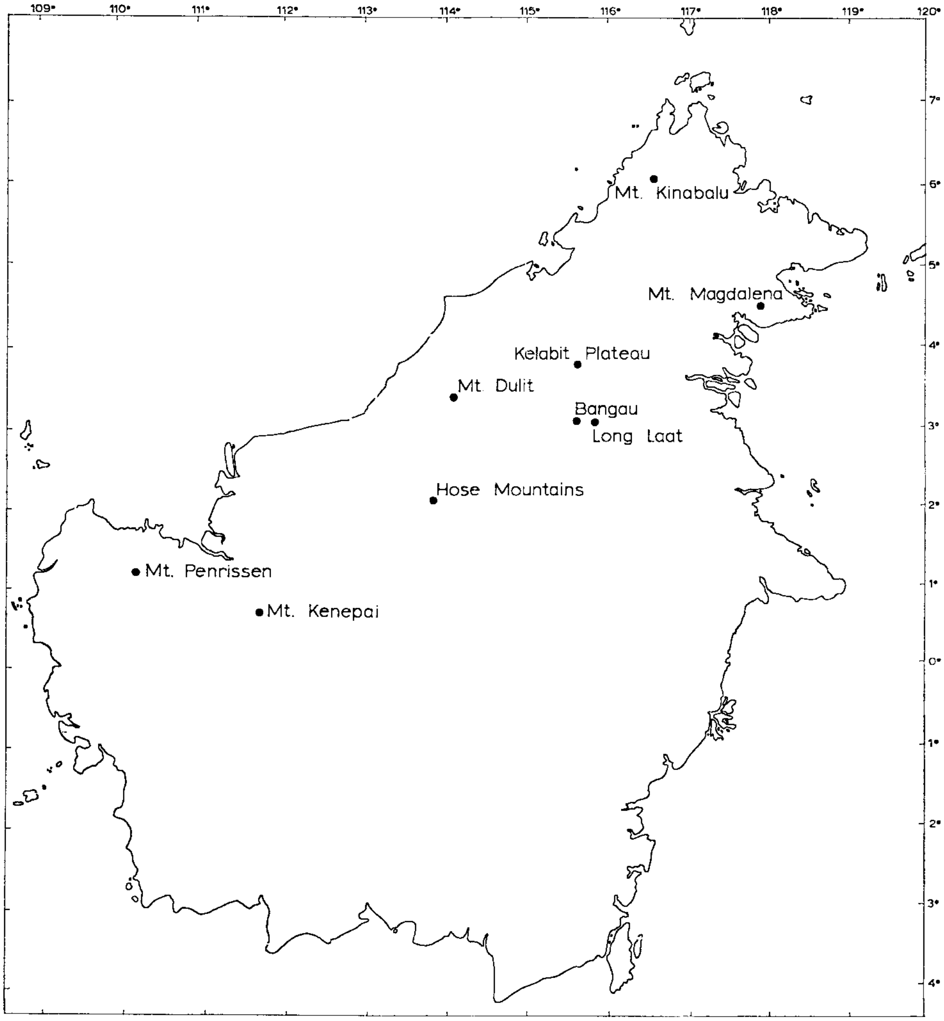


Fig. 14. The known distribution of *Oculocincta squamifrons*.

Voice. According to Harrisson (in Smythies, 1960), the call is: "chit chit chit".

Genus **Heleia** Hartlaub

Heleia Hartlaub, Journ. f. Orn. 13, 1865, p. 26 — based on *Heleia Mülleri* Hartlaub and *Heleia frigida* Hartlaub (*Zosterops frigida* Müller M.S.); type by elimination, *Heleia Mülleri* Hartlaub (Finsch, Tierreich 15, 1901, p. 49, removed *Heleia frigida* to the Timaliidae).

Pseudozosterops Finsch, Tierreich 15, 1901, p. 46 — nomen novum for *Heleia* Hartlaub, supposedly preoccupied by *Helia* Hübner.

Generic characters. A well-marked genus of two large species with relatively long tails (72-75 % of wing-length), remarkably short 2nd primaries, dark crown-feathers with broad pale edges, and comparatively heavy bills which are not black but grey or brown in colour. The crown-feathers differ from those of *Lophozosterops* in not having white shaft-streaks. There is no white eye-ring (see descriptions of the species).

Distribution. Lowlands of Soembawa, Flores and Timor.

Discussion. The preferred habitat of both species of this genus, lowlands, adds to their differences from *Lophozosterops*, and notwithstanding a superficial similarity in certain characters, like size and bi-coloured crown-feathers, I regard it as unlikely that the two genera are closely related.

Mayr (1965) is of the opinion that the two species of *Heleia* belong to one superspecies. To me it appears that this is stretching the superspecies (a systematic category of problematic practical use anyway) too far; the two species are very well-differentiated.

Species 1. **Heleia mülleri** Hartlaub

H[eleia] Mülleri Hartlaub, Journ. f. Orn. 13, 1865, p. 26 — Timor.

Zost[erops] frontalis Schlegel, Handl. Dierk. I, 1857, p. 274 — Timor (nec *Zosterops frontalis* Reichenbach, 1852).

Helaia frontalis; G. R. Gray, Hand-List Birds I, 1869, p. 164 (Timor); Boucard, Cat. Av., 1876, p. 232 (Timor).

Zosterops frontalis; Giebel, Thes. Orn. III, 1877, p. 775 (Timor).

Zosterops muelleri; Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 202 (Timor); Hartert, Nov. Zool. 5, 1898, p. 117 (Atapupu); Page, Bird Notes N. S. 4, 1913, p. 3, 6 (Is. of Timor).

Zosterops mülleri; Büttikofer, Notes Leyden Mus. 13, 1891, p. 215 (Kupang).

Pseudozosterops mülleri; Finsch, Tierreich 15, 1901, p. 47 (Timor); van Oort, Mus. d'Hist. Nat. Pays-Bas 10 (1), 1907, p. 261 (Koepang); Sharpe, Hand-List Birds V, 1909, p. 20 (Timor); Hellmayr, Avif. Timor, in Haniel, Zool. Timor I, 1914, p. 8, 53 (Lelogama); Riley, Proc. U. S. Nat. Mus. 64 (16), 1924, p. 90 (no locality); Mathews, Syst. Av. Australas. II, 1930, p. 714 (Timor); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 233 (Timor); Kuroda, Birds Isl. Java II, 1936, p. 736 (Timor); Stresemann, Journ. f. Orn. 88, 1940, p. 66 (Timor); Mayr, Bull. Am. Mus. Nat. Hist. 83, 1944, p. 137, 174 (Kupang, Tjamplong).

Pseudozosterops mulleri; Dubois, Syn. Av. I, 1902, p. 713 (Timor); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Timor).

Pseudozosterops müllerii; van Balen, Dierenw. Insulinde II, 1915, p. 484 (Timor).

Pseudozosterops muelleri; Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 626 (Timor); Rensch, Gesch. des Sundabogens, 1936, p. 187 (Timor).

Heleia mülleri; Mees, Zool. Med. 32, 1953, p. 66 (Western Timor).

Heleia muelleri; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 324 (lowlands of western Timor).

Characters. A large white-eye, Deep Olive above, pale yellow below, supercilium and throat bright yellow, with squamiferous crown and spotted breast, no eye-ring.

Description of adult.

Upper parts. Back, rump, and scapulars Deep Olive; forehead and crown with black feathers which are broadly edged with yellowish green; on the forehead the black feathers are distinctly black, and their edges are fairly narrow and yellowish, posteriorly the blackish centres become duller and smaller, the edges broader and less yellowish, and on the nape the feathers gradually merge into the uniform Deep Olive of the back; supra loral region and an ill-defined superciliary stripe Lemon Chrome; very broad black lores; no eye-ring, on the eye-lids there are a number of minute pale yellow feathers, not forming a ring; ear-coverts inclining to Pyrite Yellow; primaries, secondaries, and rectrices blackish brown, all broadly edged with Warbler Green.

Under parts. Chin and sides of throat Strontian Yellow, this colour becoming paler downwards and towards the centre of the throat, where it gradually turns into a pale yellow wash, between Barium Yellow and Naphtaline Yellow, which covers the whole remainder of the under surface; feathers of the breast with large dark grey centres of a more or less triangular shape, the apex directed rostrad.

Juvenile. Differs from adult in having the dark centres of the feathers of crown and breast not nearly so pronounced, so that the crown appears nearly unicoloured and similar in coloration to the back, whereas the ill defined pale grey centres of the breast feathers do hardly give an impression of being spots.

The old specimens collected by Müller in 1829, which, moreover, have been mounted and must have been exposed to sunlight for a considerable time, differ from the description given here, and from more recently collected material, in having the mantle tinged more brownish, in having primaries, secondaries and rectrices dull brown rather than blackish brown, and in the slightly deeper tone of the yellow on the throat.

Unfeathered parts. Iris red-brown, bill grey-black, legs grey-blue (Haniel); iris deep indian red, orbital skin bluish black, bill very dark horn grey, feet and legs greenish plumbeous, claws light brown (Hartert, 1898, ex Everett).

Measurements of 11 specimens (6 ♂, 4 ♀, 1?): wing 67-70 (68.36), tail 50-54 (51.73), tarsus 19½-21 (20.39), entire culmen 15½-17½ (16.32), exposed culmen 12-14 (12.82), culmen from anterior point of nostril 8¾-10¾ (9.57).

Structure. The majority of specimens examined were in some stage of moult, and therefore not suitable for ascertaining the wing-formula, but in the few specimens in which this character could be examined, the 2nd primary appeared relatively very short, shorter than the 10th. Tail relatively long, average wing:tail index of eleven specimens 75.7 %.

Distribution. Lowlands of Timor, where at present known from the western half only. The only definite locality records are: Koepang, Tjamplong, Atapoepoe, and Lelogama. The last-mentioned locality is at an elevation of 845 m, at present the greatest altitude from which *H. mülleri* is known.

First collector. S. Müller in 1829.

Not figured.

Types. The description of this species, though this was not specifically stated, was made after three specimens in Leiden, now cat. nos. 1, 2 and 3, male, female and juvenile, which therefore are cotypes. A bird in the British Museum, received from Leiden, cannot be a cotype as its regd. no. 52.5.12.20 shows that it was received long before the species was described. The whereabouts of a specimen in the private collection of Jules Verreaux, mentioned by Hartlaub (1865) are unknown to me.

Moult. Specimens collected in May (2) and August (2) are moulting primaries, specimens collected in August (4) do not show moult. This is entirely insufficient to determine if there is a particular moulting season.

Nidification. Unknown.

Habits, etc. Not recorded.

Discussion. The spotted breast is a particularly interesting feature of this species.

Species 2. **Heleia crassirostris** (Hartert)

Characters. Structurally similar to *H. mülleri,* but bill heavier; differs conspicuously by the absence of yellow in the plumage, no spots on breast.

Upper parts generally Saccardo's Olive; forehead creamy white; feathers of anterior part of crown blackish with creamy white edges; lores and a broad region below the eye on the sides of the face black; anterior part of ear coverts black, posterior part Saccardo's Olive; eye-ring consisting of tiny black feathers implanted on the rim of the eye; a region below, above, and particularly behind the eye naked; primaries, secondaries and rectrices dull blackish brown, all edged with a colour slightly browner, less olive, than the colour of the mantle.

Under parts close to Pale Chaladony Yellow, but even paler; sides of breast and thighs slightly washed with olive.

Distribution. Soembawa and Flores, from the lowlands up to at least 1050 m.

Geographical variation. Very slight, the race from Soembawa may be slightly larger, and has perhaps more cream colour on the crown than the race from Flores.

1. **Heleia crassirostris crassirostris** (Hartert).

Zosterops crassirostris Hartert, Nov. Zool. 4, 1897 (April), p. 172 — South Flores.

Zosterops crassirostris; Hartert, Bull. B.O.C. 6, 1897 (30 April), p. xl (Flores); Hartert, Ibis (7) 3, 1897 (July), p. 443 (Flores); Hartert, Nov. Zool. 4, 1897 (Dec.), p. 519, pl. III fig. 2 (South Flores); Hartert, Abh. Ber. Mus. Dresden 7 (2), 1898, p. 65 (no locality).

Pseudozosterops crassirostris; Finsch, Tierreich 15, 1901, p. 48 (Flores); Dubois, Syn. Av. I, 1902, p. 713 (Flores); Sharpe, Hand-List Birds V, 1909, p. 20 (S. Flores); Hellmayr, Avif. Timor, in Haniel, Zool. Timor I, 1914, p. 53 (Flores); Hartert, Nov. Zool. 27, 1920, p. 437 (South Flores, 3500 ft); Rensch, Orn. Monatsber. 36, 1928 (2 Jan.), p. 8, 9 (Flores); Rensch, Sitzungsber. Ges. Naturf. Freunde Berlin, 1928 (15 Oct.), p. 5 (Kleine Sunda-Inseln); Mayr, Bull. Am. Mus. Nat. Hist. 83, 1944, p. 174 (Lesser Sunda Islands); J. A. J. Verheijen, Ardea 49, 1961, p. 186 (no locality = Flores).

Pseudozosterops crassirostris crassirostris; Mathews, Syst. Av. Australas. II, 1930, p. 714 (Flores); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 233 (Flores); Rensch, Mitt. Zool. Mus. Berlin 17, 1931 (Sept.), p. 625 (Flores: Endeh); Kuroda, Birds Isl. Java II, 1936, p. 734 (Flores); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Flores); Verheijen, Ardea 52, (1964), 1965 (Jan.), p. 200 (Flores).

Heleia crassirostris crassirostris; Mees, Zool. Med. 32, 1953, p. 66 (Flores); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 324 (Flores).

Subspecific characters. As those of the species; differences from *junior* are given under that race.

Unfeathered parts. Iris naples yellow, bill lead grey, legs flesh colour, nails grey (Everett); iris brown-white, bill light grey, legs reddish grey (Rensch).

Measurements. Wing 9 ♂, 66½-72 (69.11); 3 ♀, 65-66½ (65.5); tail 9 ♂, 48-53½ (50.94); 3 ♀, 45-48 (46.67); tarsus 12 specimens 19-21¼ (20.27); entire culmen 12 specimens, 17-19½ (18.08); exposed culmen 12 specimens, 13½-16 (14.50); culmen from anterior point of nostril 12 specimens, 10-11½ (10.75). Note: all three females measured were in a very worn plumage, which may account for at least part of the differences in measurements of wing and tail between males and females.

Structure. 2nd primary shorter than 10th in all specimens examined. Average tail:wing index of 12 specimens, 73.12 %. Other structural characters have been mentioned in the descriptions of the species and the genus.

Distribution. Lowlands of Flores, up to at least 1050 m.

First collector. A. H. Everett's native collectors in South Flores, in October 1896.

Figure. Hartert (1897) plate III fig. 2: coloured plate on natural size by Keulemans; the plate is good except that it fails to show the naked space around the eye.

Type. In the original description, based on "a fine series", no type was designated, but Hartert (1920), listed a specimen collected on 28 October 1896 as such; this is now AMNH no. 701445 (specimen examined).

In the paper mentioned Hartert did not formally make the specimen a lectotype and anyway I agree with Deignan (1961) that lectotypes should only be selected for either of two reasons (1) when suspicion or certainty exists that the type series is composite, (2) in a wide-ranging species or subspecies, which may show some geographical variation, to restrict its type-locality. As all Everett's specimens came from South Flores, there is evidently no need for a lectotype, and all specimens collected in October-November 1896 must be regarded as cotypes, unless it can be proved that some of them did not pass through Hartert's hands at the critical time. I have examined eleven cotypes (or syntypes, to use a more up-to-date professional jargon), four in the British Museum, seven in the American Museum of Natural History. There may be others in other museums.

Moult. Specimens collected in October (4) and November (2) are undergoing their main moult. Specimens collected in June (1), and October (5) are not in moult; some of the October-specimens are in extremely worn plumage. Probably the main moult takes place in the last three months of the year.

Nidification. Verheijen (1964) has recorded nests in the following months: March (1), April (7), May (5), June (8), July (3), August (4), September (2), October (1). Clutches in Father Verheijen's collection consist of two or three eggs each, usually pure white, with hardly any gloss, occasionally very pale blue. Measurements of 1/1, 1/2, 1/2, and 1/3 are: 18.5 × 13.9; 18.3 × 14.0 and 18.3 × 14.0; 20.1 × 14.3 and 20.1 × 14.4; 18.7 × 14.2, 18.7 × 14.3 and 19.1 × 14.4 mm.

Habits, etc. Not recorded.

Discussion. Since Everett obtained the type series in 1896, only Rensch appears to have collected a single individual of this subspecies.

2. **Heleia crassirostris junior** Rensch

Pseudozosterops crassirostris junior Rensch, Orn. Monatsber. 36, 1928, p. 8 — Batoe Doelang (800 m), Sumbawa.

Pseudozosterops crassirostris Rensch, Das Prinzip geogr. Rassenkreise, 1929, p. 178 (Sumbawa).

Pseudozosterops crassirostris junior; Mathews, Syst. Av. Australas. II, 1930, p. 714 (Sumbawa); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 26 (Ile Sumbawa); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 233 (Sumbawa); Rensch, Mitt. Zool. Mus. Berlin 17, 1931 (Sept.), p. 626 (Sumbawa: Batoe Doelang); Kuroda, Birds Isl. Java II, 1936, p. 729 (Sumbawa); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 4 (Sumbawa).

Heleia crassirostris junior; Mees, Zool. Med. 32, 1953, p. 66 (Soembawa); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 325 (Sumbawa (800 m)).

Subspecific characters. Very close to the nominate race, from which perhaps not satisfactorily separable, but there is possibly rather more cream colour above the eye, and perhaps the size averages larger. See further discussion.

Unfeathered parts. Iris whitish brown, naked area around eye grey, bill light grey and blackish grey, legs light grey (Rensch).

Measurements of one male (the type): wing 72, tail 53, tarsus 20, entire culmen 17, exposed culmen 15, culmen from anterior point of nostril 11.

Distribution. Known from the type locality only: Batoe Doelang, Soembawa, 800 m.

First collector. B. Rensch on 10 May, 1927.

Not figured.

Type. Zool. Mus. Berlin no. 30.1029 (type examined).

Moult. The single specimen examined, collected in May, does not show moult.

Nidification. Unknown. Specimens collected by Rensch (1931) in May had enlarged gonads.

Habits, etc. Rensch observed a group of three birds at the edge of the forest; further nothing is known.

Discussion. In my opinion the validity of this race needs confirmation. Whilst the type specimen, which I compared with five specimens of the nominate race, seems to differ in the slightly greater extent of cream colour above the eyes, this difference is trivial. As regards measurements, those of the type are matched or surpassed by those of the specimen kept as type of *H. c. crassirostris*.

Genus **Chlorocharis** Sharpe

Chlorocharis Sharpe, Ibis (5) 6, 1888, p. 392 — type by original designation *Chlorocharis emiliae* Sharpe.

Generic characters. Large, dark birds with the lores and circum-orbital region, including the eye-ring, feathered black; bill long, slender, and curved, partly orange-yellow.

The genus is monotypic, and more particulars will be found below under the species *C. emiliae* and its races.

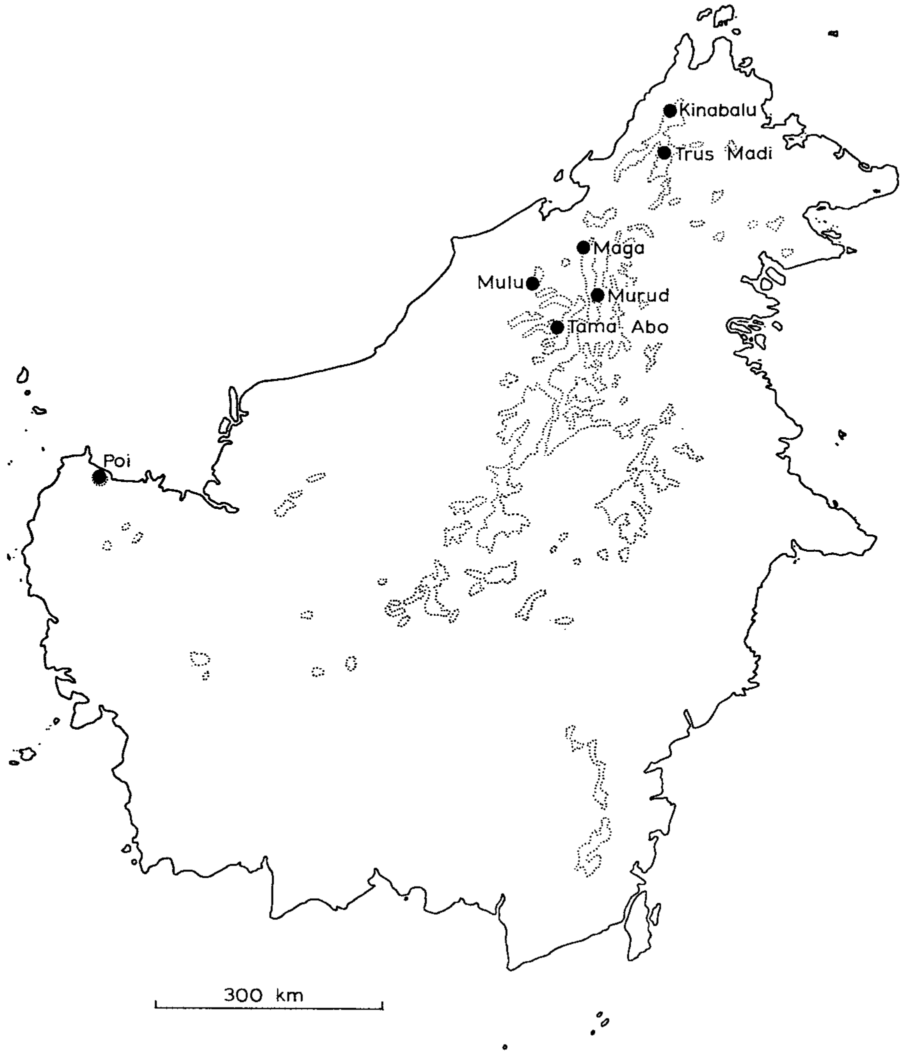


Fig. 15. The distribution of *Chlorocharis emiliae* and races; *emiliae*, Kina Balu only; *trinitae*, Trus Madi only; *fusciceps*, Maga only; *moultoni*, all other localities. The dotted lines represent the 1000 m isohypse, below which level the species would certainly not occur, thus showing the insular character of its distribution.

Distribution (fig. 15). Confined to the mountains of Borneo above 1300 m.

Discussion. As the genus has been fully dealt with in a previous paper (Mees, 1956), the discussion can be short. Here it may be said only that, though *Chlorocharis* definitely belongs to the Zosteropidae, I am unable to make any intelligent guess as to its affinities within the family.

Species 1. **Chlorocharis emiliae** Sharpe

Characters. A large bird (wing 62-72 mm), rather dark olive green above, slightly to distinctly lighter and more yellowish below, especially on the centre of the under parts; a distinct yellow superciliary stripe, lores and eye-ring black; crown usually darker than remainder of upper parts. As the races are rather distinct, the nominate race has been made the basis for comparison, and a fuller description will be found there.

Measurements are given in table XI; because there is a distinct difference in size between males and females in this species, the measurements for each sex have been given separately.

Structure. The wing-formula was not checked in enough specimens, but it looks as if in the nominate race the 2nd primary is relatively short, 2 = 8, 8>2>9 or 2 = 9, in *moultoni* 6>2>7 or 2 = 7. The relative tail lengths of the different subspecies are shown in table XI.

TABLE XI

Chlorocharis emiliae

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
emiliae (♂)	30	65½-72	44-55	68.52	49.95	72.42%
emiliae (♀)	20	64-70	46-51½	67.40	48.55	72.77%
trinitae (♂)	7	65-70	42-50	68.43	46.64	68.16%
trinitae (♀)	6	66-70	45-48	67.33	46.67	69.31%
fusciceps (♂, ♀)	2	63½,64	41,44	63.75	42.5	66.7 %
moultoni (♂)	11	61½-65	41-44½	63.64	43.23	67.93%
moultoni (♀)	15	62-64	39-43½	63.06	41.63	66.05%

Geographical variation. There is a pronounced geographical variation, four subspecies being recognized which from north (nominate race) to south (*moultoni*) change from large, long-tailed, dark in colour, to smaller, relatively shorter-tailed, lighter, more yellowish in colour.

1. **Chlorocharis emiliae emiliae** Sharpe

Chlorocharis emiliae Sharpe, Ibis (5) 7, 1888, p. 392, pl. XI fig. 1 — Mt. Kinabalu.

Chlorocharis emiliae; Sharpe, Ibis (6) 1, 1889, p. 282 (Kina Balu); Sharpe, Ibis (6) 2, 1890, p. 278, 286, 291 (Kina Balu); Whitehead, Expl. Kina Balu, 1893, p. 161, 172, 177, 224 (Kina Balu, from 6000 to 12000 ft); Hartert, Nov. Zool. 3, 1896, p. 70, 153 (no locality); Meyer & Wiglesworth, Birds Celebes, 1898, p. 485 (no locality); Sharpe, Hand-List Birds V, 1909, p. 20 (Mts. of N. W. Borneo); Moulton, 9th Rep. Sarawak Mus. 1910, p. 40 (Borneo); Moulton, Journ. Straits Br. R. As. Soc. 67, 1914, p. 172 (Borneo); Hartert, Nov. Zool. 27, 1920, p. 437 (Kina Balu, 8000 ft); Bonnet, Bull. Soc. Zool. France 49, 1924, p. 179 (Bornéo); Enriquez, Kinabalu the haunted Mountain of Borneo, 1927, p. 176, 177 (Paka Cave, 9790 ft); Pendlebury & Chasen, Journ. F. M. S. Mus. 17, 1932, p. 20 (Mt. Kinabalu: at Pakka and at all altitudes above 10000 ft); Harrisson, Sarawak Mus. Journ. 8, 1957 (Dec.) [= 1958?], p. 250 (Mt. Kinabalu); Smythies, Proc. Linn. Soc. London 175, 1964 (Jan.), p. 54 (Mount Kinabalu); Smythies, Proc. R. Soc. (B) 161, 1964 (Nov.), p. 76, 78 (Mt. Kinabalu); Moreau in Thomson, New Dict. Birds, 1964 (Nov.), p. 101, 886 (Borneo).

Chlorocharis aemiliae; Everett, Journ. Straits Br. R. As. Soc. 20, 1889, p. 105 (Kina Balu Mt. at 7000-12000 ft); Wallace, Isl. Life, 2nd ed., 1892, p. 378 (Borneo).

Zosterops emiliae; Finsch, Tierreich 15, 1901, p. 46 (Kinabalu in Höhen von 1830-3650 m); Dubois, Syn. Av. I, 1902, p. 713 (Bornéo N.).

Chlorocharis Emiliae; Finsch, Notes Leyden Mus. 26, 1905, p. 13 (Kina Balu).

Clorocharis emiliae; Köditz, Zeitschr. wiss. Zool. 126, 1925, p. 106 (anatomy).

Chlorocharis emiliae emiliae; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 234 (Kina Balu); Chasen, Bull. Raffl. Mus. 11, 1935, p. 267 (Borneo (north)); Banks, 26th Ann. Rep. Sarawak Mus. 1935, 1936, p. 17 (Borneo); Banks, Sarawak Mus. Journ. 4, 1937, p. 481 (Kinabalu); Peters, Bull. M. C. Z. 87, 1940, p. 208 (Mt. Kina Balu 5500-12000 ft); Delacour, Birds Malaysia, 1947, p. 320 (Kinabalu); Gibson-Hill, Bull. Raffl. Mus. 24, 1952, p. 289 (Mt. Kinabalu, 6000-12000 ft); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (Borneo (mountain forests)); Mees, Sarawak Mus. Journ. 6, (1955), 1956, p. 641-661 (Mt. Kinabalu); Harrisson, Sarawak Mus. Journ. 6, (1955), 1956, p. 662-687 (Mt. Kinabalu); Wynne, Key-List Birds, 1956, p. 92 (Borneo (Mountain forests)); Harrisson, Sarawak Mus. Journ. 7, (1956), 1957, p. 518-520 (Kinabalu); Smythies, Sarawak Mus. Journ. 7, 1957, p. 767 (Kinabalu); Allen & Berwick, Sarawak Mus. Journ. 8, 1958, p. 462-463, pl. XXIII (Kinabalu); Smythies, Birds Borneo, 1960, p. 487, pl. XXXII fig. 2 (Kinabalu); Corner, Proc. Linn. Soc. London 175, 1964, p. 23 (Ranunculus Col, Kinabalu); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 325 (Mt. Kinabalu).

Chlorocaris emiliae emiliae; (pt.) Banks, Proc. Zool. Soc. London, 1933, p. 275, 279 (Kinabalu); Banks, 25th Ann. Rep. Sarawak Mus. 1934, 1935, p. 14 (Borneo).

Horornis oreophila; Griswold, Sc. Monthly 48, 1939, p. 514 (Lowe's Peak, Kinabalu).

chlorocharis; Tregonning, North Borneo, 1960, p. 18 (Kinabalu near the craggy top).

Subspecific characters. The largest and darkest race. Upper parts dark olive green with over the green a distinct blackish hue, which is very pronounced on the crown, and least so on the rump which, consequently, is brighter in colour than the remainder of the upper parts; the loral line, which broadens towards the eye, is black, and there is a circum-orbital ring of black feathers.

Unfeathered parts. Iris chocolate brown, bill brown, legs yellowish brown (Waterstradt); iris hazel, maxilla brown, mandible pale yellowish orange, legs brown (Whitehead, 1893); iris chestnut brown, bill corn yellow, darker above, black at nostrils, legs dark flesh or blackish, feet with yellow soles (Harrisson).

Measurements. Wing 30 ♂, 65½-72 (68.52); 20 ♀, 64-70 (67.40); tail 30 ♂, 44-55 (49.95); tail 20 ♀, 46-51½ (48.55); tarsus 47 specimens, 21-23½ (21.99); entire culmen 44 specimens, 16½-19 (17.83); exposed culmen 44 specimens, 14-16½ (14.82); culmen from anterior point of nostril 44 specimens, 9-12 (10.53).

Distribution. Confined to Mt. Kinabalu, with an altitudinal range of from 5500 ft to near the summit, over 13000 ft, or 1650 to 4000 m. Smythies' (1964) observation at 550 ft would doubtless be a misprint for 5500 ft.

First collector. John Whitehead in January 1888 (28 January, 1888: Zool. Mus. Berlin no. 33243, USNM no. 148801). It is now generally known that St. John (1863) observed the species during his ascent of Mt. Kinabalu in 1858, but he failed to collect any.

Figures. Sharpe (1888), plate XI fig. 1 (coloured, on natural size, by Keulemans; good but centre of belly should be yellower); Smythies (1960), plate XXXII fig. 2 (coloured, about two-fifths of natural size, by Hughes).

Type. This species was based on two specimens, collector's nos. 2077 and 2079. One of these, no. 2077 went to Tring and is now AMNH no. 701481 (specimen examined).

Moult. Specimens collected in February (17), August (1), and November (1) are not in moult. Specimens collected in January (1), February (1), July (1) and August (2) are undergoing their main moult. There is not enough here to define a moulting season with any degree of confidence, though in a previous paper (Mees, 1956, p. 649) I suggested that the normal main moult takes place perhaps in August. Harrisson (1956, p. 685) was inclined to put it later than August.

Nidification. Several nests, one of which contained a well-grown young bird, were described by Allen & Berwick (1958). This was in February, and previous collecting of fledglings in February, by Whitehead and Harrisson indicates also that reproduction takes place in January. From the descriptions of nests by Allen & Berwick and Corner (1964) it would appear that these are not very different from those of other Zosteropidae. From the published photograph (Allen & Berwick, 1958, pl. XXIII) it looks as if the nest is placed in the dense twigs and foliage of *Leptospermum recurvum,* rather than suspended, but then the appearance of this tree or shrub suggests that it does not lend itself very well for the attachment of suspended nests, and Smythies (1960) states that the nest is built in a fork.

The eggs of the species remain to be discovered, and nothing is further known of its nesting habits.

Habits, etc. Harrisson (1956) has written a paper on his experiences with this species in February 1952. He found the birds most plentiful at elevations of from 3000 to 3600 m, solitary, in pairs or in small flocks, though rarely more than three together. Though mainly arboreal, one bird was seen to settle momentarily on rock or moss.

The food consists of insects and vegetable matter, especially small fruits and berries, but there is a preference for insects.

A feather mite, *Anhemialges gracillimus,* is known from *Chlorocharis emiliae* (Bonnet, 1924).

Voice. Various calls, often reminiscent of European finches, were recorded by Harrisson. The song was described by Harrisson as melodious and much like a thrush, and Smythies (1964) referred to the dawn chorus of rich and thrush-like quality. A tape recording of this dawn chorus was obtained by Mr. Corner.

Discussion. Griswold's green warbler, "*Horornis oreophila*", would certainly be this species, as *Horornis,* now known as *Cettia fortipes oreophila,* is a brown bird. This is confirmed by the fact that, though Griswold collected both *Cettia fortipes* and *Chlorocharis emiliae,* only the latter was obtained at the highest level (Peters, 1940, p. 207, 208).

2. **Chlorocharis emiliae trinitae** Harrisson

Chlorocharis emiliae trinitae Harrisson, Sarawak Mus. Journ. 7, (1956), 1957, p. 520 — Mt. Trus Madi, North Borneo, 7900 ft.

Chlorocharis emiliae trinitae; Smythies, Sarawak Mus. Journ. 7, 1957, p. 767 (Mt. Trus Madi); Smythies, Birds Borneo, 1960, p. 487 (Mt. Trus Madi); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 325 (Mt. Trus Madi).

Subspecific characters. Close to the nominate race, and of the same size, but brighter and more yellow in appearance; lower belly almost pure yellow, not greenish, sides of head, including supercilium, much yellower; mantle very slightly brighter green.

Unfeathered parts. Iris brown (13 times) or yellow (twice).

Measurements. Wing 7 ♂, 65-70 (68.43); 6 ♀, 66-70 (67.33); 14 specimens, 65-70 (67.96); tail 7 ♂, 42-50 (46.64); 6 ♀, 45-48 (46.67); 14 specimens, 42-50 (46.68); tarsus 14 specimens, 19-21¾ (20.41); entire culmen 14 specimens, 16¼-18¼ (17.39); exposed culmen 15 specimens, 13½-14¾ (14.12); culmen from anterior point of nostril 6 specimens, 9½-10¼ (9.79).

Distribution. Mt. Trus Madi, North Borneo, at altitudes from 5400 feet upwards.

First collector. Sarawak Museum collector R. Nyandoh on 22 August, 1956.

Not figured.

Type. Sarawak Museum no. 521 (c) i (type examined).

Moult. Of 15 specimens collected between 22 August and 7 September, 1956, one shows moult of both primaries and rectrices, nine of primaries, and one of rectrices; in some other specimens it is uncertain if there is moult. Apparently therefore, the period these specimens were taken is that of the main moult.

Nidification. Not recorded.

Habits, etc. From labels of specimens I take that the species frequents open areas in moderate jungle, and higher up low moss forest and summit scrub, where it is found in small parties. Stomachs contained remains of both fruits and insects: amongst the latter a grasshopper was identified, and perhaps ants.

Discussion. The measurements show that in size of wing this race corresponds with the nominate race, and that tail and tarsus average only slightly shorter.

3. **Chlorocharis emiliae fusciceps** Mees

Chlorocharis emiliae fusciceps Mees, Ardea 42, (1954), 21 January 1955, p. 161 — Pak Maga, Ulu Trusan, N.E. Sarawak.

Chlorocharis emiliae; Banks, 30th Rep. Sarawak Mus. 1939, 1940, p. 5 (Maga Mountains).

Chlorocharis emiliae moultoni; Banks, Bull. Raffl. Mus. 24, 1952, p. 161 (Maga Mountains).

Chlorocharis emiliae fusciceps; Mees, Sarawak Mus. Journ. 6, (1955), 1956, p. 641-661 (Pak Maga, Ulu Trusan); Harrisson, Sarawak Mus. Journ. 6, (1955), 1956, p. 664-673 (Trusan mountains); Harrisson, Sarawak Mus. Journ. 7, (1956), 1957, p. 518-520 (Maga); Smythies, Sarawak Mus. Journ. 7, 1957, p. 767 ("Maga Mts."); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 325 (mountains west of Trusan River).

Chlorocharis emiliae fusiceps; Smythies, Birds Borneo, 1960, p. 487 (Maga Mountains).

Subspecific characters. Very similar to *moultoni*, but differs from that race by having a somewhat darker, more sepia, crown and forehead.

Unfeathered parts. Not recorded.

Measurements of two specimens (♂, ♀): wing 63½, 64, tail 41, 44, tarsus 19½, 20½, entire culmen 15½, 16½, exposed culmen, 13, 13½, culmen from anterior point of nostril 9¾, 10.

Distribution. Known from the type locality only which on the labels of the specimens and in the original description is given as Pak Maga, Ulu

Trusan. Harrisson (1956) had criticised the use of this name, pointing out that it should read Paya Maga, which, in Murut, means "red wet place", and is a description of habitat rather than a geographical name. However, the name Maga Mountains was not invented by me, but Banks (1952), who had visited the area, already used it, as did Smythies (1960), and as Harrisson failed to suggest a better substitute name, it seems best to continue using the name Maga Mountains which has now become established in literature for the southern part of the Crocker Range.

First collector. Banks's collector Sliman on 1 May, 1939 (cf. Harrisson, 1956, p. 665-666).

Not figured.

Type. Sarawak Museum no. B. 58.21.gg (type examined).

Moult. The two specimens known of this race, both collected on 1 May, 1939, show no signs of moult and are in fresh plumage.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. This subspecies is only slightly differentiated from *moultoni*, and more material from the border area of Sarawak and British North Borneo may show intergradation between the two subspecies, in which case it might be better not to retain *fusciceps*.

4. **Chlorocharis emiliae moultoni** Chasen & Kloss

Chlorocharis emiliae moultoni Chasen & Kloss, Bull. B. O. C. 48, 1927, p. 47 — Mt. Poi.

Chlorocharis emiliae; Mjöberg, 14th Rep. Sarawak Mus. 1915-1923, 1923 (June), p. 37 (Mt. Murud and Mt. Dulit); Banks, 15th Rep. Sarawak Mus. 1924, 1925 (?), p. 24 (Sarawak); Mjöberg, Geogr. Review 15, 1925, p. 423, 425 (Mt. Poi ... above 5000 feet; Mt. Murud, 7040 feet); Baylis, Ann. Mag. Nat. Hist. (10) 1, 1928, p. 614 (Mt. Poi); Banks, 27th Rep. Sarawak Mus. 1936, 1937 (?), p. 8 (Sarawak).

Chlorocaris emiliae moultoni; Banks, 18th Rep. Sarawak Mus. 1927, 1928, p. 9 (Mt. Dulit and Mt. Murud); Banks, Proc. Zool. Soc. London, 1933, p. 275, 279 (Poi).

Chlorocharis Emiliae; Mjöberg, Durch die Insel der Kopfjäger, 1929, p. 91 (Gipfel des Mount Murud, 2200 m).

Zosterops emiliae moultoni; Snouckaert, Alauda (2) 3, 1931, p. 22 (Sarawak).

Chlorocharis emiliae moultoni; Stresemann Mitt. Zool. Mus. Berlin 17, 1931, p. 234 (Mt. Poi, Mt. Murud, Mt. Tanabo); Chasen, Bull. Raffl. Mus. 11, 1935, p. 267 (mountains of Sarawak); Banks, 26th Rep. Sarawak Mus. 1935, 1936 (?), p. 5, 17 (Mulu); Banks, Sarawak Mus. Journ. 4, 1937, p. 481 (Mulu, Murud, Tama Abo, Poi); Peters, Bull. M. C. Z. 87, 1940, p. 208 (mountains of Sarawak); Delacour, Birds Malaysia, 1947, p. 320 (Sarawak); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (Borneo); Mees, Ardea 42, 1954, p. 357 (Mts. Poi, Murud and Mulu); Mees, Sarawak Mus. Journ. 6, (1955), 1956, p. 641-661 (distribution); Harrisson, Sarawak Mus. Journ. 6, (1955), 1956, p. 662-673 (particulars); Wynne, Key-List Birds, 1956, p. 92 (Borneo (Mountain forests)); Harrisson, Sarawak Mus. Journ. 7, (1956), 1957, p. 518-520 (Poi); Smythies, Sarawak Mus. Journ. 7, 1957, p. 767 (Mt. Poi); Smythies, Birds Borneo, 1960, p. 487

(Borneo); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 325 (distribution).
Chlorocaris emiliae emiliae; (pt.) Banks, Proc. Zool. Soc. London, 1933, p. 275, 279 (Murud).

Subspecific characters. Differs from the nominate race in its smaller size, relatively shorter tail, and generally more yellowish colour. Mantle and breast are as in the nominate race, but somewhat less green and duller; the crown is similar in colour to the mantle, but slightly darker; superciliary stripes, sides of the head and neck are yellow.

Unfeathered parts. Iris yellow-brown, bill yellow-orange, legs yellow, claws horn colour (Mjöberg).

Measurements. Wing 11 ♂, 61½-65 (63.64); 15 ♀, 62-64 (63.06); 26 specimens, 61½-65 (63.29); tail 11 ♂, 41-44½ (43.23); 15 ♀, 39-43½ (41.63); 26 specimens, 39-44½ (42.31); tarsus 25 specimens, 19-21 (20.05); entire culmen 24 specimens, 14-18 (15.64); exposed culmen 24 specimens, 11-14 (12.60), culmen from anterior point of nostril 24 specimens, 8½-10 (9.18).

Distribution. Mountains of Sarawak, where known from Mt. Mulu, Mt. Murud, the Tama Abo Range and the Poi Range. The inclusion of Mt. Dulit in its range by Banks (1928) was an error (Harrisson, 1956).

First collector. Dr. E. Mjöberg on 8 November, 1922, on Mt. Murud.

Not figured.

Type. BM no. 1935.12.27.1 (ex Sarawak Mus. no. B 58.2.1.l.) (specimen examined).

Moult. Three specimens collected in October and November do not show moult; in other specimens this was not investigated.

Nidification. Not recorded.

Habits, etc. Not recorded, except that the form is common on the mountain tops (Mjöberg, 1925).

An individual from Mt. Poi has been found parasitised by a tapeworm, presumably *Anonchotaenia aryncha* (cf. Baylis, 1928).

Genus **Woodfordia** North

Woodfordia North, Vict. Nat. 23, 1906, p. 104 — type by monotypy, *Woodfordia superciliosa* North.
Sanfordia Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 13 — type by original designation and monotypy, *Sanfordia lacertosa* Murphy & Mathews.

Generic characters. The genus consists of two species which are mainly characterized by very large size, aberrant coloration with brown and citrine

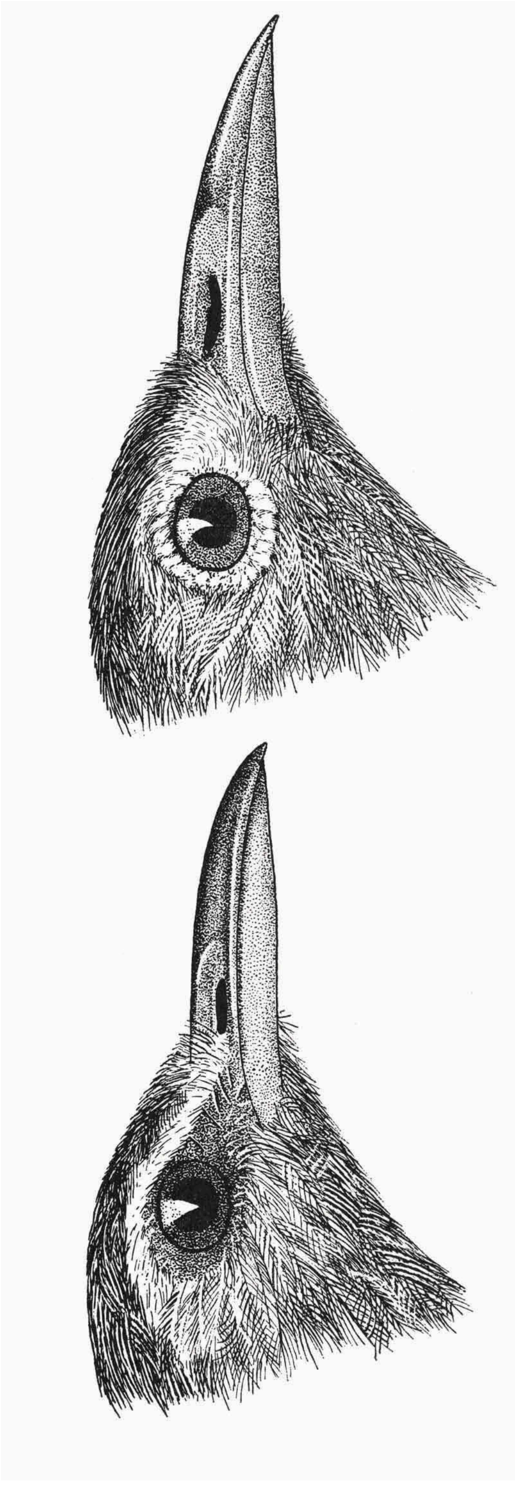


Fig. 16. Heads of *Woodfordia superciliosa* (left) and *W. lacertosa* (right). Note the well-developed eye-ring of one, and the bare circum-orbital region of the other, as well as additional specific differences. × 2½.

dominating, brownish or straw coloured bill, relatively short tail, and sturdy build.

Distribution. Rennell Island (*W. superciliosa*) and Santa Cruz Island (*W. lacertosa*).

Discussion. *Woodfordia* was regarded as a monotypic genus until Meise (1938) united the equally monotypic *Sanfordia* with it, in which he was followed by the few authors who have subsequently written about the species *lacertosa*. The resemblance between the two species is indeed sufficiently close to make it likely that this expanded genus *Woodfordia* expresses true relationships. Though the islands of Rennell and Santa Cruz are separated by about 750 km of open sea, a chance colonisation of one island from the other appears very well possible: elsewhere Zosteropidae must have crossed much larger stretches of sea.

Species 1. **Woodfordia superciliosa** North

Woodfordia superciliosa North, Vict. Nat. 23, 1906, p. 104, pl. 8 — Rennell Island, Solomon Group.

Woodfordia superciliosa; Sharpe, Hand-List Birds V, 1909, p. 632 (Rennell Isl.); Woodford, Ibis (10) 4, 1916, p. 118-122, pl. III (Rennell Island); Murphy, Am. Mus. Nov. 365, 1929, p. 10 (Rennell); Mathews, Syst. Av. Australas. II, 1930, p. 715 (Rennell Island); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 27 (Ile Rennell); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 234 (Rennell-Insel); Mayr, Am. Mus. Nov. 486, 1931 (29 Aug.), p. 29 (Rennell Island); Mayr & Hamlin, Am. Mus. Nov. 488, 1931 (14 Sept.), p. 2, 5, 7 (Rennell Island); Davidson, Proc. Calif. Ac. Sc. (4) 21, 1934, p. 198 (Kungava Bay, Rennell Island); Kinghorn, Proc. Zool. Soc. London (B) 107, 1937, p. 184 (Rennell Island); Mayr, Birds Southwest Pacific, 1945, p. 282 (Rennell Isl.); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 335 (Rennell Island); Wolff, Nat. Hist. Rennell Isl. I, 1955, p. 9, 61 (Rennell); Bradley & Wolff, Nat. Hist. Rennell Isl. I, 1956, p. 85, 112, 113, 114, 116 (Rennell Island); Clay, Nat. Hist. Rennell Isl. II, 1957, p. 145, 148, 149 (Rennell Island); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959 (15 Feb.), p. 218, 219, 220, 225, 226, 227, 231 (Rennell Island); M. Laird, Journ. Parasitol. 45, 1959 (Feb.), p. 47, 49, 52 (Te-Uhungango, Rennell); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 319 (Rennell Island).

Woodfordia; Croizat, Panbiogeography, 1958, p. 782, 929 (Rennell Island).

Characters. Upper parts. Rump and upper tail coverts and upper wing coverts citrine, anteriorly Buffy Citrine, less green; crown darker, centres of crown feathers Brownish Olive; because of this, crown not quite uniform in coloration, though the contrasts are very slight; narrow frontal band, supra-loral line, streak over the eye and anterior part of ear-coverts whitish; no eye-ring, rim of the eyes naked; lores bare; primaries and secondaries blackish brown, the outer webs broadly bordered with Serpentine Green, e.g. green of the same colour as that of the back, but rather brighter and more distinctly greenish, less olive; rectrices of the same colour as the primaries, but paler, less blackish; the outer edges with Serpentine Green.

Under parts. Chin and upper part of throat dirty whitish; sides of breast and flanks paler than Saccardo's Olive, and slightly buffy; this colour fading towards the centre of the under parts; remainder of under parts pale yellowish, fairly pure on centre of belly and under tail coverts, on breast and flanks, as stated above, becoming increasingly mixed with buffy Saccardo's Olive.

Unfeathered parts. Iris light brown, bill light horn, legs light grey or slate grey, tinged yellow (Bradley); iris brown, bill brownish, legs grey (Hamlin); skin round the eye blackish (Woodford, 1916).

Measurements. Wing 11 ♂, 75-80 (78.36); 8 ♀, 75-79 (76.31); 22 specimens, 75-80 (77.18); tail 11 ♂, 45-50 (47.27); 8 ♀, 45-49 (46.75); 22 specimens, 45-50 (46.91); tarsus 22 specimens, 22¾-25¼ (23.69); entire culmen 20 specimens, 20-23 (21.24); exposed culmen 20 specimens, 17-20¾ (18.63); culmen from anterior point of nostril 21 specimens, 11½-14 (12.62).

Structure. Wings rounded, the 2nd primary is fairly short, in length between the 7th and the 9th. Tail short for such a large species, average tail: wing index of 22 specimens 62.1%. The bare patch round the eye is an unusual feature in Zosteropidae.

Distribution. Confined to Rennell Island, a small and low island.

First collector. C. M. Woodford in 1906 (cf. Woodford, 1916).

Figures. North (1906) plate 8 (good photograph of skin); Woodford (1916), plate II (good coloured plate on natural size, by H. Grönvold after C. Mulloch. Notwithstanding the fact that it was made after a spirit specimen, the plate is remarkably good). Bradley & Wolff (1956), fig. 6 (photograph of nest with eggs).

Type. Australian Museum, Sydney, no. 0.15076.

Moult. The material is insufficiently divided over the months of the year to give an impression of the moulting season. Specimens collected in August (11), October (1) and November (5) do not show moult, other individuals from August (3) and November (1) are undergoing their main moult.

Nidification. Two nests were found by Bradley (1955), apparently in October-November, whose description and photograph show a typical *Zosterops*-nest; the two eggs of one clutch were described as plain white with a faint greenish-blue tint, dimensions 20 × 15 and 19 × 14 mm.

Habits, etc. Hamlin (in Mayr & Hamlin, 1931) observed the species in considerable numbers feeding in papaya trees, and this was confirmed by Wolff (1955), who further calls it one of the most common birds of Rennell. The song was described as being soft and having a very quick time, the alarmnote as a hoarse "ghae-ghae-ghae", and the call note as a low and quickly repeated whistle.

Stomachs contained green berries of pea-size and small insects (Bradley & Wolff, 1956).

Laird & Laird (1959) recorded *Woodfordia superciliosa* as a host of the protozoon *Trypanosoma paddae* Laveran & Mesnil, of *Haemoproteus johnstoni* Laird & Laird in the erythrocytes, and *Atoxoplasma paddae* (Aragão) in lymphocytes and monocytes. The last-mentioned two species were also found in *Zosterops g. rennelliana*. Clay (1957) listed two genera of Mallophaga from *W. superciliosa*.

Species 2. **Woodfordia lacertosa** (Murphy & Mathews)

Sanfordia lacertosa Murphy & Mathews, Am. Mus. Nov. 356, 1929, p. 13 — Santa Cruz Island.

Sanfordia lacertosa; Mathews, Syst. Av. Australas. II, 1930, p. 713 (Santa Cruz); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 27 (Ile Ndeni, Ndendi, Nitendi ou Egmont dans le groupe Santa Cruz au Nord des Nouvelles Hébrides); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 234 (Santa Cruz-Inseln: Ndendi).

Woodfordia (*Sanfordia*); Mayr, Mitt. Zool. Mus. Berlin 19, 1933, p. 317 (Santa Cruz-Inseln).

Woodfordia lacertosa; Meise, Proc. 8th Int. Orn. Congr. (1934), 1938, p. 87, 179 (Santa Cruz Insel); Mayr, Birds Southwest Pacific, 1945, p. 210 (Santa Cruz Isl.); Greenway, Extinct Birds, 1958, p. 69 (Santa Cruz); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 320 (Santa Cruz (Ndeni) Island).

Characters. In general appearance very similar to *W. superciliosa* but browner both above and below, with a longer bill; eye-ring present, and area around the eye completely feathered. Essentially this is a brown bird. with a fairly strong straw coloured bill and a narrow white eye-ring (fig. 16).

Upper parts of a brown colour not given by Ridgway, warmer and lighter than Dresden Brown, darker than Isabella Color; lores and some feathers below the eye whitish; eye-ring white, rather narrow; primaries, secondaries and rectrices varying from Saccardo's Umber to Sepia, the primaries and secondaries broadly, the rectrices narrowly edged with a colour slightly brighter than the colour of the mantle; particularly on the outer edges of the secondaries there is sometimes a more rufous tinge (this is most conspicuous in the type).

Under parts. Whole under surface more or less Cinnamon-Buff; on the sides of head and breast there is a smooth intergradation between the, anyway very similar, colours of upper and under surface.

Unfeathered parts. Iris brown, bill straw, legs straw or light yellow (Beck).

Measurements. Wing 7 ♂, 81-85 (82.86); 8 ♀, 82-86 (83.44); 15 specimens, 81-86 (83.17); tail 7 ♂, 45½-52 (49.21); tail 8 ♀, 48½-51 (49.56); 15 specimens 45½-52 (49.40); tarsus 15 specimens, 23¾-26½ (25.62); entire culmen 15 specimens, 23¼-25¼ (24.33); exposed culmen 15 specimens, 18½-21½ (20.65); culmen from anterior point of nostril 15 specimens, 13½-15½ (14.80).

Structure. Wings rounded, usually 8>2>9; plumage soft; tail relatively short, tail: wing index of 15 specimens 59.4%.

Distribution. Confined to Santa Cruz Island or Ndeni, the largest of the Santa Cruz Islands.

First collector. R. H. Beck of the Whitney South Sea Expedition, on 23 February, 1927.

Figure. See fig. 16; otherwise the species has not been figured.

Type. AMNH no. 222157 (type examined).

Moult. Of the 15 specimens examined, all collected from 23-27 February, 1927, one shows moult in both primaries and rectrices; two primary moult only, the others are not moulting main feathers though at least one shows moult of forehead feathers.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. *Woodfordia lacertosa* is the largest species of the family, though closely followed by *Megazosterops palauensis*.

Genus **Rukia** Momiyama

Rukia Momiyama, Birds Micronesia, 1922, p. 2 — type by original designation, *Tephras ruki* Hartert.

Kubaryum Momiyama, Birds Micronesia, 1922, p. 1 — type by original designation, *Zosterops oleaginea* Hartlaub & Finsch.

Cinnyro[r]hyncha Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931 (15 Oct.), p. 599 — type by monotypy, *Cinnyrorhyncha longirostra* Taka-Tsukasa & Yamashina.

Rhamphozosterops Mayr, Orn. Monatsber. 39, 1931 (4 Nov.), p. 182 — type by original designation and monotypy, *Rhamphozosterops sanfordi* Mayr = *Cinnyrorhyncha longirostra* Taka-Tsukasa & Yamashina.

Generic characters. Large slender-billed white-eyes, mainly characterized by their aberrant coloration, which is brownish, not greenish. Bill and legs are also of unusual coloration, though differing from species to species. The eye-ring can be almost complete (*R. oleaginea)*, developed under the eye only *(R. ruki)* or virtually absent (*R. longirostra*).

Structurally the three species agree in having a moderately rounded wing, with 2 = 7 to 2 = 8, and a fairly short tail. Tail : wing index of *R. oleaginea*

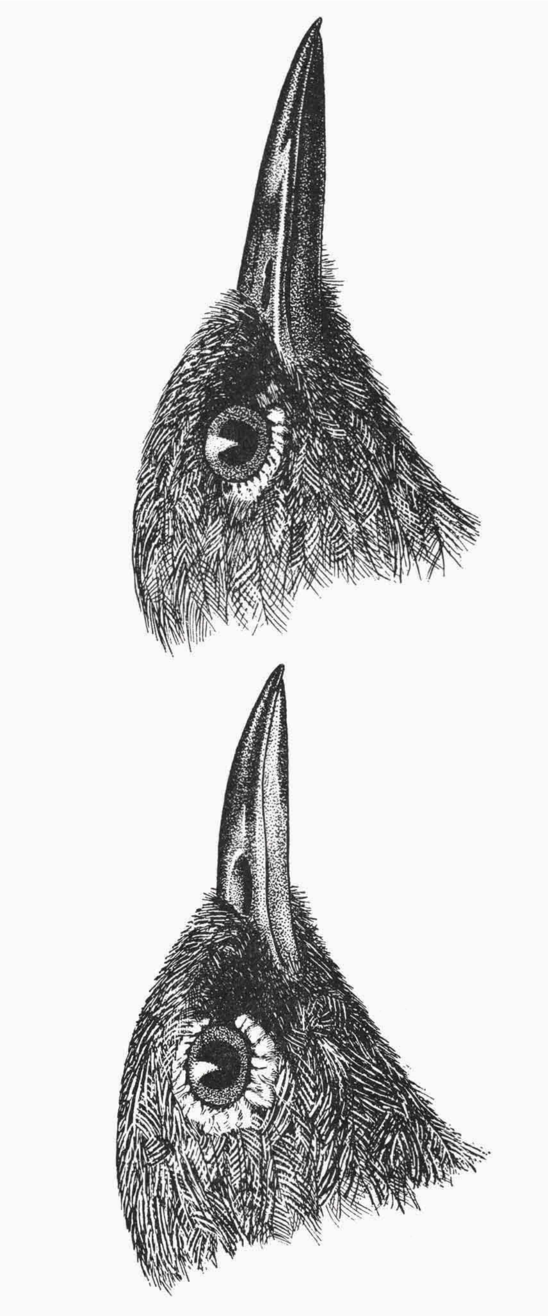


Fig. 17. Heads of *Rukia oleaginea* (left) and *Rukia ruki* (right). Note the incomplete eye-ring of *R. ruki*. × 2½.

(3 specimens 62.0%, of *R. ruki* (10 specimens) 59.6%, and of *R. longirostra* (20 specimens) 59.6%.

Distribution. Confined to three islands in the Carolines: Yap, Truk, and Ponape, each of which has its own species.

Discussion. Two of the three species constituting this genus, *R. oleaginea* and *R. ruki*, show an overall similarity which is strongly suggestive of close relationship. The third species, *R. longirostra*, is far more distinctive, especially on account of its long, slender, and slightly curved bill. There might be some justification in keeping this species in a separate genus, but its characters are not so aberrant that they preclude the possibility of affinity to the other two species. The general agreement in wing-formula and tail: wing index also suggests this.

Mayr (1944), the first to unite the large species of Melanesia, including *Megazosterops palauensis* which is kept separate by me, in one genus, used the name *Rukia* for it, on the basis of the first-reviser principle. Yamashina (1953, 1954) used the name *Kubaryum* on account of page priority. Both authors were right as Yamashina wrote during the short period, following the Paris congress, that page priority was obligatory. As now the Rules of Zoological Nomenclature have been changed once more to acceptance of the first-reviser rule, the name *Rukia*, which has the advantage of being short and having the same gender as the "mother-genus" *Zosterops*, has again become valid.

Species 1. **Rukia oleaginea** (Hartlaub & Finsch)

Zosterops oleaginea Hartlaub & Finsch, Proc. Zool. Soc. London, 1872, p. 89, 95 — island of Uap.

Zosterops oleaginea; *Gräffe, Journ. Mus. Godeffroy 2, 1873, p. 122 (Yap); Finsch, Tierreich 15, 1901, p. 24 (Yap oder Uap); Dubois, Syn. Av. I, 1902, p. 708 (Ile Uap (Carolines)); Sharpe, Hand-List Birds V, 1909, p. 7 (Caroline Is. (Uap Isl.)); Reichenow, Die Vögel II, 1914, p. 469 (Karolinen); Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 64 (Mack.); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 230 (Yap); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 173 (Yap); Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 165 (Yap); Hachisuka, Avicult. Mag. (5) 5, 1940, p. 174 (Yap); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 192 (Yap); Anonymus, Ill. Encycl. Fauna Jap., rev. ed., 1949, p. 88 (Yap).

Zosterops oleagina; Giebel, Thes. Orn. III, 1877, p. 777 (Mackenzie); Schmeltz in Schmeltz & Krause, Ethn. Abth. Mus. Godeffroy, 1881, p. 391, footnote 3 (Yap); Sharpe, Cat. Birds Brit. Mus. IX, 1884, p. 187 (Uap); Wiglesworth, Abh. Ber. Mus. Dresden [3], 1890/91, (6), 1892, p. 37 (Uap); Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (3) 7, 1895, p. 208 (Uap); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 165 (Carolinas, Uap); Bolau, Mitt. Naturh. Mus. Hamburg 15, 1898, p. 60 (Ins. Yap); Page, Bird Notes N. S. 4, 1913, p. 2 (Is. of Uap).

Zosterops oleaginus; Finsch, Syst. Uebers. Thätigk., 1899, p. 112 (Yap).

Tephras oleaginea; Matschie, Journ. f. Orn. 49, 1901, p. 112 (Yap); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Kubaryum oleaginus; Momiyama, Birds Micronesia, 1922, p. 1, Jap. text p. 264, pl. VII fig. 4 (Yap); Kuroda in Momiyama, Birds Micronesia, 1922, p. 77 (Mackenzie).

Kubaryum oleagineum; Mathews, Syst. Av. Australas. II, 1930, p. 712 (Yap Island).

Rukia oleaginea; Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Yap); Mayr, Birds Southwest Pacific, 1945, p. 300 (Yap Isl.); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 331-332, 335 (Yap); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 320 (Yap).

Rukia [*Kubaryum*] *oleaginea*; Fisher, Pacific Sc. 4, 1950, p. 62 (Yaptown, Yap Island).

Kubaryum oleaginea; Yamashina, Proc. 7th Pacific Sc. Congr. IV, Zool., 1953, p. 64 (Yap); Yamashina, Misc. Rep. Yamashina's Inst. 4, 1954, p. 136 (Yap).

Rukia oleagina; Greenway, Extinct Birds, 1958, p. 82 (Yap).

Characters. A brownish species with a well developed eye-ring which is interrupted in front only.

Upper parts including forehead, generally brownish Citrine; lores blackish, the black continued under the eye-ring; eye-ring of average width, interrupted in front by the usual blackish spot of the loral line; primaries, secondaries and rectrices blackish brown; primaries and secondaries broadly edged with the colour of the mantle, but slightly brighter, rectrices broadly edged with dark Isabella.

Under parts. Throat dull yellowish, becoming brownish Citrine, paler than the mantle, towards the upper breast, and extending as such over the whole breast and centre of belly. Flanks, remainder of belly and under tail coverts dark Isabella.

Note. The species is rare in collections, and only three specimens were examined, a male, a female, and a juvenile female. The above description is of the male; the adult female is similar to the male, but distinctly darker. Probably this difference is due to individual variation rather than sexual dimorphism, but without further material there is no point in further discussion.

Unfeathered parts. Iris reddish white, bill fulvous, with the basal part of the mandible yellowish, legs pale, probably yellow (Hartlaub & Finsch, 1872).

Measurements of three specimens (♂, ♀ and ♀ imm., given in this sequence): wing 72½, 69½, 70; tail 45, 41½, 45; tarsus 20¾, 19¾, 20½; entire culmen 18½, 17, 18; exposed culmen 14½, 13½, 14; culmen from anterior point of nostril 10½, 10¼, 11¼.

Distribution. Only known from Yap Island, where it is apparently uncommon. Localities of specimens examined are Garagai, and one mile N.W. of Yaptown.

First collector. J. S. Kubary, in or before 1871.

Figures. Kuroda (1933), plate 20 no. 165 (small coloured figure); Anonymus (1949), p. 88 (small black-and-white drawing); this paper, fig. 17.

Type. Of the three cotypes, one is in Hamburg (Bolau, 1898; confirmed by Meise, in litt., 9-IX-1966), the two others have not been traced.

Moult. The three specimens examined, collected in January, April, and August, are not in moult.

Nidification. Unknown.

Habits, etc. Very little has been recorded on this species, and recent authors (Hachisuka, 1940; Fisher, 1950) agree that it is rare. In a month spent on Yap Island, Fisher (1950) met with it but twice, both times very near Yaptown (the juvenile female examined was collected by Fisher), one in a bush overhanging a swamp in dense jungle, the other in low thick underbrush 200 yards from a swamp.

Species 2. **Rukia ruki** (Hartert)

Tephras ruki Hartert, Bull. B.O.C. 7, 1897, p. V — Ruk, in the Caroline group.

Tephras ruki; Hartert, Ibis (7) 4, 1898, p. 144 (Ruk); Hartert, Nov. Zool. 7, 1900, p. 3 (Ruk); Matschie, Journ. f. Orn. 49, 1901, p. 112 (Ruck); Hartert, Nov. Zool. 27, 1920, p. 438 (Ruk (Truk)); Mathews, Syst. Av. Australas. II, 1930, p. 712 (Caroline Islands); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Zosterops ruki; Finsch, Tierreich 15, 1901, p. 46 (Ruk-Gruppe); Dubois, Syn. Av. I, 1902, p. 713 (Ile Ruk (Carolines)); Sharpe, Hand-List Birds V, 1909, p. 18 (Caroline Is. (Ruk Isl.)); Reichenow, Die Vögel II, 1914, p. 470 (Ruk); Taka-Tsukasa & Kuroda, Tori 1 (2), 1915, p. 64 (Ruk); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 230 (Truk); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 172 (Truk); Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 169 (Truk); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 191 (Truk); Anonymus, Ill. Enc. Fauna Jap., rev. ed., 1949, p. 88 (Truk).

Rikia ruki; Momiyama, Birds Micronesia, 1922, p. 2 (Ruk).

Rukia ruki; Kuroda in Momiyama, Birds Micronesia, 1922, p. 78 (Ruk); Momiyama, Birds Micronesia, 1922, Jap. text p. 265, pl. VII fig. 5 (Ruk); Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (Truk Island); Mayr, Birds Southwest Pacific, 1945, p. 301 (Truk); Stresemann, Ibis 90, 1948, p. 334 (Truck Island); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 332 (Truk); Stresemann, quoted by Amadon & Basilio, Am. Mus. Nov. 1846, 1957, p. 4 (Truck Island); Greenway, Extinct Birds, 1958, p. 82 (Truk); Brandt, Condor 64, 1962, p. 418, 434, 435, fig. 9 (Tol Island, Truk Atoll); Berndt & Meise, Naturgesch. d. Vögel II, 1962, p. 551 (Ruk); Vincent, Red Data Book, Aves, 1966, p. 245 (Truk); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 320 (Truk); Vincent, Bull. C.I.P.O. 10, 1967, p. 97 (Truk).

Kubaryum ruki; Yamashina, Proc. 7th Pacific Sc. Congr. IV, Zool., 1953, p. 63 (Truk Island); Yamashina, Misc. Rep. Yamashina's Inst. 4, 1954, p. 135 (Truk Island).

Characters. Characterized by uniform brown-sepia plumage, incomplete eye-ring, fairly long and slender bill and orange-yellow legs.

Upper parts as well as under parts entirely brown-sepia; lores dull black; eye-ring present, but white feathers developed under the eye only; primaries rather darker, more blackish brown, than remainder of feathers;

primaries, secondaries, wing-coverts and rectrices edged with a colour which is slightly more olivaceous than the rest of the plumage; the primaries and secondaries do not have white inner edges.

Unfeathered parts. Iris red, bill black, legs orange-rufous, claws mouse-brown (Hartert, 1897); iris madder brown, bill black, legs ochraceous buff (Yamashina's collector).

Measurements of ten specimens 6 ♂, 3 ♀, 1 ?): wing 77½-83 (81.00), tail 46-50 (48.20), tarsus 23-24½ (23.80), entire culmen (nine specimens only) 19¾-21 (20.42), exposed culmen (nine specimens only) 15½-17¾ (16.36), culmen from anterior point of nostril (nine specimens only) 11-12¾ (11.72).

Distribution. Confined to the Truk group of islands. Notes on labels and published information leave us in doubt if the species is confined to one island or occurs on several. The Truk group contains half a dozen major islands, on which the species might be expected to occur, and another five or six where it might also live. The material I have seen is merely labelled Ruck, with the exception of two specimens taken by Yamashina's collector, which were taken at Suijo To (this is doubtless Tol in the Shichiyo group, the largest of the Truk Islands).

First collector. Owston's Japanese collectors in November 1895.

Figures. Momiyama (1922), plate VII fig. 5 (coloured figure); Kuroda (1933), plate 20 no. 169 (coloured figure); Anonymus (1949, p. 88), figure; Brandt (1962), fig. 9 (black and white sketch); this paper, fig. 17.

Type. The original description was based on an unstated number of individuals of both sexes, but later Hartert (1900) recorded that eight specimens had been obtained. Much later Hartert (1920) listed as type a male collected on 25 November 1895, Owston's coll. no. B 15. At present the bird kept as type is a male, 23 November 1895, Owston's no. 1315, AMNH no. 701365 and I am inclined to believe that this is the same bird listed by Hartert: 1315 might easily become B 15 through careless reading. Actually, all eight specimens are cotypes: seven are now AMNH nos. 701365-71, one is BM no. 98.4.29.15. I have examined all eight cotypes.

Moult. Specimens collected in June (1), November (3), and December (5) are not in moult; one specimen taken in June shows tail moult, no wing moult.

Nidification. Not recorded.

Habits, etc. Not recorded. The local name is given as Nikildon on several labels. The species appears to be rare, or at least local because, as Hartert (1900) pointed out, Kubary during his long stay on the islands never met with it, and Brandt (1962), though making inquiries with the natives, failed to trace it.

Species 3. **Rukia longirostra** (Taka-Tsukasa & Yamashina)

Cynnirorhyncha longirostra Taka-Tsukasa & Yamashina, Dobuts. Zasshi 43, 1931 (15 Oct.), p. 599 — Ponape Island, Caroline Islands.

Rhamphozosterops sanfordi Mayr, Orn. Monatsber. 39, 1931 (4 Nov.), p. 182 — Insel Ponape (Karolinen).

Rhamphozosterops sanfordi; Mathews, Ibis (13) 2, 1932 (1 Jan.), p. 156 (Ponape Island); Snouckaert, Alauda (2) 4, 1932 (early), p. 110 (Ponapé); Mayr, Proc. 6th Pacific Sc. Congr. 4, 1940, p. 204 (Ponape).

Cinnyrorhyncha longirostra; Taka-Tsukasa & Yamashina, Dobuts. Zasshi 44, 1932 (15 June), p. 222 (Ponape); Hachisuka & al., Hand-List Jap. Birds, rev., 1932, p. 172 (Ponapé); Meise, Proc. 8th Int. Orn. Congr. (1934), 1938, p. 87, 180 (Ponape); Hachisuka, Tori 11, 1942, p. 343, 348 (Ponape); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 191 (Ponapé); Anonymus, Ill. Enc. Fauna Jap., rev. ed., 1949, p. 87 (Ponape); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Cinnirorhyncha; Yamashina, Bull. Biogeogr. Soc. Jap. 3 (2), 1932, p. 146-147 (Ponape).

Cinnyrorhyncha longirostris; Mathews, Ibis (13) 3, 1933, p. 94 (Ponapé Island).

Rhamphozosterops; Mayr, Ibis (13) 3, 1933, p. 389-390 (Ponapé); Mayr, Mitt. Zool. Mus. Berlin 19, 1933 (29 Sept.), p. 319 (Ponape).

Rukia sanfordi; Mayr, Am. Mus. Nov. 1269, 1944, p. 7-8 (Ponapé); Mayr, Birds Southwest Pacific, 1945, p. 301 (Ponapé); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 333 (Ponapé); Greenway, Extinct Birds, 1958, p. 82 (Ponape); Vincent, Red Data Book, Aves, 1966, p. 246 (Ponapé); Vincent, Bull. C.I.P.O. 10, 1967, p. 97 (Ponapé Island).

Kubaryum longirostra; Yamashina, Proc. 7th Pacific Sc. Congr. 4, 1953, p. 64 (Ponape); Yamashina, Misc. Rep. Yamashina's Inst. 4, 1954, p. 137 (Ponape).

Rukia longirostra; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 321 (Ponape).

Characters. The long and slender, slightly curved, bill is the main character of this species which is further distinguished by its light, greenish-brown plumage, vestigial eye-ring and yellowish legs.

Upper parts. Generally Saccardo's Olive, slightly greener on the head and more buffish on the upper tail coverts; eye-ring vestigial; remiges and rectrices blackish brown, all with olive to brownish margins; primaries and secondaries with whitish to brownish inner edges.

Under parts mostly Isabella Color, strongest on the flanks; chin, throat and centre of under parts slightly tinged greenish yellow.

Unfeathered parts. Iris chestnut, bill brownish black, basal half of mandible brownish with a green tinge, legs pale yellow or yellowish-orange (Coultas).

Measurements. Wing 14 ♂, 69-72 (70.50); 7 ♀, 69-73½ (70.79); 21 specimens, 69-73½ (70.60); tail 13 ♂, 39-46½ (42.12); 7 ♀, 40-45½ (42.00); 20 specimens, 39-46½ (42.08); tarsus 21 specimens, 21-22¾ (21.72); entire culmen 18 specimens, 21¾-24¾ (23.26); exposed culmen 17 specimens, 19-21¼ (20.09); culmen from anterior point of nostril 19 specimens, 13½-15¼ (14.51).

Structure. The only species with a bill which is longer than the tarsus. Tail short, tail:wing index of twenty specimens 59.6 %. Wing of normal shape, 2 = 7 to 2 = 8.

Weight. ♂ 17.9 g.

Distribution. Confined to the island of Ponape.

First collector. W. F. Coultas on 18 November, 1930 (AMNH no. 329093).

Figure. Anonymus (1949, p. 87), figure.

Type. Yamashina Institute no. 11230, from Colonia, Ponape Island. The type of *Rhamphozosterops sanfordi* is AMNH no. 329094 (specimen examined).

Moult. Specimens collected in February (1), November (1) and December (16) do not show moult. One specimen collected in April, an immature female with the skull half ossified, is moulting primaries and rectrices; one December bird is just completing its primary-moult, and another moults wing-coverts, no main moult.

Nidification. Not recorded. Birds collected in December and February had greatly enlarged gonads.

Habits, etc. Found in hilly and mountainous country in primary and secondary forest. Coultas heard a: "deep-throated sibilation". Two specimens collected in 1956 (USNM, leg. J. T. Marshall), indicate that the species has managed to survive well, though it appears always to have been uncommon.

Discussion. This species was described and named almost simultaneously by Taka-Tsukasa & Yamashina and Mayr. The journal in which Taka-Tukasa & Yamashina published their description is dated 15 October 1931, and Mayr's description appeared on 4 November 1931. In subsequent papers, Mayr has claimed that the Japanese journal was antedated, and that his description has priority of publication, and this has caused a nomenclatural confusion which lasts to this day. On the basis of information received from the Editor of Dobutsugaku Zasshi and from Marquis Yamashina, as well as published evidence (Yamashina, 1953, 1954), I am satisfied that the name *longirostra* has priority over *sanfordi*. Mayr (1967) agrees now.

Genus **Megazosterops** Stresemann

Megazosterops Stresemann, Orn. Monatsber. 38, 1930, p. 159 — type by original designation and monotypy, *Cleptornis palauensis* Reichenow.

Generic characters. Large, aberrant coloured birds with yellow supercilium, an eye-ring which is not white but yellowish, soft plumage, broad primaries and secondaries, relatively short tail, relatively short second primary, rounded wings, a rather heavy bill, and strong legs.

Distribution. That of the single species: Palau Islands.

Discussion. At first sight one would, perhaps, not regard *M. palauensis* as a member of the Zosteropidae; Reichenow described it in *Cleptornis* but Stresemann found its true affinities. *Megazosterops palauensis* can certainly not be placed in the genus *Zosterops*. Mayr (1944) proposed to unite it with the other large Polynesian species in *Rukia*, from which, however, it differs in its soft plumage, heavy bill, yellowish eye-ring and broad primaries. As I am not convinced that *Megazosterops* is closer related to *Rukia* than to other members of the Zosteropidae, I prefer to retain it as a monotypic genus.

Species 1. **Megazosterops palauensis** (Reichenow)

Cleptornis palauensis Reichenow, Journ. f. Orn. 63, 1915, p. 125 — Babeldzuap (Palauinseln).

Megazosterops palauensis; Stresemann, Orn. Monatsber. 38, 1930, p. 159 (Baobeltaob); Mathews, Ibis (13) 1, 1931 (1 Jan.), p. 48 (Pelew Island); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 26 (Baobeltaob, Iles Palau ou Pelew); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 235 (Baobel Taob); Mathews, Ibis (13) 2, 1932, p. 156 (no locality); Hachisuka & al., Hand-List Jap. Birds, rev. 1932, p. 172 (Babelthuap); Yamashina, Tori 10, 1940, p. 674 (Peliliu I.); Hachisuka & al., Hand-List Jap. Birds, 3rd ed., 1942, p. 191 (Babelthuap, Peliliu); Taka-Tsukasa, Birds Nippon, 1967, p. 604 (no locality).

Rukia palauensis; Mayr, Am. Mus. Nov. 1269, 1944, p. 7 (no locality); Mayr, Birds Southwest Pacific, 1945, p. 300 (Peliliul Isl.); R. H. Baker, Smiths. Misc. Coll. 107 (15), 1948, p. 74 (Peleliu Island: Eastern Peninsula, Southeastern Peninsula); Marshall, Condor 51, 1949, p. 218, 219 (Peliliu); R. H. Baker, Univ. Kansas Publ., Mus. Nat. Hist. 3, 1951, p. 330 (Babelthuap, Peleliu); Greenway, Extinct Birds, 1958, p. 80 (Babelthuap, Angaur); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 320 (Babelthuap, Peleliu, Ngurukdapel).

Kubaryum palauensis; Yamashina, Proc. 7th Pacific Sc. Congr. IV, Zool., 1953, p. 64 (Palau); Yamashina, Misc. Rep. Yamashina's Inst. 4, 1954, p. 136 (Palau).

Characters. A very large species of which the structural peculiarities have been indicated in the diagnosis of the genus.

Upper parts, including rump and outer edges of primaries, secondaries and rectrices, between Medal Bronze and Dark Citrine, but somewhat paler: also close to Saccardo's Olive but with a slightly richer and more yellowish tinge, especially on the neck; crown feathers greyish towards their bases, which gives the crown a very slightly mottled appearance; a pale yellowish superciliary stripe runs from the anterior part of the eye, widening backwards; eye-ring narrow, pale yellow, interrupted in front by the pale yellowish-dusky lore; feathers of ear coverts greyish with yellowish central streak.

Under parts. Flanks Buffy Citrine; remainder of under parts close to that colour but slightly more greenish-yellow.

Unfeathered parts. Iris greyish brown; bill, upper light tan, yellowish tomia, lower dull yellow, tomia darker; legs tawny, pads yellow (Coultas); iris medium to dark rufous brown, bill olive green or olive yellow and grey brown, legs olive green (P. J. R. Hill).

Measurements. Wing 15 ♂, 80-85 (82.37); 10 ♀, 79-83½ (81.45); 26 specimens, 79-85 (82.04); tail 17 ♂, 47-53 (51.20); 10 ♀, 48-54 (50.90); 26 specimens, 47-54 (51.04); tarsus 28 specimens, 24½-27 (25.44); entire culmen 25 specimens, 19½-21½ (20.57); exposed culmen 25 specimens, 15½-17¾ (16.90); culmen from anterior point of nostril 25 specimens, 11½-13¾ (12.47).

Weights. ♂ 24.5, 27, 30.5; ♀ 27.5 g.

Structure. Some particulars have been given above as generic characters. The 2nd primary is short, wing formula 9 = 2, 9>2>10, or 2 = 10; tail short for a species of this size, average index of 26 specimens, 62.2 %.

Distribution. Confined to the Palau Islands, where known from the following islands of the group: Babelthuap (type locality), Ngurukdapel (Urukthapel), and Peleliu (material from these two islands examined). Greenway (1958) lists the species for Angaur, but that is evidently a slip for Peleliu.

First collector. A. Winkler, a person concerning whom I have been unable to discover particulars (see below under Type).

Not figured.

Type. The two cotypes are ZMB no. B 537/2 and 49.156. "Die Etiketten tragen kein Erlegungsdatum. Beide Vögel ..... stammen von Babeldzuap auf Palau. Sie sind mit 62 anderen Vögeln am 14. Oktober 1908 als Geschenk in unsere Sammlung gelangt. Der Sammler ist auch mir Unbekannt" (Mauersberger, in litt., 17-V-1966).

Moult. Specimens collected in March (2), May (3), June (1), August (4), September (4), and December (7) show no moult; the August and September birds are in very worn plumage, the December birds are in fresh plumage. Five other December birds are in various, usually advanced, stages of their main moult. Probably the main moult takes place from October till December.

Nidification. Not recorded.

Habits, etc. Marshall (1949) and Baker (1951) agree that this species, contrary to almost all other members of the Zosteropidae, does not live in flocks, but solitary or in pairs, though Coultas (MS.: Journal and Letters II, p. 287) obtained all his specimens from a flock (the nine specimens in the AMNH have, indeed, all been collected on the same day, 18 December 1931). Coultas met with the species on Peleliu only; the flock he observed was feeding in the tops of low trees and brambles. According to Marshall the species does not even suggest, let alone resemble, other species of Zosteropidae on these islands (*Z. conspicillata, Z. cinerea*).

Marshall has described the song which also appears to be very different from that of other members of the family. I quote: "When one male begins to sing, others in the vicinity do likewise and a chorus ensues. After a time they suddenly stop and streak away into the vine tangles, bursting into song again one-quarter to half an hour later from a different group of trees .... The remarkable song consists of high-pitched loud whistles and trills. Several opening whistles have a marked downward inflection and a strained quality as if uttered in extreme agony. These are followed by a long trill which surges in intensity, and there are whistles of upward inflection uttered polyphonically while the trills continue as a background. The song therefore sounds somewhat like two canaries singing at the same time". From verbal descriptions, however well-written, it is impossible to gain more than the faintest idea of what a song is like, but I want to mention that a canary-like quality has been recorded in the song of several species of Zosteropidae.

Coultas (MS) mentioned that when feeding and on the wing the birds have a sweet little sibilation, similar to *Rukia longirostra*. His experience was that they are nectar-eaters that frequent flowering trees.

Discussion. It was about the survival of this species rather than *Z. cinerea finschii* that Mayr (1945) was concerned, but it has been taken since by several collectors. Mayr (1945) thought that the species was confined to Peleliu, and that, indeed, is the island where most collectors obtained it. According to Marshall (1949) it was abundant on Peleliu, but absent from similar environment on neighbouring islands. In 1950, however, P. J. R. Hill collected six specimens on Ngurukdapel (Peabody Museum).

Genus **Hypocryptadius** Hartert

Hypocryptadius Hartert, Bull. B. O. C. 14, 1903, p. 13 — type by monotypy, *Hypocryptadius cinnamomeus* Hartert.

Generic characters. For the characters of the single species contained in the genus, see the discussion and the description of the species.

Distribution. Mountains of Mindanao: for particulars see under *Hypocryptadius cinnamomeus*.

Discussion. Ever since Hartert (1903) described the monotypic genus *Hypocryptadius* in the Zosteropidae, apparently mainly on the basis of the reduced outer primary, it has remained there. With the exception of

Hachisuka (1930), who placed the species and genus in a separate subfamily, though still maintaining it in the Zosteropidae, nobody seems to have queried its position as a, not particularly aberrant, genus of the very uniform family of the Zosteropidae. In part I of this revision, before having made a close study of *Hypocryptadius* I lightheartedly rejected Hachisuka's subfamily Hypocryptadiinae, mainly because in its diagnosis Hachisuka did not extend in any way the characters used by Hartert to diagnose the genus.

As a result of more careful investigations, my opinion on the systematic position of *Hypocryptadius* has now entirely changed. I believe no longer that Hachisuka went too far in creating a separate subfamily for the genus, but that he did not go far enough. In other words, I do not believe that *Hypocryptadius* belongs to the Zosteropidae.

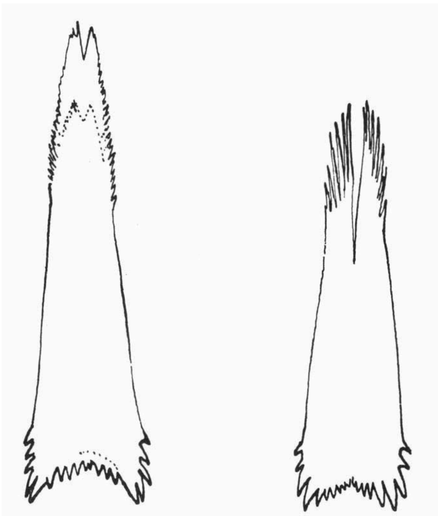


Fig. 18. Tongues of *Hypocryptadius cinnamomeus* (left), and *Lophozosterops goodfellowi malindangensis* (right), 5 ×. *Hypocryptadius* has a tongue which is only slightly divided at the tip, and there is laterally a short fringe. *Lophozosterops goodfellowi,* more or less typical of all Zosteropidae, has the tongue deeply bifid, ending in filaments.

The morphological characters which caused my change of view have for the greater part been observed by Hartert, but their value could not be fully appreciated without a knowledge of these same characters in all other species of Zosteropidae. The bill of *Hypocryptadius* is of a different shape, stronger than in the Zosteropidae, and, as noted by Hartert, there is not such a distinct ridge over the culmen. The openings of the nose are round, the posterior part of the nostrils being entirely closed by the operculum. In all Zosteropidae, the nose opening is a slit, covered by an operculum, the lower border of which is entirely free. The tongue is not bifid and brush like, and entirely different from that of the Zosteropidae. Hartert (1903) correctly noted: "feet very strong". What he did not mention, however, is that the tarsus is relatively shorter than in any member of the Zosteropidae. Species with a wing length of about 70 mm (*Zosterops strenua, Chlorocharis emiliae*) have a tarsus of the same length as *Hypocryptadius*. In colour *Hypocryptadius* differs from all Zosteropidae. Even the brown Zosteropidae have a cold brown plumage, never the deep cinnamon of *Hypocryptadius*. In size *Hypocryptadius* exceeds all the Zosteropidae; in wing length it exceeds the largest member of the Zosteropidae, *Megazosterops palauensis* over 12 % or about 10 mm. There is no eye-ring; the feathers on the rim of the eye are of the same brown colour as the remainder of the body. The two last-mentioned arguments, of course, have only relative weight: one species has to be the largest of the family, and there are several species without an eye-ring. They add to the importance of the other characters, however, and show that the bird as a whole is aberrant, not just a few of its characters.

When considering the relatively slight differences between the different families of Passeriformes as at present accepted, I regard the characters listed above certainly as sufficient to remove *Hypocryptadius* from the Zosteropidae. Perhaps I should mention that examination of the skins had convinced me already that *Hypocryptadius* does not belong to the Zosteropidae, but that I postponed a definite conclusion until I could examine its tongue, an additional character. The alcohol specimens subsequently received from Professor Rabor confirmed my expectation that the tongues are not at all *Zosterops*-like (fig. 18), and my opinion that *Hypocryptadius* has nothing to do with the Zosteropidae.

The only character *Hypocryptadius* shares with the Zosteropidae, as well as with various other groups of Passerine birds, is the reduced first primary. I can confirm, after examination of several spirit specimens, that there are nine developed primaries, nine secondaries, and twelve rectrices.

Naturally I have tried to find if *Hypocryptadius* can be placed in any other known family but I have been unsuccessful. Several other ornithologists with a greater knowledge of the avifauna of the Indo-Australian region in general and the Philippines in particular, consulted by me (Mayr, Rand) were not able to make a suggestion either. The result is probably that *Hypocryptadius* will end up in the Timaliidae, that convenient group into which anything may be incorporated that fits nowhere else.

Unfortunately nest and eggs of *Hypocryptadius* remain unknown, they might contribute to an understanding of its relationships.

As since its establishment, over sixty years ago, *Hypocryptadius* has been associated with the Zosteropidae, I have decided to include it in this revision, if only to avoid that readers would believe it to be an inadvertent omission.

Species 1. **Hypocryptadius cinnamomeus** Hartert

Hypocryptadius cinnamomeus Hartert, Bull. B.O.C. 14, 1903, p. 13 — Mt. Apo, 8000 ft, Mindanao.

Hypocryptadius cinnamomeus malindangensis Rand & Rabor, Fieldiana, Zool. 42, 1957 (20 Dec.), p. 18 — Gandawan, altitude 4500-5500 feet, Mt. Malindang, Zamboanga Peninsula, Mindanao, Philippine Islands.

Hypocryptadius cinnamomeus pallidigula de Schauensee & du Pont, Proc. Ac. Nat. Sc. Philad. 114, 1962 (26 Oct.), p. 171 — Daggayan, 4500 ft, Misamis Oriental, northern Mindanao.

Hypocryptadius cinnamomeus; McGregor & Worcester, Hand-List Birds Phil. Isl., 1906 (Jan.), p. 96 (Mindanao); Ogilvie-Grant, Ibis (8) 6, 1906, p. 473, pl. XVIII (Mt. Apo 8000 ft); Sharpe, Hand-List Birds V, 1909, p. 21 (Mt. Apo); McGregor, Manual Phil. Birds, 1910, p. 622 (Mount Apo); McGregor, Phil. Journ. Sc. 16, 1920 (April), p. 411, 428 (Mount Apo); Hartert, Nov. Zool. 27, 1920 (Nov.), p. 438 (Mt. Apo 8000 ft); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 207 (Mindanao); Hachisuka, Contrib. Birds Phil. 2, 1930, p. 207 (Mt. Apo 8000 ft); Snouckaert, Alauda (2) 3, 1931 (7 March), p. 27 (Mont Apo); Hachisuka, Birds Phil. Isl. I, 1931 (16 March), p. 41 (Apo); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 235 (Mt. Apo oberhalb 2500 m); Hachisuka, Ois. & Rev. Fr. d'Orn. N.S. 1, 1931 (late), p. 589 (Mont Apo); Stresemann, Orn. Monatsber. 40, 1932, p. 69 (Apo); Hachisuka, Bull. Biogeogr. Soc. Jap. 11, 1941, p. 7 (Mt. Apo); Delacour & Mayr, Birds Phil., 1946, p. 12, 237 (Mt. Apo 3000-6000 ft); Wynne, North W. Nat. N.S. 2, 1954, p. 625 (Mt. Apo); Wynne, Key-List Birds, 1956, p. 91 (Mt. Apo); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 279, 282 (Mt. Malindang 3500-7000 ft); Ripley & Rabor, Postilla 50, 1961, p. 12 (Mount Katanglad).

Hypocryptadius cinnamomeus cinnamomeus; Rand & Rabor, Fieldiana, Zool. 42, 1957, p. 18 (Mt. Apo); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 306 (mountains of south-eastern Mindanao); de Schauensee & du Pont, Proc. Ac. Nat. Sc. Philad. 114, 1962, p. 171 (Mt. Apo, Mt. Malindang); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 326 (Mt. Apo).

Hypocryptadius cinnamomeus malindangensis; Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 280, 306 (Mt. Malindang 3500-7450 ft); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 326 (Mt. Malindang).

Hypocryptadius cinnamomeus pallidigula; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 326 (coastal mountains in Misamis Oriental Province, Mindanao).

Characters. A sturdily built Passerine bird with nine-primaried wings and uniform coloration.

Upper parts entirely bright cinnamon; primaries and secondaries blackish grey with outer edges and inner webs cinnamon. On the outer primary the cinnamon on the inner web occurs only on its basal portion, for just over half its length, but inwards the cinnamon becomes more extensive and on the secondaries is continued to near the feather-tips. The feathers of the alula are also blackish grey, slightly edged with cinnamon: in life they might show up as a greyish wing patch, though much of them would be covered by the cinnamon upper wing coverts. Rectrices largely cinnamon, but with an admixture of grey, especially towards their tips.

Under parts. Chin, throat and breast light cinnamon, gradually becoming paler on lower breast and flanks. Lower flanks, heels and under tail coverts pale buffy grey, centre of belly dirty white.

Unfeathered parts. Iris reddish, light yellowish-red or pale brownish red, bill bluish grey with blackish tip, legs bluish grey (Goodfellow); iris brown, bill plumbeous, dusky on upper side of maximilla, legs plumbeous (Mearns).

Measurements. Wing 15 ♂, 88-96 (92.67); 19 ♀, 87-95 (92.03); 34 specimens, 87-96 (92.32); tail 15 ♂, 51½-57 (54.90); 19 ♀, 53-58½ (55.18); 34 specimens, 51½-58½ (55.06); tarsus 34 specimens, 20-22½ (21.23); entire culmen 34 specimens, 16-19¾ (17.93); exposed culmen 34 specimens, 13-15¾ (14.39); culmen from anterior point of nostril 34 specimens, 9¾-11¾ (10.77).

Structure. Several structural peculiarities, such as shape of bill, tongue and legs have been dealt with in the discussion of the genus. There are some weak black bristles at the gape. The wing-formula is usually with the 3rd, 4th, and 5th primaries longest and much of the same length, and the 2nd agreeing in length with the 7th. There are twelve rectrices, all of practically equal length. Tail:wing index of 34 specimens, 59.6%; tarsus:wing index 23.0%.

Weights. ♂ 27.7, 28.5, 28.6; ♀ 28.4, 29.6, 30.0, 30.5, 31.0, 31.2 g.

Distribution. Mountains of Mindanao with a lower limit of about 1000 m and an upper limit of perhaps 2000 m. It has been recorded from the following mountains: Apo, Malindang, Katanglad, Hilong-Hilong, and the coastal mountains at Daggayan.

First collector. Walter Goodfellow on Mt. Apo in April 1903. It is perhaps worth mentioning that on Mt. Malindang (on the summit of Mt. Bliss) the species was first collected by E. A. Mearns in May 1906 (USNM nos. 202390, 202392, 202393, 210804), but this has never been published and Rand & Rabor (1957, 1960) were evidently unaware of the existence of this material when they described and discussed *H. c. malindangensis*.

Figure. Ogilvie-Grant (1906), plate XVIII (coloured, on about two-thirds natural size, by H. Goodchild: a fair representation, but the colours are not strong enough).

Type. In the original description Hartert confusingly says: "Types ♂♀, No. 121, Goodfellow Coll.". Though he mentioned both sexes, he gave a collector's number for one specimen only, and it appears justified to regard that one as the holotype; later Hartert (1920) again listed it as type. The specimen is now AMNH no. 701496 (type examined).

Moult. No moult in specimens collected in February (3), March (1), April (11), May (5), June (1), July (2) and November (5). Main moult of primaries and rectrices in specimens collected in May (3), June (1) and July (1). Data are still insufficient but it looks as if the main moult commences in May.

Nidification. Unknown.

Habits, etc. Though the species has been collected frequently in recent years, all papers in which it is dealt with are nothing more than faunistic lists and skin catalogues. Nothing about voice and behaviour appears to have been published.

Discussion. *Hypocryptadius cinnamomeus* was regarded as monotypic until Rand & Rabor (1957) described *malindangensis*. The validity of this subspecies was subsequently denied by one of its authors (Ripley & Rabor, 1961). Another attempt at subdivision was made by de Schauensee & du Pont (1962).

The material closely studied by me consisted of two paratypes of *pallidigula* (out of the eleven specimens known), sixteen from Mt. Malindang (topotypical of *malindangensis*), and sixteen from Mt. Apo (type and topotypical specimens of *H. cinnamomeus*), and I am unable to appreciate any significant geographical variation. As regards *pallidigula,* the blackish appearance of primaries and rectrices noted in the original description, might have been caused by fresh material having been compared with faded skins. I see no difference in colour of the throat. The loral line is perhaps a bit on the light side, but here I see no reason for enthusiasm either. The wings of the two specimens are short, ♂ 88, ♀ 87, but come just within the minimum of specimens from Apo and Malindang. As far as *malindangensis* is concerned, there is no need to discuss this name as my conclusions agree with those of Ripley & Rabor (1961). Therefore I again treat *Hypocryptadius cinnamomeus* as a monotypic species.

ADDITIONS AND CORRECTIONS TO PART I

Page 5.

Probably Amadon & Basilio (1957) are right in stating that Moreau (1957) erroneously united two of the *Speirops* species. This means that the genus *Speirops* has four species. It is not clear to me why Amadon & Basilio treat the gender of *Speirops* as masculine.

Page 6.

It is not Sharpe (1891) but apparently A. Newton (1888) who raised the group to family status: "On the whole it seems safest to regard the genus, at least provisionally, as the type of a distinct Family — Zosteropidae — as Families go among Passerine birds ...".

Even earlier A. J. Campbell (1883, p. 40) noted: "It is remarkable that some of our authorities have not created a distinct family name for the genus *Zosterops* ...... The British Museum and others have placed them a sub-family of the *Meliphagidae* or Honey-eaters, the eggs of which are invariably pinkish or salmon-coloured and spotted, whereas the *Zosterops* are of a uniform blue".

Boetticher (1954) deviated from general usage by making the group a subfamiliy of the Promeropidae. His classification presupposes that the nectar-eating Passeres are a monophyletic group, something I regard as unlikely.

Page 7.

My changed views on the status of the genus *Hypocryptadius* have been given on a previous page.

Page 8, line 14: for 43, read 44.

Page 18, 16th line from bottom: for vol. IX, read vol. XI.

Page 19.

Mathews (1919, p. 477) mentions as date of publication of the paper in which the genus *Zosterops* was proposed 17 February 1827; on the other hand I regard it as not impossible that it was actually published at the end of 1826.

Laubmann (1920), in his paper on type fixations in Lesson's "Manuel d'Ornithologie", discussed *Zosterops* and stated: "Für die Gattung *Zosterops* Vig. und Horsf. ergibt sich wie wir oben dargetan haben, *Zosterops dorsalis* Vig. und Horsf. = *Certhia caerulescens* Lath. durch Monotypie als Genotype. Lesson handelte daher keineswegs in Recht, wenn er *Motacilla madoraspatana* [misprint for *maderaspanata*] L. 1766 zur Genotype erhob".

Vaurie (1959) also stated that the type of *Zosterops* is *Z. dorsalis* by monotypy, and at my request for further explanation, Dr. Vaurie wrote (29-II-1960): "In the case of the type species of *Zosterops*, I do, however, consider that it is *dorsalis* by *monotypy*. I am familiar with the literature concerned and aware that a technical objection could be raised, but we need not discuss it".

Although the question is of purely academic interest, for *Z. maderaspatana* and *Z. lateralis* will probably always be regarded as congeneric, I maintain that *Motacilla maderaspatana*, a species expressly included in their new genus by Vigors & Horsfield, has become the type through Lesson's designation.

Page 22.

Zosterops ceylonensis Holdsworth

Additional references.

Zosterops ceylonensis; Newton, Encycl. Brit., 9th ed., XXIV, 1888, p. 824 (Ceylon); Page, Bird Notes N. S. 4, 1913, p. 2 (hills of Ceylon); Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (no locality = Ceylon); Kershaw, Familiar Birds Ceylon, 1925, p. 88 (Ceylon); Henry & Waite, Col. Pl. Birds Ceylon IV, 1935 (Ceylon); Malpas, Adm. Rep. Colombo Mus. for 1935, 1936, p. 10 (Ceylon); Stresemann, Journ. f. Orn. 87, 1939 (Jan.), p. 164 (no locality); Malpas, Adm. Rep. Colombo Mus. for 1938, 1939 (May), p. 9 (Mousekanda, Gammaduwa); Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (no locality); Phillips, Ceylon Journ. Sc. (B) 24, 1951, p. 144, 145 (many localities in Ceylon); Deraniyagala, Adm. Rep. Nat. Mus. Ceylon for 1953, 1954, p. 4 (no locality = Ceylon); Phillips, Birds Ceylon 3, 1955, p. 13, 26 (Nuwara Eliya); Deraniyagala, Adm. Rep. Nat. Mus. Ceylon for 1957, 1958 (April), p. 6 (Ceylon, mountain areas); Gilliard, Living Birds of the World, 1958, p. 351 (Ceylon); Ripley Journ. Bombay Nat. Hist. Soc. 56, 1959, p. 78 (Indian subregion); Ripley, Syn. Birds India and Pakistan, 1961, p. 593 (Ceylon, in the hill zone from 3300 feet up (uncommonly as low as 1500 feet)); Abdulali, Journ. Bombay Nat. Hist. Soc. 61, (1964), 1965 (10 June), p. 568 (Ceylon); Mayr, Breviora 228, 1965, p. 2 (no locality); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 296 (hills and mountains of Ceylon).

Nidification. Phillips (1951), in a publication not previously available to me, has given many interesting particulars. A total of 45 nest-finds were divided over the year as follows: February (2, both still building), March (15), April (10), May (5), June (4), July (2), August (5), and September (2, both with young). Of 32 nests, twenty contained two, and twelve had three eggs. Both sexes build the nest, and feed and care for the young; most probably both incubate the eggs.

Page 37.

Zosterops palpebrosa (Temminck)

Ripley (1961, p. 592) has placed *egregia* in the synonymy of the nominate race. Though I have also suggested this, it seems illogical to maintain *salimalii* and to reject *egregia*, as the former is an even poorer race. For the moment I prefer to maintain my original classification.

Biswas (1963) expressed the opinion that the arrangement proposed by me in 1957 is not entirely satisfactory, and more in particular re-instated *amabilis* as a valid race: "..... on comparing recent collections from the Gir

Forest (Kathiawar), Balaghat District (Madhya Pradesh), Darjeeling District (West Bengal), etc., I find that the Kathiawar series stands out quite distinctly, so that Koelz's *amabilis* is, in my opinion, a valid race".

As my former conclusion was based on only one exact topotype of *amabilis*, besides good series from adjacent Baroda, I requested Dr. Biswas a loan of his specimens, which he most kindly granted. The material received consists of thirteen specimens from Nepal, Assam and Darjeeling, which are clearly referable to the nominate race, four specimens from Balaghat District, very slightly yellower, and six specimens from Gujarat, which are distinctly yellower. This would appear to confirm Dr. Biswas's conclusions as regards the validity of *amabilis*, but comparison of these six specimens with ten skins of *egregia* from Ceylon (RMNH) failed to reveal any difference. As Dr. Biswas did not state that he has examined any topotypical *egregia*, our conclusions are not really contradictory: we both agree that birds from Kathiawar are yellower than those from Nepal, Bengal and Assam, only he calls them *amabilis* (without examination of topotypical *egregia*), and I continue to call them *egregia*. The new fact that has emerged is that specimens from Balaghat District, M.P., belong to the nominate race; on my map (Mees, 1957, fig. 3), Central India was included in the range of *egregia* and this would have caused the divergence of opinion between Dr. Biswas and me. My conclusion is therefore that *amabilis* remains a synonym of *egregia*, and that further investigations in Central India are necessary.

Zosterops palpebrosa nilgiriensis Ticehurst

Additional references.

Zosterops palpebrosa palpebrosa; (pt.) Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Südindien, Bergländer von Mysore südlich); Bates, Bird Life in India, 1931, p. 72 (Kotagiri, Nilgiri Hills).

Zosterops palpebrosa; (pt.) Dewar, Indian Birds' Nests, 1929, p. 35 (Nilgiris).

Zosterops palpebrosa nilgiriensis; Vaurie, Am. Mus. Nov. 1869, 1958, p. 28 (Nilgiris and other hills of the southwest to Travancore); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 565 (Nilgiris and hills of southwestern India to Travancore); Ripley, Syn. Birds India and Pakistan, 1961, p. 592 (intergrades with the nominate form in the Biligirirangan Hills of Mysore, thence south and west to Coorg, Nilgiris and the southern hill ranges of Madras and Kerala, Nelliampathies and Palnis from 1500 (rarely 1000 feet) to 8650 feet); Biswas, Journ. Bombay Nat. Hist. Soc. 60, 1963, p. 190 (Nilgiris, Palnis and associated ranges of south-western India); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 294 (Nilgiri and Palni (Palani) Hills).

Page 40.

Zosterops palpebrosa egregia Madarász

Additional references.

Zosterops palbebrosa; Hartlaub, Journ. f. Orn. 13, 1865, p. 5, 6 (Mussoree).

Zosterops palpebrosus; Stoliczka, Journ. As. Soc. Bengal 37, 1860, p. 51 (Sutlej

Valley, N.W. Himalayas); Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 7 (Ceylon); Eha [= E. H. Aitken], The Common Birds of Bombay, [1901?], p. 116 (Bombay) [1]).

Zosterops palpebrosa; Barnes, Handb. Birds Bombay Pres., 1885, p. 247 (Bombay Presidency: common in the Deccan, rare in Sind); (pt.) Nuyens, De Vogelwereld I, 1886, p. 83 (Ceylon, Indië); Wood-Mason, Ann. Rep. Ind. Mus. April 1888 to March 1889, 1889, app. D, p. 18 (Mount Aboo); Heine & Reichenow, Nomencl. Mus. Hein. Orn., 1890, p. 72 (Ostindien, Ceylon); Jesse, Ibis (7) 5, 1899, p. 345 (Lucknow); Jesse, Ibis (8) 2, 1902, p. 486 (Lucknow); Dewar, Bird Notes 8, 1909 (March), p. 9 (plains of India); Perreau, Bird Notes 8, 1909 (Oct.), p. 218-221 (Baklob); Perreau, Bird Notes N. S. 1, 1910 (June), p. 179 (Bakloh, Punjub); (pt.) Page, Bird Notes N.S. 4, 1913 (Jan.), p. 1 (India: Himalayas to Ceylon, with the Laccadives); Whistler, Bird Notes N. S. 5, 1914, p. 165 (Jhelum, Pundjab); Page, Bird Notes N. S. 8, 1917, p. 32 (Bakloh, Punjab); Babault, Mission Babault, Rés. Sc. Ois., 1920, p. 18, 275 (Moti Nala, C. P.; Colombo); (pt.) Dewar, Indian Birds' Nests, 1929, p. 35 (plains of India, Ceylon); J. R. Baker, Proc. Zool. Soc. London 108 A, 1938, p. 567, 582 (Ceylon); Kendeigh, Parental Care and its Evolution in Birds, Illinois Biol. Monogr. 22 (1-3), 1952, p. 266 (no locality); (pt.) G. Steinbacher, Thieme's Vogelboek, [1959], p. 47 (India en Ceylon); Michaelis, Falke 8, 1961, p. 326 (Indien, Ceylon, und auf den Laccadiven); Watson, Zusi & Storer, Prelim. Field Guide Birds Ind. Ocean, 1963 (early), p. 42 (Laccadives); George & Berger, Avian Myology, 1966, p. 103 (no locality = presumably Baroda).

Zosterops palpebrosa egregia; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Ceylon); Deraniyagala, Adm. Rep. Colombo Mus. for 1937, 1938, p. 12, 13 (Kalawewa, Kambalgamuwa); Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (no locality); Deraniyagala, Adm. Rep. Nat. Mus. Ceylon for 1952, 1953, p. 7 (no locality = Ceylon); Deraniyagala, Adm. Rep. Nat. Mus. Ceylon for 1955, 1956, p. 5 (no locality = Ceylon); Vaurie, Am. Mus. Nov. 1869, 1958, p. 28 (distribution); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 565 (distribution); Paludan, Vidensk, Medd. Dansk naturh. Foren. 122, 1959 (Dec.), p. 318 (Afghanistan); Phillips, Birds Ceylon 4, 1961, p. 35 (Ruhuna Nat. Park); Watson, Zusi & Storer, Prelim. Field Guide Birds Ind. Ocean, 1963, p. 109 (Laccadives; Kadmat, Kiltan, and Chetlat); Biswas, Journ. Bombay Nat. Hist. Soc. 60, 1963 (13 July), p. 190, 191 (Ceylon and the rest of India); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 294 (distribution).

Zosterops palpebrosa palpebrosa; Kershaw, Familiar Birds Ceylon, 1925, p. 87 (Ceylon); (pt.) Ripley, Syn. Birds India and Pakistan, 1961, p. 592 (distribution); Rutgers, Encycl. Vogelliefh. III, 1966, p. 24.33.0.1.1-3 (India, Ceylon).

Zosterops palpebrosa occidentis; Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 218 (no locality).

Zosterops ceylonensis; Austin, Birds of the World, 1961, p. 281 (highlands of Ceylon).

Zoesterops palpebrosa; M. MacDonald, Birds in my Indian Garden, 1961, p. 192, also p. 116-126 (Delhi).

Zosterops palpebrosa amabilis; Biswas, Journ. Bombay Nat. Hist. Soc. 60, 1963, p. 190, 191 (Gir Forest, Kathiawar); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 294 (Kathiawar Peninsula).

---

1) This little book is undated and I have been unable to ascertain its date of publication. A copy was, however, presented by its author to the library of the Bombay Natural History Society in 1901 (cf. Journ. Bombay Nat. Hist. Soc. 13, p. 718, published on 18-V-1901). As Aitken was closely associated with the Society, the booklet would have been published not long before. The articles contained in the book were, according to its preface, first published in the Times of India; I have been unable to check this reference.

Page 45.

Figures. An attractive coloured plate by Goodchild appears in Page's (1913) article; Austin (1961) gave a good coloured plate under the name *Z. ceylonensis*: the yellow forehead of the bird depicted proves that it is a specimen of *Z. palpebrosa.*

Page 46.

Nidification. As my attack on Nice (1953) was not very well founded, it is gratifying to see my conclusions confirmed. Skead & Ranger (1958) found in *Zosterops capensis* a minimum incubation period of 10 days and 3 ± 4 hours; therefore my statement that in *Z. palpebrosa* it is 10 to 11 days, 10½ days in one case, has nothing unlikely.

Page (1913) gave a good description of a breeding case in his aviary. He found an incubation period of 10 to 11 days. The eyes of the chicks were open on the morning of the fifth day. Nestling plumage similar to adults but not quite so intense and the young birds did not get white eye-rings until 24 days after leaving the nest. Perreau (1910) noted that both sexes participate in nest construction. Recently Richardson (1962) gave many interesting particulars on nidification.

Page 47, line 18-19; delete the part placed in parenthesis.

Page 48.

Habits, etc. The birds seem rather hardy, as the following quotation shows: "Possibly a resident on the Samana: a party of eight or nine stayed there during the winter of 1906-07, in spite of frequent heavy snow-storms ..." (C. H. T. Whitehead, 1909, p. 110-111).

Page 49, line 18: for *Phydole,* read *Pheidole.*

Page 50.

Voice. At the breeding season the white-eye sings most sweetly. The ordinary cheeping note then becomes glorified into something resembling the lay of the canary — far less powerful, but equally pleasing to the ear (Dewar, 1909).

Page 51.

Zosterops palpebrosa salimalii Whistler

Additional references.

Zosterops palpebrosa salimalii; Vaurie, Am. Mus. Nov. 1869, 1958, p. 28 (Eastern Ghats north to the Godavari); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 565 (Eastern Ghats north to Godavari); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 294 (eastern Ghats).

Zosterops palpebrosa sálimalii; Ripley, Syn. Birds India and Pakistan, 1961, p. 592 (Southeast Hyderabad (Mananur, Farahabad), and the adjacent hills of southern Orissa (Bamra) and Andhra, Nallamallais, Shevaroys, Chitteri Range, from 2000 to 4800 feet); Biswas, Journ. Bombay Nat. Hist. Soc. 60, 1963, p. 190 (Eastern Ghats north to Godavari).

Page 53.

Zosterops palpebrosa palpebrosa (Temminck)

Additional references.

[*Curruca*] *palpebrosa*; Lesson, Traité d'Orn., 1831, p. 417 (Bengale).

Sylvia palpebrosa; Gervais, Dict. d'Hist. Nat. Guérin I, 1833-1834, p. 418 (Bengale).

Zosterops palpebrosa; Drapiez, Dict. Sc. Nat. X, 1845, p. 742 (l'Inde); E. Verreaux, Cat. d'Ois., 1849, p. 50 (Indes Orient.); Boucard, Cat. Av., 1876, p. 231 (India); (pt.) Nuyens, De Vogelwereld I, 1886, p. 83 (Indië); Wood-Mason, Ann. Rep. Ind. Mus. April 1888 to March 1889, 1889, app. D, p. 18 (Nepal); Russ, Gefied. Welt 24, 1895 (7 Feb.), p. 43, fig. (no locality); Neunzig, Gefied. Welt 29, 1900 (6 Sept.), p. 288 (no locality); Oustalet, Nouv. Arch. Mus. Hist. Nat. Paris (4) 5, 1903, p. 16 (Van-Bou, Tonkin); Menegaux, Bull. Mus. Hist. Nat. Paris 13, 1907, p. 9 (l'Inde); Dewar, Indian Birds, 1910, p. 98 (no locality = India); Page, Bird Notes N. S. 3, 1912, p. 188 (no locality); (pt.) Page, Bird Notes N. S. 4, 1913 (Jan.), p. 1 (Burmese countries eastwards, into S. China); Bainbridge, Bird Notes N. S. 4, 1913 (July), p. 233 (no locality); Weidholz, Gefied. Welt 44, 1915 (April), p. 135 (no locality); Finn, Garden and Aviary Birds of India, 2nd ed., 1915, p. 22, pl. V fig. 2 (India: Calcutta bazaar); Bergtold, A Study of the Incubation Periods of Birds, 1917, p. 101 (no locality); Hopkinson, Bird Notes (3) 2, 1919, p. 30 (no locality); Bainbridge, Bird Notes (3) 3, 1920, p. 108 (no locality); Hopkinson, Bird Notes (3) 5, 1922, p. 220 (no locality); Hopkinson, Rec. Birds Bred in Captivity, 1926, p. 60 (no locality); van Oort, Versl. 's Rijks Mus. Nat. Hist. 1928-1929, 1929, p. 34 (Engelsch-Indië); Ridley, Dispersal of Plants, 1930, p. 469 (India); Lack, Darwin's Finches, 1947, p. 30 (Burma); Poulsen, Dansk Orn. For. Tidsskr. 50, 1956, p. 280, 281, 294 (no locality); Whitaker, Wilson Bull. 69, 1957, p. 232 (no locality); Rutgers, Trop. Volièrevogels II, 1958, p. 109 (captivity); (pt.) G. Steinbacher, Thieme's Vogelb., 1959, p. 47 (India); Boosey, Foreign Bird Keeping, 1959, p. 299 (India and Indo-China); Simmons, Avicult. Mag. 67, 1961, p. 127 (captivity); Richardson, Avicult. Mag. 68, 1962 (March-April), p. 51, 54 (captivity); Richardson, Avicult. Mag. 68, 1962 (Nov.-Dec.), p. 209 (captivity); Kunkel, Zeitschr. f. Tierpsych. 19, 1962, p. 559-576 (behaviour in captivity); Kunkel, Journ. f. Orn. 103, (1962), 1963 (21 Jan.), p. 360 (no locality); Schumacher, Condor 66, 1964 (31 July), p. 309 (longevity in captivity); Harrison, Behaviour 24, 1965, p. 175 fig. 2, 177 fig. 6, 195 (no locality); Očko, AZ-Nachr., 1965, p. 38-42 (captivity); Tolman, Zo leer je vogels kennen, 1966, no. 158 (no locality); Rutgers, Encycl. Vogelliefh. III, 1966, p. 24.33.0.1.1-3 fig. (no locality); Barclay-Smith, Avicult. Mag. 74, 1968 (Jan.), p. 26 (captivity).

Zosterops mesoxantha; Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Burmah).

Zosterops simplex; Finn, Osprey 5, 1901, p. 123 (Calcutta: cage-bird); Harington, Ibis (10) 2, 1914, p. 15 (Maymyo); (pt.) Low, List Vertebr. Anim. Zool. Soc. London II, Birds. 1929, p. 175 (East Nepal).

Zosterops palpebrosus; van Name in Webster's Dict. Engl. Language, 1911, p. 2329 (India).

Zosterops palpebrosa palpebrosa; (pt.) Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Bengalen); Mathews, Syst. Av. Australas. II, 1930, p. 698 (India); Stone, Proc. Ac. Nat. Sc. Philad. 85, 1933, p. 172, 216 (Niungai, Yunnan); Chakravarty & Kar, Proc. Ind. Ac. Sc. (B) 22, 1945, p. 63, 68 (Calcutta); Chakravarty & Kar, Proc. R. Soc. Edinburgh (B) 62, 1947, p. 228 (presumably near Calcutta); Ripley, Search for the Spiny Babbler, 1952, p. 301, also p. 33, 157 (Nepal); Rand & Fleming, Fieldiana, Zool. 41, 1957, p. 198 (various localities in Nepal); Vaurie, Am. Mus. Nov. 1869, 1958, p. 28 (Nepal, Bengal, Orissa and eastern India eastward to Burma and Yunnan); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959 (15 Feb.), p. 227 (Calcutta); Fleming, Journ. Bombay Nat. Hist. Soc. 56, 1959 (Dec.), p. 580 (Tansen-Pokhara, West Nepal); Inglis, Journ. Bengal Nat. Hist. Soc. 31, 1960 (Dec.), p. 49 (the Duars); (pt.) Ripley, Syn. Birds India and Pakistan, 1961, p. 592 (distribution); Sálim Ali, Birds Sikkim, 1962, p. 362 (Sikkim); Berndt & Meise, Naturgesch. d. Vögel II, 1962, p. 552 (Nepal bis Indochina); Biswas, Journ. Bombay Nat. Hist. Soc. 60, 1963, p. 190 (distribution); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 295 (distribution).

Zosterops palpebrosa cacharensis; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Assam südlich des Brahmaputra, Manipur, Luschai, Chittagong, Chinberge); Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (Assam); Makatsch, Der Brutparasitismus in der Vogelwelt, 1955, p. 166 (table taken from Stuart Baker, 1942).

Zosterops palpebrosa subsp.; (?) Delacour & Jabouille, Rech. Orn. Prov. Quangtri, 1925, p. 184 (Hanoi, Quangtri) [this species, or *Z. japonica simplex*?].

Zosterops palpebrosa elwesi; Delacour & Jabouille, Rech. Orn. Tranninh (Laos), Thua-Thien et Kontoum (Annam), 1927, p. 196 (Xieng-Khouang, Kontoum, Dakto); Gee, Moffett & Wilder, Bull. Peking Soc. Nat. Hist. 1, 1927, p. 316 (Northwest India and the Himalayas to west Assam and north Shan States); Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 218 (no locality).

Zosterops palpebrosa williamsoni; (pt.) Gee, Moffett & Wilder, Bull. Peking Nat. Hist. Soc. 1, 1927, p. 316 (South Yunnan).

Zosterops aureiventris mesoxantha; Stuart Baker, Fauna Brit. India, Birds, 2nd ed., VII, 1930, p. 282 (Karen Hills, Burma); Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (no locality).

Zosterops palpebrosa lpebrosa; Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 218 (no locality).

Zosterops palpeebrosa; Rutgers, Trop. Volièrevogels I, 1954, p. 95, pl. III (India).

Zosterops palpebrosa joannae; Cheng, Distrib. List Chin. Birds II (in Chin.), 1958, p. 372 (map of distribution in China); Cheng & Cheng, Acta Zool. Sin. 12, 1960, p. 270 (southern Yunnan); Deignan, U.S. Nat. Mus. Bull. 226, 1963, p. 214 (Thailand: Chiang Rai, Chiang Mai); Cheng & al., Acta Zool. Sin. 15, 1963, p. 307 (Szechuan: Mi-i, Yen-yüan, Hsi-ch'ang; Yunnan; Li-chiang, Lu-shui); Cheng, Syst. Keys Birds China (in Chin.), 1964, p. 290 (South China).

Zosterops palpebrosa mesoxantha; Deignan, U.S. Nat. Mus. Bull. 221, 1961, p. 508 (summit of Doi Suthep (elev. 5500 feet), lat. 18°50'N, long. 98°55'E).

Zosterops palpebrosa joanae; Cheng & Cheng, Acta Zool. Sin. 14, 1962, p. 90 (Hsi-Shu-An-Pan-Na area, Yunnan).

Zosterops palpebrosa siamensis; Deignan, U. S. Nat. Mus. Bull. 226, 1963, p. 214 (Thailand: reported from mountains of the northern plateau, on the West southward to Tak); (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 295 (south-eastern Tibet, most of Burma, northern Thailand, Yunnan, Szechwan and Indochina).

Note. When there is doubt as to provenance, for example in the records of birds kept in captivity, I have placed the reference under this, the nominate race, rather than under one of the other Indian races.

Distribution. Cheng & al. (1963) have collected the species in three localities in south-western Szechuan. The only previous record from Szechuan is of a single specimen obtained at Ningyenfu (this revision, pt. I, p. 58).

Habits, etc. Poulsen (1956) has described the peculiar habit of "anting" in this species; he mentions also that it eats ants of the species *Lasius niger*.

In view of the extreme scantness of data on lifespan in small birds, it seems worth drawing attention to Chalmers Mitchell's (1911) paper. For *Z. palpebrosa* he found a lifespan of up to 87 months; there is no reason, of course, to assume that this is the maximum lifespan attainable under favorable conditions. A remarkable instance of longevity has been recorded by Schumacher (1964); it will be discussed in one of the concluding chapters.

Kunkel (1962) has published a study on the behaviour of *Z. palpebrosa*, one of the first of its kind in the Zosteropidae.

Two blood-parasites, the protozoa *Haemoproteus zosteropsi* and *Isopora zosteropis*, have been described from this subspecies (Chakravarty & Kar, 1945, 1947).

Oustalet (1903) mentioned that Germain observed *Z. palpebrosa* in the gardens of Saigon, and adds: "peut-être l'espèce ne visite-t-elle cette région qu'accidentellement et en hiver". The way it is put, suggests that the record is based on field-identification and until actual material may become avaiblable, I prefer to regard this observation as pertaining to *Z. japonica simplex*.

Zosterops palpebrosa nicobarica Blyth

Additional references.

Zosterops nicobarica; Boucard, Cat. Av., 1876, p. 231 (Nicobar I.).

Zosterops palpebrosa; (pt.) Nuyens, De Vogelwereld I, 1886, p. 83 (Nicobar); (pt.) Page, Bird Notes N. S. 4, 1913, p. 1 (Andaman Is. and Nicobars).

Zosterops palpebrosa nicobariensis; Low, List Vertebr. Anim. Zool. Soc. London II, Birds, 1929, p. 175 (Andaman Islands, Nicobar); Junge, Treubia 16, 1938, p. 354 (no locality).

Zosterops palpebrosa nicobarica; Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (no locality); Ripley, Syn. Birds India and Pakistan, 1961, p. 593 (Andaman and Nicobar Is. in the northern group, excluding Great and Little Nicobar); Deignan, U. S. Nat. Mus. Bull. 221, 1961, p. 509 (Kar Nicobar Island); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 295 (Andaman and Nicobar Islands).

Page 63.

Zosterops palpebrosa siamensis Blyth

Additional references.

Zosterops siamensis; Boucard, Cat. Av., 1876, p. 231 (Tenasserim); Menegaux, Bull. Mus. Hist. Nat. Paris 13, 1907, p. 9 (la Cochinchine); Page, Bird Notes N. S. 4, 1913,

p. 2, 5 (Siam, extending into Burmese countries); Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (no locality).

Zosterops palpebrosa siamensis; (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 295 (Burma).

Page 67.

I have now examined the four specimens of *Z. p. palpebrosa* from Thandaung in the British Museum; they show no signs of intergradation with *siamensis*.

Deignan (1963) has revived the opinion that the yellow-bellied and the pale-bellied birds in Burma and Thailand are varieties of one subspecies, and accordingly listed grey-bellied birds from Thailand as *siamensis*. Even though the range of *siamensis* has not yet been satisfactorily defined, it is clearly a good geographical race, and in the related subspecies from Java I have found that the differences between grey- and yellow-bellied populations are multifactorial (Mees, 1951, also Moreau, 1957).

Page 70.

Zosterops palpebrosa williamsoni Robinson & Kloss

Additional reference.

Zosterops palpebrosa williamsoni; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 295 (eastern coast of Thailand from Bangkok to Malay Peninsula (Tandjong Patani)).

Page 72.

Zosterops palpebrosa auriventer Hume

Additional references.

Zosterops aureiventer; (pt.) Page, Bird Notes N. S. 4, 1913, p. 1 (from S. Tenasserim down the Malayan Pen.).

Zosterops palpebrosa buxtoni; (pt.) Kuroda, Birds Isl. Java II, 1936, p. 204 (Borneo).

Zosterops palpebrosa aureiventer; Delacour, Birds Malaysia, 1947, p. 319 (Malaya).

Zosterops aureiventris aureiventris; Vira, Ind. Sc. Nomencl. Birds India, Burma and Ceylon, 1949, p. 219 (no locality).

Zosterops palpebrosa williamsoni; Madoc, Introd. Malayan Birds, rev. ed., 1956, p. 218 (Malaya); Tweedie, Common Malayan Birds, 1960, p. 60 (Malaya).

Zosterops palpebrosa auriventer; Smythies, Sarawak Mus. Journ. 7, 1957, p. 765 (distribution in Borneo); de Schauensee, Proc. Ac. Nat. Sc. Philad. 110, 1958, p. 295, 299 (Bangka); Smythies, Birds Borneo, 1960, p. 484 (S. W. Sarawak: Kuching, Santubong, Penrissen); Deignan, U. S. Nat. Mus. Bull. 226, 1963, p. 214 (Thailand: Phangnga, Trang); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 296 (distribution).

Zosterops palpebrosa; Medway & Wells, Malayan Nat. Journ. 17, 1963 (Sept.), p. 127 (Rantau Panjang, Selangor); Fogden, Sarawak Mus. Journ. 14, (1966), 1967, p. 317 (Sarawak River, Kuching).

Zosterops ? palpebrosa; Medway, Bull. Nat. Mus. Singapore 34, 1966 (March), p. 46 (Tekek, Pulau Tioman).

Distribution. Medway's (1966) record from Pulau Tioman, though given with some reservations as to specific identity of the birds observed, would be referable to this subspecies: a welcome, but certainly not unexpected extension of its known range.

Habits, etc. Many interesting particulars on behaviour and nidification are given by Madoc (1956).

Voice. According to Madoc (1956): "The call is a vibrant, metallic "dzaah dzaah" rapidly repeated several times; this is rather like the twanging of a very slack banjo string. It also utters a shrill, rapid, twittering "dzee-da-da" ".

Page 76.

Zosterops palpebrosa buxtoni Nicholson

Additional references.

Zosterops lateralis; Boucard, Cat. Av., 1876, p. 231 (Java); (pt.) Giebel, Thes. Orn. III, 1877, p. 776 (Java); Heine & Reichenow, Nomencl. Mus. Hein. Orn. (1882-1890), 1890, p. 72 (Java).

Zosterops aureiventris; (pt.) Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Java).

Zosterops aureiventer; (pt.) Page, Bird Notes N. S. 4, 1913, p. 1 (Sumatra, Java).

Zosterops auriventer; Porsch, Biol. Generalis 5, 1929, p. 162 (Java).

Zosterops palpebrosa buxtoni; (pt.) Kuroda, Birds Isl. Java II, 1936, p. 704 (W. and M. Java); Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (Java); Hellebrekers & Hoogerwerf, Zool. Verh. 88, 1967 (31 May), p. 147 (West Java); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 296 (hilly country and mountains of Sumatra and western Java (Bantam and Bogor)).

Zosterops aureiventer buxtoni; Hoogerwerf & Siccama, Ardea 27, 1938, p. 208 (no locality).

Zosterops palpebrosa; (pt.) Sody, Madj. Ilmu Alam (= Nat. Tijdschr. Ned. Ind.) 122, (1956), 1957, p. 162 (Java, 100-2500 m.).

Page 80, 7th line from bottom: for Pasimoentjang, read Pasirmoentjang.

Page 82.

Zosterops palpebrosa melanura Hartlaub

Additional references.

Zosterops melanura; Boucard, Cat. Av., 1876, p. 232 (Africa); W. Blasius, Verh. zool.-bot. Ges. Wien, 1883, p. 86 (Pontianak) [but record regarded as doubtful].

Zosterops flava; Spennemann, Gefied. Welt 36, 1907, p. 44 (Java) [1]).
Zosterops gallio; Page, Bird Notes N. S. 4, 1913, p. 2 (Java).
Zosterops; Sody, Jaarber. C.N.V. 10, 1920, p. 111 (Tjikadjang).
Zosterops palpebrosa subsp.; Stresemann, Temminckia 3, 1938, p. 144 (Süd- und West-Borneo).
Zosterops palpebrosa gallio; Stresemann, Journ. f. Orn. 87, 1939 (31 Jan.), p. 156, 161 (Java, Bali); Stresemann, Journ. f. Orn. 87, 1939 (31 July), p. 333 (distribution Java-S.O. Borneo); Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (Java).
Zosterops palpebrosa; (pt.) Sody, Madj. Ilmu Alam (= Nat. Tijdschr. Ned. Ind.) 112, (1956), 1957, p. 162 (Java, 100-2500 m).
Zosterops palpebrosa melanura; Hellebrekers & Hoogerwerf, Zool. Verh. 88, 1967 (31 May), p. 148 (West Java); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 296 (hills and mountains of Java (except westermost part); Bali).

Page 83.

Distribution. Sody (1957) gives as vertical distribution of *Z. palpebrosa* on Java 100-2500 m. This, however, was based on the incorrect identification of *Z. montana* with *Z. palpebrosa* that was customary thirty years ago (Sody, in litt., 6-XII-1957), and Sody himself did not remember ever having met with the species at very high elevations. But in the Sody Collection (now in RMNH) is a skin labelled: "G. Tjerimai, Java, 2500 m, 2-VI-1931, leg. H. J. V. Sody". Mr. Sody wrote about this: "Wanneer U echter mijn stuk hebt gezien en nog wel met de aanduiding 2500 m, dan moet het geval wel zeker zijn, daar ik nooit lichtvaardig hoogten schatte...". The Sody collection contains also material from Goenoeng Dieng, 2060 m, and Tjandiroto, M. Java, 715 m. It seems therefore that the vertical distribution of this subspecies is not from about 200 to 1600 m, but from 200 to 2500 m.

Page 86.

Zosterops palpebrosa unica Hartert

Additional references.

Zosterops melanura unica; J. A. J. Verheijen, Ardea 52, (1964), 1965 (15 Jan.), p. 200 (Flores).
Zosterops palpebrosa unica; Mayr in Paynter (editor), Check-Llst Birds XII, 1967, p. 296 (Sumbawa and Flores).

---

1) Spennemann lists, on the page indicated, three species of Zosteropidae, under the names *Z. flava*, *Z. javanica* and *Z. auriventer*; as he lived at the time in Semarang, and mentions the three species as being sold in the bird market of that town, it is likely that *Z. flava* = *Z. palpebrosa melanura*, and *Z. auriventer* = *Z. montana*. Not only is the true *Z. flava* unknown from Middle Java, but Spennemann also mentions that "*Z. flava*" appears in the market together with the mountain bird *Z. javanica*. True *Z. flava*, of course, is purely coastal in distribution.

Nidification. Verheijen (1965) mentions that he has found no less than 47 nests, in the months March to August, and October. The main breeding season apparent from his notes is from April to June.

Page 88.

Zosterops erythropleura Swinhoe

Additional references.

Zosterops erythropleura; Boucard, Cat. Av., 1876, p. 231 (China); Waterhouse, Zool. Works Gould, 1885, p. 27 (no locality); Taczanowski, Mém. Ac. Imp. St.-Pétersbourg (7) 39, 1891, p. 198 (sur l'Amour inférieur, aux environs de Dondon, au 49° L.N.); Berezowski & Bianchi, Aves exp. Potanini prov. Gan-su, 1891, p. III, XXIII, XXXIX, 125 (Io-dzan-pu, Gan-su); Palacký, Aquila 5, 1898, p. 289 (au pays d'Amour); Page, Bird Notes N. S. 4, 1913, p. 1 (from S. Amoorland, extending throughout China to Moupin); Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Jünnan); Stone, Proc. Ac. Nat. Sc. Philad. 85, 1933, p. 216 (Chengwei); Mizuno, Distrib. List Manchur. Birds, 1934, p. 39 (Manchuria); Stegmann, Faune de l'U.R.S.S., Ois. 1 (2), 1938, p. 66, 70, 148, 152 (Ussuri, Amur); Takatsukasa, Domestic Birds Ill. in Col. (in Jap.), 1939, p. 227, pl. 52 fig. 6 (captivity); Vorobiov, Comt. Rend. (Doklady) Ac. Sc. U.R.S.S. 52, 1946, p. 829 (Ussuri Region); Cheng, Distrib. List Chin. Birds II. Passeriformes (in Chin.), 1958, p. 372 (map of distribution in China); Croizat, Panbiogeography II, 1958, p. 417 (Ussuriland and Corea); Vaurie, Birds Paleartic Fauna. Passeres, 1959, p. 565 (distribution); Li, Tang & Chin, Acta Zool. Sin. 11, 1959, p. 406 (Shanghai); Boosey, Foreign Bird Keeping, [1959], p. 299 (Siberia); Portenko, Birds U.S.S.R. (in Russ.) IV, 1960, p. 223 (distribution); Michaelis, Falke 8, 1961, p. 326 (das östliche China, vom Amur bis Indochina); Cheng & Cheng, Acta Zool. Sin. 14, 1962, p. 90 (Hsi-shuan-pan-na area, Yunnan); Fennell & King, Condor 65, 1963 (27 Sept.), p. 447 (near the summit of Nam-san, near Seoul); Deignan, U. S. Nat. Mus. Bull. 226, 1963, p. 213 (Thailand: Chiang Mai, Nan); Cheng, Syst. Keys Birds China (in Chin.), 1964 (early), p. 177, 290 (distribution in China); Moreau in Thomson, New Dict. Birds, 1964 (Nov.), p. 886 (beyond the north-eastern border of China, reaches Burma in winter); Mayr, Breviora 228, 1965, p. 2 (no locality); Cheng, Tan & Li, Acta Zool. Sin. 17, 1965, p. 444 (northwestern Szechwan); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 291 (distribution).

Zosterops subrosea; Page, Bird Notes N. S. 4, 1913, p. 1 (Hankow, Central China).

Zosterops erythropleurus; Uchida & al., Hand-List Jap. Birds, 1922, p. 170 (Corea: N. Heian Distr.); Dementiev, Birds U.S.S.R. (in Russ.) IV, 1937, p. 154 (distribution); Portenko, Birds U.S.S.R. (in Russ.) III, 1954, p. 14, fig. 13 (no locality); Kurentzov, Trud. Far Eastern Br. Ak. Nauk U.S.S.R. 8, Zool., 1955, p. 53 (Amoor valley); Piechocki, Abh. Mus. Dresden 24, 1958, p. 143 (Wuying); Rakhilin, Bull. Soc. Nat. Moscou, Biol. 65, 1960, p. 45 (east slope of Sikhote-Alin Mountain); Litvinenko & Shibaev, Ornitologia 7, 1965, p. 119 (middle course Zudzikhe River); Kurentzov, Zoogeography Amur Region (in Russ.), 1965, p. 104, fig. 70, 124 (Amur Region).

Zosterops erythropleura erythropleura; Kuroda, Birds in Life Col. I (in Jap.), 1933, pl. 20 no. 161 (distribution); Wilder & Hubbard, Birds Northeastern China, 1938, p. 215 (Hopei); Fennell, Misc. Rep. Yamashina Inst. 4 (22/23), 1965, p. 182 (Korea).

Zosterops erythropleurus erythropleurus; Dementiev, Syst. Av. Ross. I, 1935, p. 164 (region du fleuve Khungari).

Zosterops erythoropleura; Barnes & McLure, Migr. Anim. Path. Survey, Ann. Narr. Rep. 1965, 1966, app. I (Thailand) [1]).

Distribution. Piechocki (1958) reports fledglings collected on 6 August 1956 at Wuying in N. E. Manchuria. This is the first real evidence of breeding in Manchuria. Portenko (1960) mentioned that the Expedition Petapin, about which I know no particulars, has found the species in summer in the southern part of the province of Kansu, from where it has also been recorded by Berezowski & Bianchi (1891).

Litvinenko & Shibaev (1965) on 21 June 1962, found four fledglings, attended by three adults, in *Ulmus*-woodland along the middle course of the Sudzukhe River, in southern Ussuria. The adult birds were catching insects, uttering calls resembling those of *Aegithalos caudatus.* This is the first irrefutable evidence of breeding so far south.

I regard it now as very unlikely that the species would breed in the mountains of Szechuan; the birds taken there in summer, must have been non-breeding individuals. More investigations in the winter-quarters are desirable because it is unusual for small passerine birds to stay a whole season and in some numbers in their winter quarters.

Records from Korea (where the species is known to occur on migration only) were previously confined to the extreme north and north-west, but Fennell & King (1962) collected a specimen near Seoul on 16 May 1962. The fact that there are no other observations from South Korea confirm my earlier assertion that the main stream of migrants passes west of Korea.

Page 96.

Zosterops japonica Temminck & Schlegel

For a revision of the species, see Vaurie (1958).

Page 98.

In fig. 6 the island Oki is incorrectly included in the range of *Z. japonica insularis,* as according to Taka-Tsukasa & Ikeda (1936) it is inhabited by the nominate race. I have not examined material from the island.

Page 99.

Zosterops japonica japonica Temminck & Schlegel

Addition references.

Zosterops japonica; Boucard, Cat. Av., 1876, p. 231 (Japonia); Wallace, Isl. Life, 1880, p. 370 (Japan); Heine & Reichenow, Nomencl. Mus. Hein. Orn., (1882-1890),

1) The name of the second author is spelt McLure on cover and title page of this publication, and therefore I have cited it with the same spelling though it should actually be McClure.

1890, p. 72 (Japan); Wallace, Isl. Life, 2nd ed., 1892, p. 398 (Japan); Neunzig, Gefied. Welt 24, 1895 (30 May), p. 171, fig. (no locality); Hauth, Gefied. Welt 26, 1897 (14 Oct.), p. 323 (no locality); Neunzig, Gefied. Welt 29, 1900 (6 Sept.), p. 288 (no locality); von Sydow, Gefied. Welt 32, 1903 (June), p. 196 (Japan); Ogawa, Arch. f. Protistenk. 24, 1912, p. 120, 121 (Fukuoka, Kiushiu); Page, Bird Notes N. S. 4, 1913, p. 1 (Japan); Weidholz, Gefied. Welt 44, 1915, p. 135 (no locality); Moller, Biol. Generalis 7, 1931, p. 101, 134 (no locality); Groebbels, Der Vogel I, 1932, p. 443 (no locality); Takatsukasa, Domestic Birds Ill. in Col. (in Jap.), 1939, p. 226, pl. 52 fig. 4 (Japan); McClure & Yoshi, Auk 74, 1957, p. 365 (Toyama Prefecture); Kunkel, Zeitschr. f. Tierpsych. 16, 1959, p. 308 (captivity); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959, p. 226 (Japan); Michaelis, Falke 8, 1961, p. 326 (auf fast allen japanischen Inseln); Richardson & Bowles, B. P. Bishop Mus. Bull. 227, 1964 (16 March), p. 36 (Kauai).

Zosterops japonicus; Hall, Emu 19, 1919, p. 91 (no locality).

Zosterops palpebrosa japonicus; Uchida, Hand-List Jap. Birds, 1922, p. 168 (Hokkaido, Hondo, Northern Seven Is. (Oshima and Niijima), Shikoku, Kiushiu); Hachisuka, Birds Jap. and Brit. Isl., 1925, p. 15 (Japan); Uchida & Shimomura, Photogr. Bird-Life Jap. II, 1931, App. p. 4 (Mt. Fuji); Makatsch, Der Brutparasitismus in der Vogelwelt, 1955, p. 169 (Japan).

Zosterops palpebrosa; Yamashina, Bull. Biogeogr. Soc. Jap. 1, 1929 (Oct.), p. 57 (North Japan); Keast in Bodenheimer (editor), Biogeogr. Ecol. Austr., 1959, p. 97 (Japan); Yamashina, Birds in Japan, 1961, p. 85, 196 (from Central Honshiu southward, also ... northern Honshiu and southern Hokkaido); Uramoto, Misc. Rep. Yamashina's Inst. 3, 1962 (Dec.), p. 139 (Japan); Uramoto, Misc. Rep. Yamashina's Inst. 3, 1963 (Dec.), p. 304 (Japan); Nakagawa, Animals and Zoo 16, 1964 (May), p. 103 phot. (no locality = Ueno, Japan); Yoshii & Hasuo, Misc. Rep. Yamashina Inst. 4 (25), 1966 (30 June), p. 289 (Japan); Keast, Australia, 1966, p. 198 (Kauai).

Zosterops palpebrosa japonica; Porsch, Biol. Generalis 5, 1929, p. 162 (Japan); Kuroda, Birds in Life Col. I, 1933, pl. 19 no. 154 (Japan); Takatsukasa, Jap. Birds (Board of Tourist Ind., Jap. Govt. Railways), 1941, p. 42 (Japan); Udagawa, Tori 13, 1953, p. 80 (Yagishiri Island); Amadon & Gilliard, Bird of the World, The Anim. Kingdom II, 1954, p. 1146 (Japan, Hawaiian Islands); Yamashina, Misc. Rep. Yamashina's Inst. 11, 1957, p. 427 (Tokyo); Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 39 (distribution); Croizat, Panbiogeography II, 1958, p. 417 (no locality); Mishima, Tori 15, 1959, p. 132, 133 (Japan); Shirai, Jap. Wildlife Bull. 17, 1960, p. 188 (northern parts of Izu Archipelago); Hashimoto, Jap. Wildlife Bull. 17, 1960, p. 206 (Mieken, Japan); Shirai, Jap. Wildlife Bull. 17, 1960, p. 225 (Inan District, Sikoku); Hirano, Ishii & Kobayashi, Annot. Zool. Jap. 35, 1962 (June), p. 64-71 (no locality = Tokyo: endocrinology); Uemura & Kobayashi, Gen. Comp. Endocrinology 3, 1963 (June), p. 253-264 (Japan: endocrinology); Arai, Journ. Fact. Sc. Tokyo (IV) Zool. 10, 1963 (10 Nov.), p. 249-268 (Tokyo: endocrinology); Kobayashi, Proc. XIII Int. Orn. Congr. 1962, II, 1963, p. 1077 (no locality = Tokyo); Immelmann, Zool. Jahrb. 91, 1963 (30 Sept.), p. 172 (no locality = Japan); Uemura, Dobuts. Zasshi 73, 1964 (April), p. 118-126 (no locality = Tokyo: endocrinology); Uemura, Annot. Zool. Jap. 38, 1965 (June), p. 88 (Japan: endocrinology); Yoshii & Hasuo, Misc. Rep. Yamashina Inst. 4 (23/24), 1965 (Dec.), p. 168 (Japan); Kuroda Jr., Misc. Rep. Yamashina Inst. 4 (23/24), 1965 (Dec.), p. 237, 253, 264 (Hokkaido: Kojima Island, Cape Esan area, Mt. Hakodate); Ogasawara & Saito, Misc. Rep. Yamashina Inst. 4 (25), 1966 (30 June), p. 349 (Shimokito Peninsula, Aomori, Honshû); Eddinger, Condor 69, 1967 (9 Oct.), p. 530 (Honolulu).

Zosterops palpebrosus japonicus; Baldwin, Checkl. Birds Hawaii Nat. Park, Kilauea-Mauna Loa Sect., 1941, p. 7, 29 (bird park, Nat. Park); Munro, Birds Hawaii, 1944, p. 170, pl. 19 fig. 5 (Oahu, Lanai and probably other islands); Alicata, Kartman

& Fisher, Rep. Univ. Hawaii Agricult. Exp. Stat. 1946-1948, 1948 (Dec.), p. 104 (Honolulu); Munro, Birds Hawaii, 2nd ed., 1960, p. 170, pl. 19 fig. 5 (Oahu, Lanai and probably other islands).

Zosterops palpebrosa yesonensis; Kobayashi, Birds Jap. Nat. Col., 1956, p. 20 (Hokkaido).

Zosterops japonica japonica; Vaurie, Am. Mus. Nov. 1869, 1958 (31 Jan.), p. 21, 22, 26, 27 (distribution and syst. discussion); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 562 (distribution); (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 291 (distribution).

Zosterops palpebrosa yesoensis; Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958 p. 39 (Hokkaido); Mishima, Tori 15, 1959, p. 132, 133 (Hokkaido).

Zosterops palpibrosus japonicus; Bryan, Check List and Summary Hawaiian Birds, 1958, p. 21 (Hawaiian Islands).

Zosterops palpibrosus; Dunmire, Birds Nat. Parks Hawaii, 1961, p. 27 (Kilauea, Haleakala Parks).

Zosterops; Kobayashi, Proc. XIII Int. Orn. Congr. 1962, II, 1963, p. 1077, 1081 (no locality = Tokyo).

Zosterops japonica yesoensis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 291 (Hokkaido).

Figure. A nice coloured plate is given by Yamashina (1961); a very small one by Dunmire (1961); others by Kuroda (1933) and Takatsukasa (1939).

Habits, etc. In recent years *Z. j. japonica* has become (always under the incorrect name *Z. palpebrosa japonica),* a favourite object of endocrinological investigations. Particularly the connection between day-length, activity of the neurosecretory cell-groups of the hypothalamus, and gonadal development have been studied: partly a natural continuation and deepening of Miyazaki's (1934, 1935) pioneer work on the same species.

Parasites. Ogawa (1912) found one bird out of 24 examined infected with *Haemoproteus,* and two out of 24 with *Leukocytozoon.*

Page 104.

Zosterops japonica stejnegeri Seebohm

Additional references.

Zosterops palpebrosa stejnegeri; Uchida, Hand-List Jap. Birds, 1922, p. 169 (Seven Isls, Bonin Isls); Hachisuka, Birds Jap. and Brit. Isl., 1925, p. 15 (Japan); Kuroda, Birds in Life Col. I, 1933, pl. 19, no. 155 (Seven Islands); Hachisuka & al., Hand-list Jap. Birds, 4th ed., 1958, p. 40 (Seven Is. of Izu); Shirai, Jap. Wildlife Bull. 17, 1960, p. 195, 198, 199 (Miyake Island, Hachijo Island); Yamashina, Birds in Jap., 1961 (June), p. 44 (Seven Islands of Izu).

Zosterops japonica stejnegeri; Croizat, Panbiogeography II, 1958, p. 418 (Izu-Sichito, Bonins); Vaurie, Am. Mus. Nov. 1869, 1958, p. 21, 25, 26, 28 (Seven Islands of Izu); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 564 (Seven Islands of Izu); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 292 (Seven Islands of Izu; introduced on Bonin Islands).

Zosterops palpebrosa; Yamashina, Birds in Jap., 1961, p. 13 (Seven Islands of Izu).

Page 104, 4th line from bottom: for Paläarkt., read paläarkt.

Page 107.

Zosterops japonica alani Hartert

Additional references.

Zosterops palpebrosa alani; Uchida, Hand-List Jap. Birds, 1922, p. 169 (S. Sulphur Is. or S. Dionisio, Volcano Islands); Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 41 (Volcano Is., Bonin Is. (introduced)).

Zosterops japonica alani; Croizat, Panbiogeography II, 1958, p. 418 (Bonins, Volcano (Iwojima)); Vaurie, Am. Mus. Nov. 1869, 1958, p. 21, 25, 26, 28 (Volcano and Bonin Islands); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 564 (Bonin and Volcano Islands); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 292 (Iwo Jima and Minami-iwo-jima, Volcano Islands).

Page 108, line 6: delete reference to pl. I fig. 3.

Page 108.

Zosterops japonica insularis Ogawa

Additional references.

Zosterops palpebrosa ijimae; Uchida, Hand-List Jap. Birds, 1922, p. 169 (Northern coasts of Kiusiu, Iki, Tsushima, Quelpart Is., S. Corea (S. Keisho Distr. and Zenra Distr.), Dagelet Is.); Hachisuka, Birds Jap. and Brit. Isl., 1925, p. 15 (Japan); Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 40 (Northern coast of Kiushiu, Iki I., Tsushima, Quelpart I., S. Korea, Dagelet I.); Yang & Yoon, Zoologica (Seoul) 1, 1962 (Dec.), p. 8 (Kur-moon island, Korea).

Zosterops palpebrosa insularis; Uchida, Hand-List Jap. Birds, 1922, p. 169 (Tanegashima, Yakushima); Hachisuka, Birds Jap. and Brit. Isl., 1925, p. 15 (Japan); Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 40 (Tanegashima, Yakushima); Mishima, Tori 15, 1959, p. 131, 133 (Tanegashima, Yakushima).

Zosterops japonica insularis; Vaurie, Am. Mus. Nov. 1869, 1958, p. 21, 22, 23, 26, 27 (Tanegashima and Yakushima); Croizat, Panbiogeography II, 1958, p. 418 (Central Riukius (Kumeshima), disconnected in the Osumi-Gunto (Yakusihima/Tanegashima)); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 563 (Tanegashima and Yakushima); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 292 (Tanegashima and Yakushima).

Zosterops japonica ijimae; Croizat, Panbiogeography II, 1958, p. 418 (Kyushu, Iki, Tsushima, Quelpart (Saisyuto), Dagelet (Uturyoto) islands, Corea).

Zosterops japonica japonica; (pt.) Vaurie, Am. Mus. Nov. 1869, 1958, p. 22, 26 (Tsushima); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 291 (islands between Japan and Korea; straying to Korea).

Zosterops japonica; Won, Woo & Yoon, Misc. Rep. Yamashina Inst. 4 (26), 1966 (Dec.), p. 409 (Kyunggi-do, Korea).

Distribution. Hachisuka & al. (1958) still include the northern coast of Kiushiu in the breeding range of this race, but I do not know on what evidence. Yamashina (in litt., 28-X-1955) has no material from Kiushiu in his collection.

Vaurie (1958) has synonymized *ijimae* with *japonica* rather than with *insularis;* he wrote: "Mees considers it a synonym of *insularis* but in the topotype of *ijimae* that I have examined the coloration is identical with that of nominate *japonica,* and the difference in the length of the bill is not significant, as it measures only half a millimeter longer than that of the specimen of nominate *japonica* with the longest bill measured. It seems best to me to synonymize *ijimae* with nominate *japonica,* but the differences between the latter are relatively so slight that *ijimae* could be synonymized as well with *insularis*".

Vaurie is quite right that *insularis* differs from *japonica* only in its slighter larger bill. He had but a single specimen of *ijimae* to base his conclusions on. My own figures for the average length of the exposed culmen (taken from this revision, part I, pp. 102, 110) are: *japonica* (33 specimens) 10.97 mm; *ijimae* (8 specimens) 11.63 mm; *insularis* (9 specimens) 11.78 mm. From this it appears that *ijimae* should be included in *insularis* rather than in *japonica.* My figures show some overlap in bill-length between *japonica* and *insularis,* but the bill of the latter is always heavier (see this revision part I, pl. I fig. 1 and 3; fig. 3 actually represents a specimen of "*ijimae*"), and *insularis* is quite a satisfactory race, as races go in Zosteropidae.

Page 109, 9th line from bottom: behind "larger", add: (pl. I fig. 3).

Page 112.

Zosterops japonica loochooensis Tristram

Additional synonyms.

Zosterops palpebrosa iriomotensis Kuroda, 1923.
Zosterops palpebrosa yonakuni Kuroda, 1923.

These two nominal races were accepted by me merely because I had no material to verify their status. Vaurie (1858) has since synonymized them with *loochooensis*, and I agree wholeheartedly.

Additional references.

Zosterops palpebrosa loochooensis; Uchida, Hand List Jap. Birds, 1922, p. 169 (distribution); Kuroda, Birds in Life Col. I, 1933, pl. 19 no. 156 (Loochoo); Mishima, Tori 15, 1959, p. 131, 133 (Amami-Oshima, Kikaigashima to Miyako).

Zosterops palpebrosa iriomotensis; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Iriomote); Kuroda, Birds in Life Col. I, 1923, pl. 19 no. 157 (Iriomote); Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 41 (Iriomote); Mishima, Tori 15, 1959, p. 131, 133 (Ishigaki, Iriomote, and adjacent islands); Kurata, Misc. Rep. Yamashina Inst. 4 (25), 1966, p. 367 (Iriomote I.).

Zosterops japonica loochooensis; Vaurie, Am. Mus. Nov. 1869, 1958 (31 Jan.), p. 21, 23, 24 (distribution); Croizat, Panbiogeography II, 1958, p. 418 (Riukius); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 563 (distribution); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 292 (distribution).

Zosterops palebrosa loochooensis; Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958 (March), p. 40 (distribution).

Zosterops palpebrosa yonakuni; Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958 (March), p. 41 (Miyako, Ishigaki, Yonakuni); Mishima, Tori 15, 1959 (Sept.), p. 128, 130, 131, 133 (Yonakuni).

Zosterops japonica yonakuni; Croizat, Panbiogeography II, 1958, p. 417 (Southern Riukius (Yonakunishima, or Kuni, west of Iriomote Island towards Northeastern Formosa)).

Zosterops japonica iriomotensis; Croizat, Panbiogeography II, 1958, p. 417 (Southern Riukius (Iriomote (shima))).

Zosterops japonica loochooensis; Croizat, Panbiogeography II, 1958, p. 418 (Southern Riukius (Sakishima-Gunto) to Amamioshima / Kikaigashima of the Northern Riukius); Mayr in Paynter (editor), Check-List Birds XII, 1967 p. 292 (distribution).

Zosterops japonica yonakunii; Croizat, Panbiogeography II, 1958, p. 418 (Yonakunishima).

Zosterops palpebrosa; Yamashina, Birds in Japan, 1961 (June), p. 10 (Riu Kiu chain).

Distribution. The subspecies *loochooensis* (including its synonyms *iriomotensis* and *yonakuni*) ranges down the whole chain of the Riu Kiu Islands, to, and including, Yonakuni.

Page 118, line 6: for culmen 10-11, read exposed culmen 10-11.

Page 118.

Zosterops japonica daitoensis Kuroda

Additional references.

Zosterops palpebrosa daitoensis; Kuroda, Birds in Life Col. I, 1933, pl. 19 no. 158 (Borodino Islands); Mishima, Tori 15, 1959, p. 128, 131, 133 (Minami-Daitojima).

Zosterops japonica daitoensis; Croizat, Panbiogeography II, 1958, p. 417 (Southern Borodino (Okinodaito) Islands); Vaurie, Am. Mus. Nov. 1869, 1958 (31 Jan.), p. 21, 24, 26 (Borodinos); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 563 (Borodino Islands); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 293 (Borodino Islands).

Zosterops palebrosa daitoensis; Greenway, Extinct Birds, 1958, p. 78 (Minami Daito Shima).

Validity. I have expressed doubt about the validity of this race, but in default of material, accepted it. Vaurie (1958) has since recognized it and given a diagnosis.

Figure. Kuroda (1933), plate 19 no. 158 (coloured figure, two-thirds natural size).

Page 120.

Zosterops japonica simplex Swinhoe

Additional references.

Zosterops simplex; Boucard, Cat. Av., 1876, p. 231 (China); Waterhouse, Zool. Works Gould, 1885, p. 27 (no locality); Meyer & Wiglesworth, Birds Celebes, 1898, p. 492

(China); Outstalet, Nouv. Arch. Mus. Hist. Nat. Paris (4) 5, 1903, p. 17 (Amoy); de la Touche in Davidson, The Isl. of Formosa, 1903, App. II, p. viii, xii (Formosa); Menegaux, Bull. Mus. Hist. Nat. Paris 13, 1907, p. 8 (Tonkin); Mathis & Leger, Bull. Soc. Path. Exot. 3, 1910, p. 704, 706 (Tonkin); Thayer & Bangs, Mem. M. C. Z. 40, 1912, p. 187 (Hsienshan and Kwatzeling, Hupeh); Finn, Garden and Aviary Birds of India, 2nd ed., 1915, p. 23 (Burma and China); França, Jorn. Sc. Mat. Fís. e Nat. Lisboa (3) 1, 1917 (Jan.), p. 44 (Tonkin); Amédée-Pichot, Bull. Soc. Nat. d'Acclim. France 66, 1919, p. 181 (cage-bird in China); Uchida, Annot. Zool. Jap. 9, 1920, p. 636, 637 (Formosa: Nanpeishō); Berlioz, Bull. Mus. Hist. Nat. Paris 27, 1921, p. 268 (les provinces chinoises de Kouy-Tchéou et de Yunnan); (pt.) Low, List Vert. Anim. Zool. Soc. London II, Birds, 1929, p. 175 (Southern China, Lower Pegu); Moller, Biol. Generalis 7, 1931, p. 134, 135 (no locality); Groebbels, Der Vogel, 1932, p. 443 (no locality); Stone, Proc. Ac. Nat. Sc. Philad. 85, 1933, p. 216 (Tsaupo); Siroki, Zool. Garten (N.F.) 9, 1937 (Oct.), p. 219 (captivity); Wilder & Hubbard, Birds Northeastern China, 1938, p. 214 (Hopei); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959 (15 Feb.), p. 226 (Tonkin); Boosey, Foreign Bird Keeping, [1959], p. 300 (Indo-China); Fischer, Beitr. z. Vogelk. 7, 1961, p. 312 (Hanoi); Michaelis, Falke 8, 1961 (about Sept.), p. 324 (Hanoi).

Zosterops mussoti; Thayer & Bangs, Mem. M. C. Z. 40, 1912, p. 187 (Szechwan).

Zosterops palpebrosa peguensis; Uchida, Hand-List Jap. Birds, 1922, p. 170 (Formosa); Uchida, Journ. Coll. Agricult. Imp. Univ. Tokyo 9, 1926, p. 2, 16 (Formosa); Ogawa & Uegaki, Arch. f. Protistenk. 57, 1927 (21 Jan.), p. 15, 16, 17, 18, 30 (Formosa); Gee, Moffett & Wilder, Peking Soc. Nat. Hist. Bull. 1, 1927, p. 315 (Eastern Burma to Yunnan); Uegaki, Fukuoka Ikwadaigaku Zasshi 21, 1928, p. 160-182, German abstr. p. 8 (Formosa); M. Laird & E. Laird, Nat. Hist. Rennell Isl. II, 1959, p. 226 (Formosa).

Zosterops palpebrosa simplex; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Süd- und Mittelchina, Hoihau und Kiungtschau in Nordhainan, Formosa); Rutgers, Encycl. Vogelliefh. III, 1966, p. 24.33.0.1.1-3 (no locality).

Zosterops palpebrosa mussoti; Gee, Moffett & Wilder, Peking Soc. Nat. Hist. Bull. 1, 1927, p. 315 (western Szechuan and Yunnan).

Zosterops simplex simplex; Gee, Moffett & Wilder, Peking Soc. Nat. Hist. Bull. 1, 1927, p. 315 (throughout China proper except the extreme west and north); Chang, Nanking Journ. 2, 1932 (Nov.), p. 566 (Nanking); Wilkinson, The Shanghai Bird Year, 1935, p. 211, also p. 183 (Shanghai); H[erklots], Hong Kong Nat. 7, 1936, p. 85 (northwesterly corner of the New Territories); Shaw, Bull. Fan Mem. Inst. Zool. 8, 1938, p. 212 (Lingshantao); Herklots, Hong Kong Birds, 1953 (April), p. 104, fig. (Hong Kong, Canton).

Zosterops palpebrosa taivaniana; Kuroda, Birds in Life Col. I, 1933, pl. 19 no. 159 (Formosa); Haschisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 41 (Formosa); Maa, Pacific Insects Monogr. 10, 1966, p. 70 (Puli, Nantou hsien, Taiwan).

Zosterops peguensis; Takatsukasa, Domestic Birds Ill. in Col. (in Jap.), 1939, p. 227, pl. 52 fig. 5 (China).

Zosterops japonica simplex; Ladiges, Mitt. Hamburg. Zool. Mus. Inst. 49, 1944, p. 87, 100 (auf See: 150 Sm. nördlich von Tsingtau); Vaurie, Am. Mus. Nov. 1869, 1958 (31 Jan.), p. 24 (distribution); Cheng, Distrib. List Chin. Birds II, Passeriformes (in Chin.), 1958, p. 371 (map of distribution in China); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 564 (distribution); Li, Tang & Chin, Acta Zool. Sin. 11, 1959, p. 406 (Shanghai); Cheng & Cheng, Acta Zool. Sin. 12, 1960, p. 270 (southern Yunnan); Cheng & al., Acta Zool. Sin. 13, 1961, p. 117 (Hunan); Cheng & Cheng, Acta Zool. Sin. 14, 1962, p. 90 (Hsi-shuan-pan-na area, Yunnan); Cheng & al., Acta Zool. Sin. 14, 1962, p. 371 (Tsinling and Ta-pa-shan region, Shensi); Cheng & al., Acta Zool. Sin. 15, 1963, p. 307 (Szechuan: Omei, O-pien, Hui-tung; Yunnan: Li-chiang, Te-ch'in); Cheng

& al., Acta Zool. Sin. 15, 1963, p. 327 (Mt. Omei, Szechwan, 500-1100 m); Deignan, U.S. Nat. Mus. Bull. 226, 1963, p. 214 (Thailand; Chiang Rai, Chaiya Prakan, Chiang Mai, Lampang, Loei, Nakhon Ratchasima, Ubon); Cheng, Syst. Keys Birds China (in Chin.), 1964 (before July), p. 177, 290 (summary of distribution in China); Cheng, Tan & Li, Acta Zool. Sin. 17, 1965, p. 444 (northwestern Szechwan); Macfarlane & Macdonald, Annot. Check-List Birds Hong Kong, rev., 1966, p. 78 (Hong Kong); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 293 (distribution).

Zosterops palpebrosa; Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 3, 1950, p. 243 (Formosa).

Zosterops palpebrosa pequensis; Reis & Nóbrega, Tratado de Doenças das Aves, 2nd ed. III, 1957, p. 211 (no locality).

Zosterops japonica taivaniana; Croizat, Panbiogeography II, 1958, p. 417 (Formosa).

Zosterops japonica; Benham, Hong Kong Bird Rep. 1964, 1965, p. 26 (Hong Kong); (pt.) Barnes & McLure, Migr. Anim. Path. Survey, Ann. Narr. Rep. 1965, 1966, app. I (Thailand); Benham, Hong Kong Bird Rep. 1965, 1966, p. 27 (Hong Kong).

Zosterops Japonica; Webster, Hong Kong Bird Rep. 1966, 1967, p. 27 (Hong Kong).

Page 123, 15th line from bottom: for 1941, read 1943 (3 Dec.).

Weights. 4 ♂ 8-10, 2 ♀ 10, 11 g (Cheng & al., 1963).

Distribution. Cheng & al. (1962) have confirmed the occurrence of *Z. j. simplex* in the Tsinling mountains of southern Shensi, whereas the fact that the Japanese expedition to Shansi in 1941/42 failed to obtain it (Kiyosu, 1958, 1959), indicates that this province is beyond the northern limit of common occurrence. In Nanking, Chang (1932) recorded *Z. j. simplex* in summer only, from April to October, his last observation being October 26th. Fischer (1961) found *simplex* common in winter in Hanoi, when the resident population is augmented by migrants, and also common in Tonkin, particularly in towns (but I doubt that *simplex* can be distinguished in the field from *palpebrosa*).

Habits, etc. Fischer (1961) described how ten to fifteen individuals would come to a common roost every night. As food he mentioned small insects and nectar.

Parasites. In Formosa, Ogawa & Uegaki (1927) found infection with protozoa of the genera *Haemoproteus* and *Proteosoma*. Uegaki (1928) studied the life-cycle of this *Haemoproteus*, and further mentioned having observed *Toxoplasma* or a related genus. In Tonkin, Mathis & Leger (1910) noted infection with *Haemoproteus* in one out of four specimens examined. Two species of Mallophaga, several genera of feather-mites, and a hippoboscid fly *Ornithoica simplicis* are known from this subspecies (see p. 364).

Geographical variation. Previously (this revision, pt. I. p. 129) I have tried to prove that the difference in size between mainland birds and the population from Formosa is only slight. Through Dr. Dien I received two additional specimens from Formosa, obtained near Taipei in the autumn of 1958. The wings of these birds measure only 52½ and 53 mm, very small.

It has occurred to me that large birds collected in Formosa might well be migrants from the mainland. Indeed, in view of the known migratory habits of *Z. j. simplex*, and the geographical position of Formosa, it would be curious if mainland birds did not visit the island. In 1965 alone, 310 individuals were ringed in Formosa, mainly in the season that migrants may be expected (Barnes & McClure, 1966), and it is perhaps not too optimistic to hope that proof of migration will soon be forthcoming. Evidently it would be of interest to measure a good series of breeding birds from Formosa. Probably this would show that the difference in size from mainland birds is greater than I surmised, though it is unlikely that it would justify either recognition of the name *taivaniana* or inclusion in *hainana*.

Addendum. I have just received some fresh material from Formosa, six specimens collected in June, and six collected in September, 1967, and therefore almost certainly breeding birds. The wing-measurements of these birds (8 ♂, 4 ♀) are 52-55, average 53.5 mm; they are, however, in extremely worn plumage. Weights 7.5-11.2 g. This material confirms the small size of the Formosa breeding birds. The largest specimen from Formosa I have seen, with a wing of 58 mm, is one from the Nanto District, dated 16-III-1908, leg. Goodfellow (but evidently obtained by a Chinese or Japanese collector); this bird may well have been a migrant, but the date cannot be correct as its registered number is BM no. 1907.12.12.18, which means that it was registered in December 1907, and therefore can never have been collected in 1908. What is now needed is the collecting of some specimens in winter.

Page 129

Zosterops japonica hainana Hartert

Additional references

Zosterops palpebrosa hainana; Gee, Moffett & Wilder, Peking Soc. Nat. Hist. Bull. 1, 1927, p. 315 (southern Hainan).

Zosterops japonica hainana; Vaurie, Am. Mus. Nov. 1869, 1958, p. 21, 25 (Hainan); Cheng, Distrib. List Chin. Birds II, Passeres (in Chin.), 1958, p. 371, 372 (map of distribution = Hainan); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 562 (Hainan); Cheng, Syst. Keys Birds China (in Chin.), 1964, p. 177, 290 (Hainan); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 293 (Hainan Island).

Page 131.

Zosterops japonica batanis McGregor

Additional references.

Zosterops palpebrosa batanis; Kuroda, Birds in Life Col. I, 1933, pl. 20 no. 160 (Botel Tobago, Kashoto); Hachisuka & al., Hand-List Jap. Birds, 4th ed., 1958, p. 41 (Botel Tobago, Kashoto).

Zosterops japonica batanis; Vaurie, Am. Mus. Nov. 1869, 1958 (31 Jan.), p. 21, 25 (Batan Island, Botel Tobago (Koto Sho) and Kasho To); Cheng, Distrib. List Chin. Birds II (in Chin.), 1958, p. 371, 372 (map of distribution in China = Botel Tobago); Croizat, Panbiogeography II, 1958, p. 417, 418 (Batan Islands, Botel Tobago); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 562 (islands off eastern Formosa (Botel Tobago and Kasho To) and Batan Island); Cheng, Syst. Keys Birds China (in Chin.), 1964, p. 290 (Formosa region); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 293 (distribution).

Page 132, 20th line from bottom: for 1919, read 1910.

Page 133.

Zosterops japonica meyeni Bonaparte

Additional references.

Zosterops meyeni; Boucard, Cat. Av., 1876, p. 231 (Philipp. I.); Salvin, Cat. Coll. Birds Strickland, 1882, p. 172 (Philippine Islands); McGregor, Phil. Journ. Sc. 1, 1906, p. 768, 770 (Banton); Page, Bird Notes N. S. 4, 1913, p. 2 (Luzon); McGregor & Gardner, Condor 32, 1930, p. 99 (Manila bird market).

Zosterops japonica meyeni; Vaurie, Am. Mus. Nov. 1869, 1958, p. 21, 25, 26, 27 (Luzon, Calayan Islands north of Luzon, and on Lubang, Verde, and Banton Islands south of Luzon); Vaurie, Birds Palearctic Fauna, Passeres, 1959, p. 562 (Calayan, Luzon, Lubang, Verde, and Banton Islands); J. Steinbacher, Senckenbergiana 34, 1954, p. 304 (no locality); Croizat, Panbiogeography, II, 1958, p. 417 (Banton, Verde, Lubang, Luzon, Cagayan); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 294 (distribution).

Zosterops montana montana; (pt.) de Schauensee & du Pont, Proc. Ac. Nat. Sc. Philad. 114, 1962, p. 170 (Luzon: Antipolo, Novaliches).

Zosterops japonica; (pt.) Barnes & McLure, Migr. Anim. Path. Survey, Ann. Narr. Rep. 1965, 1966, app. I (Luzon).

Figures. Kittlitz (1833), plate 19 fig. 2 (small coloured figure); Kittlitz (1835), plate 3 (an attractive coloured figure on natural size); Reichenbach (1852) plate 461, fig. 3295 (coloured figure, after Kittlitz but slightly modified and better than the majority of figures in this work).

Type. Professor Ivanov has searched for type material in the Zoological Institute, Leningrad, and found one specimen, about which he informed me as follows (in litt., 11-III-1967): "The specimen of *Z. japonica meyeni* was erroneously identified as *Z. palpebrosa*. It has the label: No. 55 *Dicaeum* (n. sp.) *flavum* Kittl./ *Sylvia palpebrosa*/ Manila/ v. Kittlitz. The word "n. sp." was crossed out, evidently by Kittlitz himself".

Nidification. McGregor (1906) mentioned young birds of various sizes collected on Banton in July-August. He also gave descriptions of eggs and of a nest found in the second half of July, and a photograph of a nest with an egg.

Discussion. Under *Z. m. montana*, de Schauensee & du Pont (1962) make the remark: "Mees (1957) calls all Philippine birds *montana*, but it appears that highland birds are larger than lowland specimens". Apart from the fact that in my 1957 paper I did recognize the population of *Z. montana* from Luzon as a separate race, this remark has puzzled me considerably, as *Zosterops montana* is not, and is nowhere, a lowland bird. The Luzon specimens listed as *Z. m. montana* by de Schauensee & du Pont were collected in cultivated country, only a few miles from Manila, a most unlikely habitat for *Z. montana*. Therefore I consider it a safe assumption that the birds in question belong to *Z. japonica meyeni*.

Page 134.

Zosterops salvadorii Meyer & Wiglesworth

Additional references.

Zosterops salvadorii; Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Engano); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 297 (Engano Island).

Page 138.

Zosterops atricapilla atricapilla Salvadori

Additional references.

Zosterops clava; Everett, Journ. Straits Br. R. As. Soc. 20, 1889, p. 95 (Bornean group).

Zosterops atricapilla; Meyer & Wiglesworth, Birds Celebes, 1898, p. 488, 489 (Sumatra); Page, Bird Notes N. S. 4, 1913, p. 2 (Mount Singalan, Sumatra); Banks, Proc. Zool. Soc. London, 1933, p. 275, 277 (Kinabalu); Fogden, Sarawak Mus. Journ. 12, (1965), 1966, p. 409 (Batu Patap, Ulu Sabai, Tutoh).

Zosterops clara; Meyer & Wiglesworth, Birds Celebes, 1898, p. 488, 489 (Kini Balu); Bonnet, Bull. Soc. Zool. France 49, 1924, p. 179 (Bornéo); Banks, Proc. Zool. Soc. London, 1933, p. 278 (Northern Borneo); Gaud, Nat. Hist. Rennell Isl. IV, 1962, p. 31 (Bornéo).

Zosterous atricapilla atricapilla; Smythies, Sarawak Mus. Journ. 7, 1957, p. 765 (Kinabalu, 3000 ft. upwards; Mt. Mulu at 4500 ft.).

Zosterops atricapilla atricapilla; Smythies, Birds Borneo, 1960, p. 485, pl. XLII fig. 3 (Kinabalu from 3000 feet upwards, Mt. Mulu at 4500 feet); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 298 (distribution).

Figure. Smythies (1960), plate XLII fig. 3 (coloured plate by Hughes).

Parasites. The feather-mite *Anhemialges gracillimus* has been found on this species (Bonnet, 1924).

Page 146.

Zosterops everetti everetti Tweeddale

Additional references.

Zosterops Everetti; Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 289 (Philippines).

Zosterops everetti; Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Cebu); Page, Bird Notes N. S. 4, 1913, p. 1 (Philippine Islands).

Zosterops everetti everetti; Rabor, Auk 76, 1959, p. 40 (Cebu); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 258 (Cebu); Rabor, Bull. C. I. P. O. 8, 1962, p. 81 (Cebu);

Vincent, Red Data Book, Aves, List extinct birds, 1966, p. 20 (Cebu); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 298 (Cebu).

According to Rabor this subspecies has not been found since 1906; he regards it as extinct, a victim of the total deforestation of the island of Cebu. This subspecies is apparently very rare in collections; besides the two types in the BM, I have only examined one other specimen, a female collected at Toledo, 22 June 1892, by Bourns & Worcester (USNM no. 315720). I would like to be advised of any other specimens existing in collections.

Page 146.

Zosterops everetti basilanica Steere

Additional references.

Zosterops basilanica; Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Basilan, Samar, Leyte, Dinagat, Mindanao).

Zosterops everetti; Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 277, 278 (Mt. Malindang).

Zosterops everetti basilanica; Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 305, 319, 359, 411 (Leyte, Samar, Dinagat, Mindanao, Basilan, original material recorded from Mt. Malindang on Mindanao, and from Samar at: Matuginas 100-400 m, San Isidro, Matuguinao 300-400 m, Mount Capoto-an 400-600 m); de Schauensee & du Pont, Proc. Ac. Nat. Sc. Philad. 114, 1962, p. 171 (Mt. Lobi, Leyte); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 298 (distribution).

Page 149.

Zosterops everetti forbesi Bangs

Additional reference.

Zosterops everetti forbesi; Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 258 (Camiguin South).

Page 151.

Zosterops everetti boholensis McGregor

Additional references.

Zosterops everetti boholensis; Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 258, 305, 319, 358 (Bohol at Sandayong, Sierra Bullones 300-350 m, Canlangit, Sierra Bullones 300-350 m, Anislagan, Sierra Bullones 300-350 m, Abakhanan, Sierra Bullones 700 m, Cantaub, Sierra Bullones 700-750 m); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 298 (Bohol Island).

Page 152.

Zosterops everetti siquijorensis Bourns & Worcester

Additional references.

Zosterops siquijorensis; (pt.) Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Siquijor).

Zosterops everetti siquijorensis; Rabor, Auk 76, 1959, p. 40 (Siquijor Island); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 228, 233, 258, 305, 359 (Siquijor); Rabor, Bull. C.I.P.O. 8, 1962, p. 81 (Siquijor); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (Siquijor).

Zosterops palpebrosa siquijorensis; Deignan, U.S. Nat. Mus. Bull. 221, 1961, p. 509 (Siquijor Island).

Type. The USNM cotype earlier mentioned by me, is the one later listed as type by Deignan (1961). However, one cotype is still present in the Minnesota Museum of Natural History, registered number 6775: "it still has the red type series label of the Menage collection" (Warner, in litt., 24-VI-1959). If a lectotype has to be selected, it is perhaps preferable to take the Minnesota specimen.

Page 154.

Zosterops everetti mandibularis Stresemann

Additional references.

Zosterops basilanica; (pt.) Meyer & Wiglesworth, Birds Celebes, 1898, p. 495 (Bongao).

Zosterops everetti mandibularis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (Sulu Archipelago (Sulu, Tawi-Tawi, Bongao)).

Page 155.

Zosterops everetti babelo Meyer & Wiglesworth

Additional reference.

Zosterops everetti babelo; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (Karakelong and Salebabu, Talaut Islands).

Page 155, 7th line from bottom: for pl. XX, read pl. XXX.

Page 155, 5th line from bottom, substitute:

Type. Lost during the bomber-attack of 13-II-1945 (Gaffrey, in litt., 8-I-1960).

Page 156.

Zosterops everetti tahanensis Ogilvie-Grant

Additional references.

Zosterops aureiventer; Banks, Proc. Zool. Soc. London, 1933, p. 277 (Borneo).

Zosterops palpebrosa media; Dupond, Verh. Kon. Natuurh. Mus. België (2) 23, 1942, p. 111 (Toembang Maroewai, Bornéo).

Zosterops aureiventer aureiventer; Ripley, Bull. M.C.Z. 94, 1944, p. 414 (Malay Peninsula).

Zosterops palpebrosa aureiventer; Madoc, Introd. Malayan Birds, rev. ed., 1956, p. 219 (Malaya).

Zosterops everetti tahanensis; Smythies, Sarawak Mus. Journ. 7, 1957, p. 766

(distribution in Borneo); Smythies, Birds Borneo, 1960, p. 485, pl. XLII fig. 2 (from the lower slopes of Kinabalu to the Poi range); Deignan, U.S. Nat. Mus. Bull. 226, 1963, p. 215 (Pattani); Thompson, Univ. Kansas Publ., Mus. Nat. Hist. 17, 1966, p. 43 (Cocoa Research Station, Tawau, N. Borneo); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (distribution).

Zosterops everetti; Smythies, Sarawak Mus. Journ. 9, (1959), 1960, p. 262 (Mt. Kinabalu up to 5500 feet at least).

Zosterops sp.; Medway & Wells, Malayan Nat. Journ. 17, 1963 (Sept.), p. 138 (Gn. Brinchang, Cameron Highlands, Pahang).

Zosterops palpebrosa; McClure, Bird-Banding 35, 1964, p. 153 (Mt. Brinchang, Pahang); McClure, Wilson Bull. 79, 1967 (June), p. 153 (Gombak watershed near Kuala Lumpur).

Weights of the birds from Tawau are: ♂ 7.8, 8.2, 8.2; ♀ 7.8, 7.8, 7.9, 8.6, 9.7 g.

Distribution (fig. 19). Dupond's (1942) record of a specimen from Toembang Maroewai on the Barito, which I had overlooked, shows that in Borneo the species is not confined to Sarawak and British North Borneo. I have examined the specimen. On Mt. Kinabalu, Smythies (1960) recently found *Z. everetti* common up to 5500 feet at least. Smythies (1957, 1960) also mentioned a specimen from the upper Baleh (Rajang), originally misidentified as *Z. palpebrosa auriventer*. In August, 1962, Dr. M. C. Thompson collected nine specimens at Tawau, 750 ft.: a further extension of its known range [1]).

At present, reliable records in Malaya are confined to the states of Perak, Pahang, and Selangor. The occurrence in Malaya as far south as Negri Sembilan, mentioned by Robinson & Kloss (1923) and subsequent authors, remains unconfirmed. Though actually the species is likely to occur in that state, there are no documented published records and no material exists. (There are no specimens in the National Museum, Singapore; when Robinson & Kloss wrote their note they were on the staff of the Selangor State Museum, Kuala Lumpur, but the bird collections from that institute, with the exception of a few mounted specimens, were transferred to the Raffles Museum, now the National Museum, Singapore, in 1928, see Gibson-Hill, 1949, p. 9). Glenister (1951) has a sight record for Penang Hill; in view of the close resemblance between *Z. palpebrosa auriventer* and the present species, it will be prudent to await confirmation by a collected specimen before accepting this, especially since Cairns (1955) noted that *Z. p. auriventer* is on the increase on Penang and can be met with in the most unexpected places.

---

1) Of these nine specimens, three are in the Kansas Museum, three in the USNM, two in the B. P. Bishop Museum, and one, through courtesy of the Director of the last-mentioned institute, in the RMNH, where this subspecies was not previously represented.

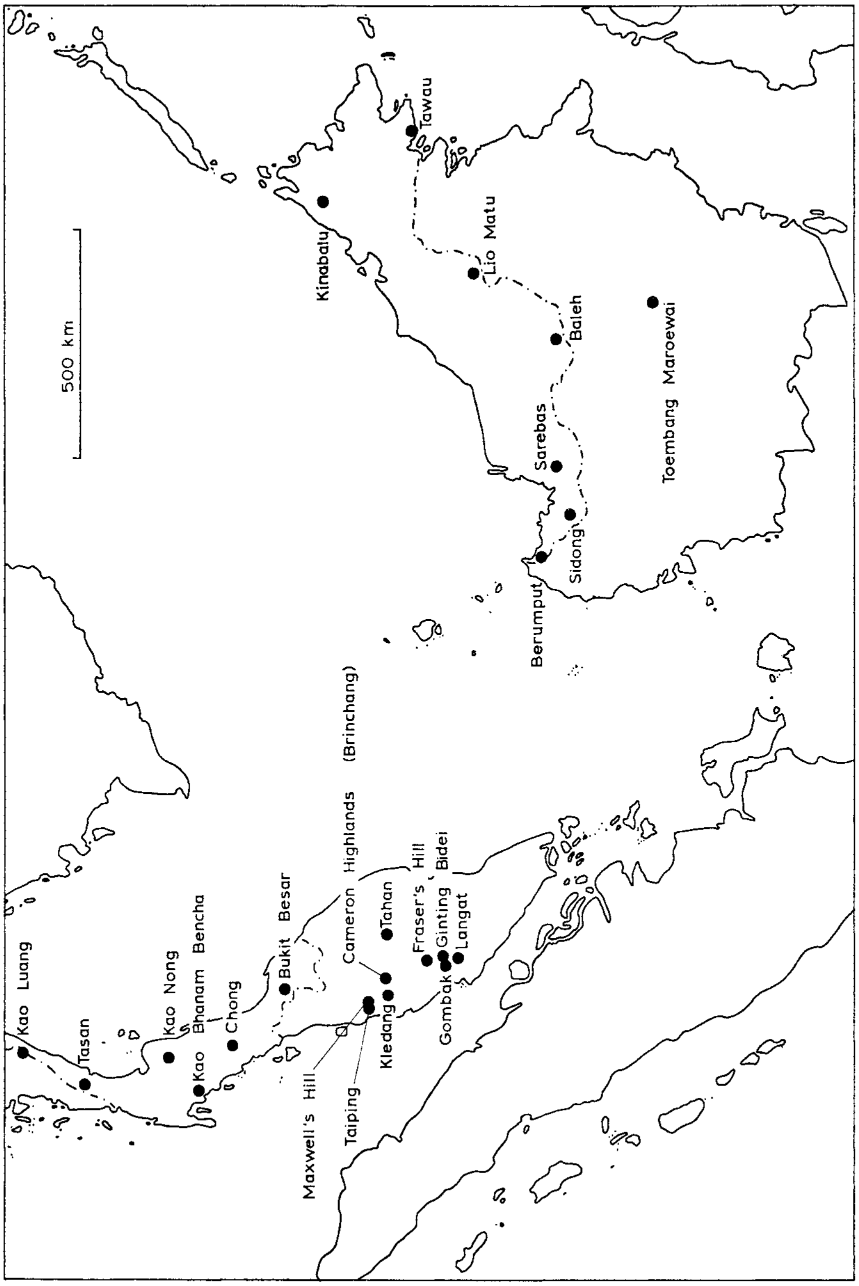


Fig. 19. The known distribution of *Zosterops everetti wetmorei* (Peninsular Siam south to Chong) and *Zosterops everetti tahanensis* (all other localities).

Figure. Smythies (1960), plate XLII fig. 2, coloured plate by Commander Hughes; the illustration is quite meritorious, but it shows the bird with much yellow on the forehead and over the lores, while a character of this race is that it has little or no yellow on these parts, and therefore does not bring out the differences from *Z. palpebrosa auriventer*.

Discussion. Since writing my previous papers dealing with this subspecies (Mees, 1954, 1957), I have examined additional material, and there is little doubt that there exists a slight difference in size between birds from Malaya and from Borneo, the latter being smaller. In the averages this difference was masked by one giant from Liomatu with a wing of 56 mm, larger than any other specimen from either Borneo or Malaya. Therefore individual measurements are here given:

Borneo: ♂ 49, 49, 50, 50, 50, 50½, 51, 51, 51, 51, 52, 52, 56.
♀ 48½, 50½, 51, 51, 52, 53.
sex? 49½.
juv. 48½, 49
Malaya: ♂ 51½, 52, 52, 54, 55.
♀ 50, 52.

Page 159.

Zosterops everetti wetmorei Deignan

Additional references.

Zosterops atricapilla wetmorei; Deignan, U.S. Nat. Mus. Bull. 221, 1961, p. 509 ("Chong" (a mountain pass on the road from Trang to Phatthalung, at about lat. 7° 36′ N., long. 90° 50′ E.), Province of Trang, peninsular Siam).

Zosterops everetti wetmorei; Deignan, U.S. Nat. Mus. Bull. 226, 1963, p. 215 (Thailand: peninsular provinces from Prachuap Khiri Khan south to Trang); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (peninsular provinces from Prachuang Kiri Khan south to Trang, Thailand).

Zosterops everetti; Barnes & McLure, Migr. Anim. Path Survey, Ann. Narr. Rep. 1965, 1966, app. I (Thailand).

Distribution (fig. 19). The name Kloa Luang should read Khao Luang or Kao Luang. Erroneously Kao Nong and Kao Nawng were listed as different localities, for they are different spellings for the same mountain. In order to give a better idea of the distribution of this and the preceding subspecies, a map is given. Its known distribution indicates that the subspecies *wetmorei* almost certainly occurs in Tenasserim, Burma.

Page 162.

Zosterops nigrorum nigrorum Tweeddale

Additional references.

Zosterops sp.; McGregor, Phil. Journ. Sc. 1, 1906, p. 703 (Caluya).

Zosterops nigrorum; Page, Bird Notes N. S. 4, 1913, p. 2 (Is. of Negros); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 235, 258 (Negros).

Zosterops nigrorum nigrorum; Rabor, Auk 69, 1952, p. 257 (Negros); Ripley & Rabor, Peabody Mus. Bull. 13, 1958, p. 77 (Negros Island); Croizat, Panbiogeography II, 1958, p. 418 (Negros, Panay, Masbate); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 300 (Negros, Panay, Masbate, Caluya, Ticao, and Cresta de Gallo (near Sibuyan)).

Page 164.

Zosterops nigrorum luzonica Ogilvie-Grant

Additional references.

Zosterops nigrorum luzonica; Gilliard, Bull. Am. Mus. Nat. Hist. 94, 1950, p. 473 (South Luzon); Croizat, Panbiogeography II, 1958, p. 418 (Southern Luzon); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 300 (southeastern Luzon (Mayon, Sorsogon)).

Page 166.

Zosterops nigrorum aureiloris Ogilvie-Grant

Additional references.

Zosterops aureiloris; McGregor, Phil. Journ. Sc. 1, 1906, p. 703 (Luzon and Mindoro).

Zosterops nigrorum aureilornis; Gilliard, Bull. Am. Mus. Nat. Hist. 94, 1950, p. 473 (North Luzon).

Zosterops nigrorum aureiloris; Ripley & Rabor, Peabody Mus. Bull. 13, 1958, p. 77 (Mindoro: Barawanan Peak, Mount Halcon, 2500-4000 ft; Ilong Peak, Mt. Halcon, 3000-5000 ft); Croizat, Panbiogeography II, 1958, p. 418, 419 (Mindoro, Northern Luzon); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (northern Luzon south to Manila and on Mindoro).

Page 168.

Zosterops nigrorum meyleri McGregor

Additional references.

Zosterops nsigrorum meyleri; Croizat, Panbiogeography II, 1958, p. 418 (Camiguin North); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 299 (Camiguin Island).

Page 169.

Zosterops nigrorum richmondi McGregor

Additional references.

Zosterops richmondi; McGregor, Phil. Journ. Sc. 1, 1906, p. 703 (Cagayancillo); Oberholser, Proc. U.S. Nat. Mus. 54, 1917, p. 188 (Cagayancillo Island).

Zosterops nigrorum richmondi; Croizat, Panbiogeography II, 1958, p. 418 (Cagayancillo); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 300 (Cagayancillo Island).

Page 170.

Zosterops montana Bonaparte

For a revision of the Philippine races, see Ripley & Rabor (1958, p. 74-77).

Page 171, in table V, 5th line, column "wing": for 57.59, read 57-59.

Page 172, fig. 10: Palawan can be included in the range of the species, see further down under the heading Distribution of the nominate race.

Page 176.

Zosterops montana montana Bonaparte

Additional synonyms.

Zosterops whiteheadi Hartert, 1903.
Zosterops montana pectoralis Mayr, 1945.

Additional references.

?*Fringilla*? sp.; Junghuhn, Java I, 2nd ed., 1851, p. 614 (no locality = Java).

Zosterops chlorates; Boucard, Cat. Av., 1876, p. 231 (Morty I.); Page, Bird Notes N. S. 4, 1913, p. 3, 5 (Sumatra); Rensch, Proc. VII Int. Orn. Congr. (1930), 1931, p. 201 (Kleine Sunda-Inseln, oberhalb 1000 m).

Orosterops montana; Boucard, Cat. Av., 1876, p. 232 (Sumatra).

Zosterops sarasinorum; Kükenthal, Abh. Senckenb. Naturf. Ges. 22, 1896, p. 237 (Lokon); Meyer, Notes Leyden Mus. 24, 1904, p. 234 (Nord und Süd Celébes); Moller, Biol. Generalis 7, 1931, p. 135 (no locality).

Zosterops neglecta; Meyer & Wiglesworth, Birds Celebes, 1898, p. 492, 493 (East Java).

Zosterops whiteheadi; McGregor, Phil. Journ. Sc. 1, 1906, p. 770 (Lepanto, Luzon).

Zosterops foghaënsis; Stresemann, Nov. Zool. 20, 1913, p. 367 (no locality).

Zosterops palpebrosa neglecta; Hellmayr, Avif. Timor, in Haniel, Zool. Timor I, 1914, p. 52, 53 (Java, Bali, Lombok und Flores); Stresemann, Verh. Orn. Ges. Bayern, 1917, p. 138 (Bali); Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Ostjava, Bali, Lombok, Flores).

Zosterops palpebrosa citrinella; Stresemann, Nov. Zool. 21, 1914, p. 366 (von Flores über Lombok and Bali bis nach Ost-Java).

Zosterops palpebrosa montana; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Sumatra).

Zosterops palpebrosa foghaensis; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33 (Gebirge von Buru).

Zosterops chlorates neglectus; Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 458 (Lombok 1600-2400 m).

Zosterops montanus; Heinrich in Stresemann, Journ. f. Orn. 87, 1939, p. 372, 375, 376 (vertical distribution in Celebes).

Zosterops montana sindorensis; Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (W. en M.-Java).

Zosterops montana neglecta; Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (O.-Java).

Zosterops halconensis; E. E. Hume, Ornithologists of the U.S. Army Medical Corps, 1942, p. 320 (no locality).

Zosterops palpebrosa citrinella; Sody, Madj. Ilmu Alam (= Nat. Tijdschr. Ned. Ind.) 112, (1956), 1957, p. 154 (Oost Java („Gunung Lawa"), over Bali en Lombok, tot Flores).

Zosterops montana; Sody, Madj. Ilmu Alam (= Nat. Tijdschr. Ned. Ind.) 112, (1956), 1957, p. 162 (Java 1600-3300 m); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 279, 300 (Mt. Malindang 3500-7000 ft); Salomonsen, Dansk Orn. For. Tidsskr. 56, 1962 (15 Oct.), p. 129, 131 (Palawan); Rabor, Postilla 73, 1962 (20 Dec.), p. 3 (Palawan).

Zosterops montana montana; de Schauensee, Not. Naturae 303, 1957 (31 Dec.), p. 10 (Lake Lanao, Mindanao); Ripley & Rabor, Peabody Mus. Bull. 13, 1958, p. 74 (Ilong Peak, Mount Halcon 4000-5000 ft); Rand & Rabor, Fieldiana, Zool. 35, 1960, p. 305 (Mt. Malindang 2700-7050 ft); (pt.) de Schauensee & du Pont, Proc. Ac. Nat. Sc. Philad. 114, 1962, p. 170 (Civolig 3250 ft, Daggayan 4000-5000 ft, Mindanao); Maa, Pacific Insects Monogr. 10, 1966, p. 56 (Mt. Katanglad, 1600-1800 m, Mindanao); Hellebrekers & Hoogerwerf, Zool. Verh. 88, 1967 (31 May), p. 147 (no locality = Java); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 301 (distribution).

Zosterops montana halconensis; Deignan, U.S. Nat. Mus. Bull. 221, 1961, p. 508 (Mount Halcón (at elev. 4500 ft), Midoro Island).

Zosterops montana florenses; J. A. J. Verheijen, Ardea 52, (1964), 1965 (Jan.), p. 200 (Flores).

Distribution. In part I of this revision, p. 21-22, I noted that it would not at all surprise me if in the mountains of Palawan a species of *Zosterops* remained to be discovered. In June 1962, Dr. Salomonsen showed me two skins of *Zosterops montana* that had been taken on Mt. Mantalingajan, Palawan, at an altitude of 1040 m, in September 1961. We compared these specimens with material from elsewhere and agreed that they are referable to the nominate race.

Nidification. On Flores, Verheijen (1965) found nests in the months April, May, June and August.

Parasites. Maa (1966) has recorded the hippoboscid fly *Ornithoica philippinensis* from this species in Mindanao.

Discussion. In their revision of the Philippine races of *Z. montana,* Ripley & Rabor (1958) concluded that neither *whiteheadi* nor *pectoralis* are sufficiently differentiated for recognition. It may be noted that at least about the validity of *whiteheadi* I had expressed doubt, and I wholeheartedly follow the two mentioned authors in synonymising these two names with the nominate race.

For a criticism of de Schauensee & du Pont's (1962) paper, see under *Z. japonica meyeni* (p. 262). It looks to me as if a certain amount of confusion between *Z. m. montana* and *Z. everetti basilanica* may also have taken place in the paper of these authors, and in de Schauensee's (1957) previous one: from Lake Lanao I have never seen any but the last-mentioned species and its level of less than 500 m a.s.l. is certainly far too low for *Z. montana* though that species might occur on some of the surrounding mountains.

Page 183, 2nd line from bottom: for Japandajan, read Papandajan.

Page 189.

Zosterops montana difficilis Robinson & Kloss

Additional references.

Zosterops montana; van Balen, Dierenw. Insulinde II, 1915, p. 483 (berg Dempo op op Sumatra).

Zosterops montana difficilis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 302 (Mt. Dempo).

Page 191.

Zosterops montana steini Mayr

Additional references.

Zosterops palpebrosa citrinella; (pt.) Hellmayr, Avif. Timor in Haniel, Zool. Timor I, 1914, p. 52 (Bonleo).

Zosterops; Schulze, Zeitschr. Morph. Oek. Tiere 30, 1936, p. 30 (Moetisgebirge Timor, 2000 m).

Zosterops montana steini; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 301 (mountains of Timor).

Page 192, 1st line, substitute:

First collector. C. B. Haniel at Bonleo (eastern slope of Mt. Moetis), on 14 June 1911.

Discussion. Having noted that Hellmayr (1914) mentioned one of the specimens of *Zosterops* from Timor to have the iris "weissgrau", I asked Haniel's series on loan from the Munich Museum, and found my suspicion that this skin belonged to *Z. montana* confirmed. This individual is extremely similar to *Z. citrinella citrinella*; from the Munich series of six *citrinella* it differs only in very slightly purer green, less brownish, upper parts, and slightly paler yellow throat, the yellow extending somewhat farther on the breast. The *citrinella*'s have their flanks equally strongly tinged with isabel, one of them being even considerably darker on the flanks than the specimen of *montana*. The differences are so slight that without the added evidence of the iris colour I would not have ventured to separate this skin from *citrinella*.

Previously I recognized *steini* mainly on the basis of having: "the yellow of the front ... rather more extended than in the majority of specimens from the other islands". I have compared Haniel's specimen with skins from Sumatra (2), Sikatok, Mid Java (5), East Java (1), Bali (2), Mindanao

(2) and Negros (2), and found that it has not more but rather less yellow on its forehead than specimens from those other localities. This makes me doubt the validity of *steini;* it might be preferable to synonymize it with the nominate race.

Page 194, line 15: for 55.67, read 53.67.

Page 194, 2nd line from bottom: for *obstinatus,* read *obstinata.*

Page 196, line 18: I overlooked that Ripley (in litt., 6-IX-1955) mentioned to me that he has collected a series of *Z. montana obstinata.*

Page 196.

Zosterops montana ternatana Stresemann

Additional references.

Zosterops chloris; Boucard, Cat. Av., 1876, p. 230 (Ternate).
Zosterops intermedia; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Ternate).
Zosterops montana ternatana; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 300 (Piek van Ternate).

Page 197.

Zosterops natalis Lister

Additional references.

Zoesterops natalis; Wood-Jones, London Hospital Gazette, 1909, p. 15 (in repr.) (Cocos-Keeling).
Zosterops natalis; Ridley, Dispersal of Plants, 1930, p. 469 (Christmas Island); Stresemann, Journ. f. Orn. 87, 1939, p. 164 (no locality); Dammerman, Verh. Kon. Ak. Wetensch. (2) 44, 1948, p. 107, 120 (Christmas Island, Cocos-Keeling Islands); Watson, Zusi & Storer, Prelim. Field Guide Birds Ind. Ocean, 1963, p. 42, 97, 103 (Christmas Island; introduced on Pulo Tikus, Cocos-Keeling Islands); Moreau in Thomson, New Dict. Birds, 1964 (Nov.), p. 886 (Christmas Island); Voous, Nytt Mag. Zool. 12, 1964 (Dec.), p. 47 (Christmas Island); Mayr, Breviora 228, 1965 (15 Sept.), p. 3 (no locality); Pearson, Bull. B. O. C. 86, 1966 (April), p. 69 (Christmas Island); G. F. van Tets & P. A. van Tets, Austr. Bird Bander 4, 1966 (Sept.), p. 59 (Christmas Island); G. F. van Tets & P. A. van Tets, Emu 66, 1967 (June), p. 316 (Christmas Island); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 310 (Christmas Island, Indian Ocean; introduced on Pulu Luar, Cocos-Keeling group).
Zosterops lutea natalis; Croizat, Panbiogeography II, 1958, p. 727 (Christmas Island).

Characters. Previously (this revision, pt. I, p. 198) I remarked that: "pale buff on the flanks ... is probably entirely due to post-mortem discoloration". Actually all specimens I collected recently have the flanks tinged with a light but by no means inconspicuous buff, and this is also quite evident in the field. It is well shown in Lister's (1889) plate XXVII which otherwise is somewhat off-colour. The ear-coverts of fresh specimens are pure grey in colour, quite distinctive.

Unfeathered parts. Iris adult bright brown, juvenile grey, bill black, basal portion of mandible pale blue, legs blue-grey (Mees).

Weights. ♂ 10, 10, 10.5, 11, 11.7; ♀ 10, 10.5, 11, 12, 14; sex? 10, 10, 11, 12.5, 12.5 g.

Habits, etc. In 1961 I spent a month (14 June-15 July) on Christmas Island, observing and collecting its fauna. Like all previous visitors, I found *Zosterops natalis* very common. To give a more exact impression: there must be at least several thousands of individuals and their actual numbers could easily run well into five figures.

The birds moved about in flocks, and I found them extremely versatile, clinging against the bark of trees, pottering about on the ground, and even catching insects on the wing in flycatcher-fashion. At one time I have thought that this great versatility would have some connection with the fact that the Christmas Island avifauna is poor in species so that a greater ecological niche would be available to each, but I have seen almost all these ways of behaviour also in *Z. lateralis gouldi*.

A favourite food at the time of my stay was *Carica papaya* L., which tree, though originally introduced, is now very common in secondary growths. Small berries of several wild trees were also taken; one of these was identified as *Callicarpa albida* Bl. (by Professor van Steenis, Leiden).

An entirely yellow individual, apparently a pure lutino, had been observed for several months before my arrival by residents of Drumsite (on the inland cliff above Flying Fish Cove), and continued to be seen during my stay, but I did not have the good fortune to observe it personally.

Voice. The species has a variety of calls, which, owing to the short duration of my stay, I have not been able to analyse completely (as a basis of comparison *Z. lateralis gouldi* has again been taken).

A high, thin, but not drawn-out "tsēē-sēēt . . . tsēē-sēēt . . . .", the function of which was not clear.

Call of alarm and agitation. A loud: "tsìrr . . . tsìrr . . .". Unexpectedly the call of some birds scolding a goshawk, *Accipiter fasciatus natalis*, was not this one but a higher: "cheeuw . . . cheeuw . . . cheeuw . . .", that I have not otherwise heard.

Song. Lister (1889) and Gibson-Hill (1947) stated that there is no song, but it is difficult to draw a borderline between calls and song, and I see no reason not to consider certain notes as song, though they are certainly very different from the rich varied song found in several other species. For what it is worth I give here the following description of a series of loud notes which I believe may be called song. "yĕrr yĕrr weet yĕrr yĕrr tyĕrr weet....."

Page 200.

Zosterops flava (Horsfield)

Additional references.

Dicaeum flavum; Horsfield, Zool. Res. Java, 1824, Gen. Cat. (Java); Vigors & Horsfield in Sophia Raffles, Mem. Raffles, 1830, p. 673 (Java).

Zosterops flava; Boucard, Cat. Av., 1876, p. 231 (Java); Salvadori, Orn. Pap. II, 1881, p. 371 (Giava); Meyer & Wiglesworth, Birds Celebes, 1898, p. 487 (Sumatra, Java and Borneo); Page, Bird Notes N. S. 4, 1913, p. 2 (Java, Sumatra and Borneo); Oberholser, Proc. U. S. Nat. Mus. 54, 1917, p. 188 (Java); Bartels Jr., Beitr. Fortpfl.-biol. Vögel 7, 1931, p. 64 (Java); Stresemann, Temminckia 3, 1938, p. 114 (Südhälfte von Borneo); Stresemann, Journ. f. Orn. 87, 1939, p. 164 (no locality); Stresemann, Journ. f Orn. 87, 1939, p. 333 (Java und S. O. Borneo); Smythies, Sarawak Mus. Journ. 7, 1957, p. 766 (Java and Borneo: Bandjarmasin; Pending near Kuching); Smythies, Birds Borneo, 1960, p. 485, pl. XLII fig. 4 (Bandjarmasin, Pending near Kuching); Kunkel, Zeitschr. f. Tierpsych. 19, 1962, p. 562 (Java); McClure, Malayan Nat. Journ. 17, 1963, p. 116 (no locality); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 302 (distribution).

Zosterops flava flava; Lonsain, Holl. Namen Vogels van Java, 1941, p. 12 (Java); Hellebrekers & Hoogerwerf, Zool Verh. 88, 1967, p. 148 (West-Java).

Distribution. Smythies (1957) mentioned a specimen from Pending near Kuching; he repeated this in his book (Smythies, 1960) but added that the skin is no longer present in the collection of the Sarawak Museum. As his authority is Moulton, who was not always sufficiently critical (cf. Junge, 1954, p. 324), I cannot accept this record.

Figure. Smythies (1960), plate XLII fig. 4 (coloured plate on two-thirds of natural size, by Hughes): a bit off-colour; the upper parts should be more greenish, not brownish yellow, the under parts are shown too pale.

Nidification. According to Bartels Jr. (1931), *Zosterops flava* makes much use of cobweb in nest construction. The Bartels collection contains five clutches, two of two eggs, three of three eggs; four clutches were collected on the same date, 13-V-1920, at Sedari, Batavia; the fifth was obtained at Moeara Boengin, on 15-V-1922. The eggs are white with perhaps the slightest suggestion of blue; they measure: 15.4 × 11.2 and 15.1 × 11.2; 15.8 × 11.7, 15.9 × 11.5 and 15.7 × 11.5; 15.9 × 11.5, 16.5 × 11.7 and 16.2 × 11.7; ca. 15.5 × 11.6, 14.6 × 11.4 and 14.8 × 11.4; 15.8 × 11.4 and damaged.

ADDITIONS AND CORRECTIONS TO PART II

Page 4, fig. 1: 4th line of caption, read *Z. stresemanni* for *Z. stesemanni.*

Page 6.

Zosterops chloris Bonaparte

It was with considerable hesitation that previously I accepted *Z. chloris* and *Z. citrinella* as conspecific, and this arrangement has never quite satisfied me. I consider now that it is preferable to treat them as distinct, though closely related species. This means that the three forms *citrinella, harterti* and *albiventris* have to be taken out of the species *Z. chloris* to constitute the species *Z. citrinella.*

The "*Zosterops chloris* group" now contains the following species: *Z. chloris, Z. citrinella, Z. grayi, Z. uropygialis,* and probably the little-known *Z. consobrinorum.*

Page 13.

Zosterops chloris chloris Bonaparte

Additional references.

Zosterops brunneicauda; Page, Bird Notes 8, 1909, p. 205 (no locality = probably Aroe Islands); Page, Bird Notes N. S. 4, 1913, p. 2, 5 (Is. of Ceram, Laut, Choor, and the Aru Is.).

Zosterops chloris; Page, Bird Notes N. S. 4, 1913, p. 2 (Is. of Banda).

Zosterops chloris chloris; Mees, Nova Guinea, Zool. 31, 1965 (31 Dec.), p. 143, 190 (Schildpad Islands near Misool); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 587 (Moluccas ... Aru Island group (Pulu Babi) and near Misol Island (Schildpad Islands)); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 304 (distribution).

Page 15, line 9: for Unmeathered, read Unfeathered.

Page 18.

Zosterops citrinella albiventris Reichenbach

Addition references.

Zosterops albiventer; Boucard, Cat. Av., 1876, p. 231 (Warrior's I.); Page, Bird Notes N. S. 4, 1913, p. 1 (Cape Grenville and Islands of Torres Straits).

Zosterops flavogularis; A. J. Campbell, Vict. Nat. 4, 1888 (Feb.), p. 183 (no locality).

Zosterops griseiventer; Page, Bird Notes N. S. 4, 1913, p. 2 (Tenimber Is.).

Zosterops (Luteozosterops) albiventris; Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926, p. 93 (N. Q., Torres Str. Is.).

Zosterops albiventris; Leach, An Austr. Bird Book, 9th ed. (Morrison), 1958, p. 172 (N. Q., Torres St. Is.); Hill, Austr. Birds, 1967, p. 256 (Austr. distribution).

Zosterops chloris albiventris; Keast, Bull. M. C. Z. 123, 1961, p. 387 (islands off

Cape York); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 304 (distribution).
Zosterops palpebrosa albiventris; Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 12, 588 (islands of Torres Straits (Warrior, Deliverance, Cairncross) and islands off Cape York).

Page 19, 20th line from bottom: for "Emu 24, 1925, p. 112 . . .", read "Emu 25, 1925, p. 112 . . .".

Distribution (fig. 20). Previously I had not worked out in detail the Australian distribution of this subspecies, but access to better maps and help from Mr. McKean has now enabled me to locate all islands it has been recorded from. It appeared that the subspecies ranges rather farther down on islands off the Queensland coast than I assumed, compare fig. 20 with the previous figure (pt. II of this revision, fig. 2).

Page 23, first four lines.
These remarks were made from memory, at a time that Finsch's (1901) paper was not available to me. Finsch referred not to Dampier but to Barchewitz. Barchewitz, however, does mention Dampier. In my opinion the description of the song, and the name "Repetiervogel" would certainly not pertain to a *Zosterops* but to the familiar "chromatic scale" of a species of *Gerygone*.

Page 27.

Zosterops citrinella citrinella Bonaparte

Additional references.

Zosterops citrinella; Boucard, Cat. Av., 1876, p. 231 (Timor); Page, Bird Notes N. S. 4, 1913, p. 2 (Island of Timor).
Zosterops chloris citrinella; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 304 (Timor, Rotti, Sawu, and Sumba).

Page 36.

Zosterops chloris intermedia Wallace

Additional references.

Zosterops intermedia; Boucard, Cat. Av., 1876, p. 231 (Celebes); (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Celebes).
Zosterops chloris intermedia; Stresemann, Orn. Monatsber. 40, 1932, p. 47 (Celebes); Coomans de Ruiter, Limosa 20, 1947, p. 226 (Makassar); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 303 (distribution).
Zosterops lutea; J. A. J. Verheijen, Ardea 49, 1961, p. 186 (Palué).
Zosterops lutea sumbavensis; J. A. J. Verheijen, Ardea 52, (1964), 1965 (Jan.), p. 200 (Flores).

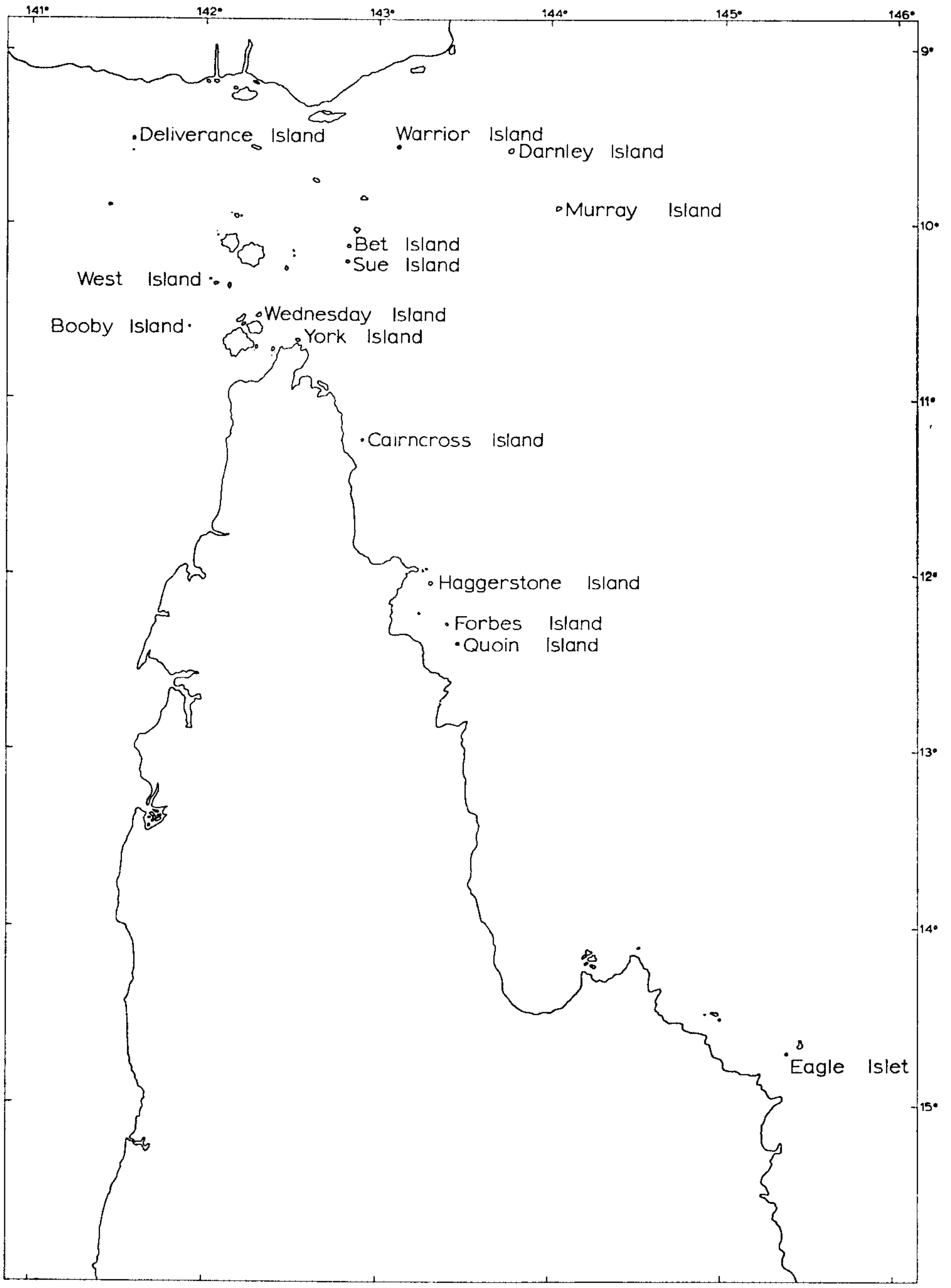


Fig. 20. The Australian distributional area of *Zosterops citrinella albiventris*

Distribution. Father Verheijen (1961), found the species very plentiful and breeding on the small volcanic island of Palué (perhaps better Paloë), ten miles off the north coast of Flores; birds were seen near the coast and at 2000 feet.

Nidification. Verheijen (1965) found nests in April (64), May (4) and June (1).

Page 43.

Zosterops chloris maxi Finsch

Additional references.

Zosterops maxi; Snouckaert, Versl. Med. N. O. V. 4, 1907 (Nov.), p. 47 (Poeloe Pangang (Duizend Eilanden)).

Zosterops intermedia; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Lombock).

Zosterops lutea maxi; Marinkelle, Med.-Bl. Natuurhist. Ver. Ind. 3, 1951, p. 10 (Eiland Middelburg).

Zosterops lutea solombensis; Deignan, U.S. Nat. Mus. Bull. 221, 1961, p. 510 (Pulau Solombo Besar (lat. 5°35′S., long. 114°25′E.), Java Sea; Pulau Kalambau (lat. 4°55′S., long. 115°35′E.), Laurot Islands, Java Sea).

Zosterops flava maxi; Hellebrekers & Hoogerwerf, Zool. Verh. 88, 1967 (31 May), p. 148 (small islands in the area of the Java Sea).

Zosterops chloris maxi; Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 303 (distribution).

Page 48.

Zosterops grayi Wallace

Additional references.

Zosterops grayi; Boucard, Cat. Av., 1876, p. 231 (Ké I.); Page, Bird Notes N. S. 4, 1913, p. 1 (Ké Islands); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 305 (Great Kei Island).

Page 50.

Zosterops (grayi) uropygialis Salvadori

Additional references.

Zosterops uropygialis; Page, Bird Notes N. S. 4, 1913, p. 2, 5 (little Ké Is.); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 305 (Little Kei (Tual or Nuhu Rowa) Island).

Page 55, line 5: for 1969, read 1960.

Page 59.

Zosterops wallacei Finsch

Additional references.

Zosterops aurifrons; Boucard, Cat. Av., 1876, p. 231 (Timor).

Zosterops aureifrons; Page, Bird Notes N. S. 4, 1913, p. 1 (Flores and Sumbawa); Rensch, Proc. VII Int. Orn. Congr. (1930), 1931, p. 202 (im Gebiete der Kleinen Sunda-Inseln).

Zosterops wallacei; Rensch, Proc. VII Int. Orn. Congr. (1930), 1931, p. 201 (im Gebiete der Kleinen Sunda-Inseln); Verheijen, Ardea 52, (1964), 1965 (Jan.), p. 200 (Flores); Mayr, Breviora 228, 1965 (15 Sept.), p. 2 (no locality); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 302 (distribution); Skead, Sunbirds S. Afr., 1967, p. 282, 298 (the Sunda Islands).

Nidification. Verheijen (1965) found a total of 64 nests from March to October, with a peak in the first half of this period.

Father Verheijen has presented me with a clutch of two of this species, taken at Potjong, west Flores, on 15-V-1959. The eggs are very pale blue in colour; one with numerous very small brown spots, the other with more sparse brown spots, which are most concentrated near the blunt end. The eggs measure 15.9 × 12.3 and 16.2 × 12.7 mm, average weight 0.068 g. No other species of *Zosterops* is known to have spotted eggs, and therefore the eggs confirm the aberrant position of *Z. wallacei* in the genus.

Page 66.

Zosterops atrifrons atrifrons Wallace

Additional references.

Zosterops atrifrons; Boucard, Cat. Av., 1876, p. 231 (Celebes); Page, Bird Notes N. S. 4, 1913, p. 2 (Celebes); Moller, Biol. Generalis 7, 1931, p. 135 (no locality).

Zosterops atifrous; Everett, J. Straits Br. R. As. Soc. 20, 1889, p. 141 (Celebes).

Zosterops chloris; Kükenthal, Abh. Senckenb. Naturf. Ges. 22, 1896, p. 237 (Tomohon, Embong).

Zosterops delicatula; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Aru Islands).

Zosterops minor Sharpei; Croizat, Panbiogeography II, 1958, p. 699 (Aroes).

Zosterops atrifrons atrifrons; (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 306 (northern peninsula of Celebes).

Kükenthal (1896) recorded two species of *Zosterops* from the Minahasa, one at the lower levels, which he called *Z. chloris*, and one at the higher levels which he called *Z. sarasinorum*. A specimen from Lokon, 5000′, in the Senckenberg museum confirms that the last-mentioned species was correctly identified according to the nomenclature of the time; of the other species there is no material, but as it was evidently common, it must have been *Z. atrifrons*. *Z. chloris* is unknown from the ornithologically well-explored Minahasa.

Page 70.

Zosterops atrifrons surda Riley

Additional references.

Zosterops atrifrons surda; Deignan, U. S. Nat. Mus. Bull. 221, 1961, p. 510 (Rano Lindu, near the Lindu Lake (about lat. 1°17′S., long. 120°04′E.), central Celebes); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 306 (North-central Celebes).

With reference to Deignan's locality record given above, it should perhaps be pointed out that the word Rano means lake, Rano Lindu is therefore the lake itself, not a locality near it.

Page 71.

Zosterops atrifrons subatrifrons Meyer & Wiglesworth

Additional reference.

Zosterops atrifrons atrifrons; (pt.) Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 306 (Peling and Banggai Islands).

Page 73.

Zosterops atrifrons sulaensis Neumann

Additional reference.

Zosterops atrifrons sulaensis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 306 (Sula Islands (Taliabu, Sula Mangoli, Sula Besi)).

Page 74.

Zosterops atrifrons stalkeri Ogilvie-Grant

Additional references.

Zosterops stalkeri; Stresemann, Verh. Orn. Ges. Bayern 13, 1917, p. 138 (Hochebene von Manusela (Mittel-Seran) in 800 m).

Zosterops atrifrons stalkeri; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 306 (Ceram).

Page 76.

Zosterops atrifrons minor Meyer

Additional references.

Zosterops albiventer var. *minor*; Boucard, Cat. Av., 1876, p. 231 (Mysore I.).

Zosterops aureigula; Page, Bird Notes N. S. 4, 1913, p. 2 (Is. of Jobi, N. W. New Guinea).

Zosterops novaeguinea; Wichmann, Nova Guinea 4, 1917, p. 194 (Cyclopen-Gebirge).

Zosterops minor minor; Croizat, Panbiogeography II, 1958, p. 699 (Japen Island, Upper Mamberano, Cyclops and Sepik mountains); Gilliard & Le Croy, Bull. Am. Mus. Nat. Hist. 123, 1961, p. 17, 83 (Victor Emanuel Mountains: Telefomin, 4800 feet); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 590 (distribution).

Zosterops atrifrons minor; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 307 (Japen and mountains of northern New Guinea (Cyclops Mountains, mountains ot upper Mamberano, and Sepik Mountains)).

Distribution. The record by Gilliard & Le Croy (1961) from Telefomin airfield is an interesting one, that confirms the suspicion that the very dissimilar races *minor* and *chrysolaema* (the latter already known from Ok Tsjop) are separated by the central mountain range.

Page 77.

Zosterops atrifrons chrysolaema Salvadori

Additional references.

Zosterops chrysolaema; Page, Bird Notes N. S. 4, 1913, p. 2 (Arfak Mountains).

Zosterops minor chrysolaema; Croizat, Panbiogeography II, 1958, p. 699, 700 (Onin Peninsula, Arfak Mts.); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 590 (Arfak Mountains and Onin Peninsula).

Zosterops minor tenuifrons; Croizat, Panbiogeography II, 1958, p. 699, 701 (mountains of Eastern New Guinea (Herzog Mts. south to the highlands between Buna and Tufi)); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 590 (mountains on north coast of south-eastern New Guinea from Herzog to the Hydrographer Mountains, also a similar population on Tamarau Mountains in Vogelkop).

Zosterops novaeguineae; Watson, Wheeler & Whitbourn, Emu 62, 1962, p. 97 (Edie Creek Road near Wau, Forestry Area No. 1 at Wau, near Bulolo).

Zosterops atrifrons chrysolaema; Mees, Emu 62, 1962, p. 220 (Morobe District); Mees, Zool. Verh. 66, 1964, p. 22 (Ok-Tsjop); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 307 (distribution).

Zosterops minor; Colman, New Guinea Bird Soc. Newsl. 24, 1967, p. 4 (Lower Watut Valley near Bulolo, 780 m).

Page 81.

Zosterops atrifrons rothschildi Stresemann & Paludan

Additional references.

Zosterops minor rothschildi; Croizat, Panbiogeography II, 1958, p. 699 (Weyland Mts.); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 590 (Weyland Mountains).

Zosterops atrifrons rothschildi; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 307 (Weyland Mountains).

When in New York in 1962, I had an opportunity to examine the type and only known specimen of this race, but can add nothing to its good original description: it is like *minor*, but with a narrow white eye-ring.

Gilliard & LeCroy (1967) have recorded under the name *Zosterops minor* subsp.? four specimens from the Adelbert Mountains. At my request Mrs. LeCroy compared these specimens with the type of *rothschildi*, and she reported (in litt., 4-I-1968) that: "They are very similar to *rothschildi*. In fact, one specimen is in no way distinguishable from *rothschildi*. It has the lores dusky. The other three specimens have the lores black and one of these has the back slightly darker green, more like *gregaria*". The interesting point is that at both ends of the range of *minor* similar intermediates occur. On this basis I consider it justified to conclude that *rothschildi* does not represent a separate race, but is only an intergrade or hybrid between *minor* and *chrysolaema*, likely to appear independently wherever these two forms meet.

Page 82.

Zosterops atrifrons gregaria Mayr

Additional references.

Zosterops minor gregaria; Croizat, Panbiogeography II, 1958, p. 699 (mountains of Huon Peninsula); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 590 (Huon Peninsula); Gilliard & LeCroy, Bull. Am. Mus. Nat. Hist. 138, 1967 (10 Nov.), p. 79 (Huon Peninsula).

Zosterops atrifrons gregaria; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 307 (mountains of Huon Peninsula).

Page 83.

Zosterops atrifrons delicatula Sharpe

Additional references.

Zosterops delicatula; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (S. E. New Guinea); Hvass, De Vogels der Wereld, 1963, p. 21, fig. (het zuidoostelijk berggebied voor Nieuw Guinea) 1).

Zosterops minor delicatula; Croizat, Panbiogeography II, 1958, p. 699 (mountains of Southeastern New Guinea (Port Moresby District)); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 590 (southern slopes of the mountains of south-eastern New Guinea).

Zosterops minor pallidogularis; Croizat, Panbiogeography II, 1958, p. 699 (D'Entrecasteaux (Goodenough, Fergusson)); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 590 (Fergusson and Goodenough Islands).

Zosterops atrifrons delicatula; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 307 (distribution).

Figure. Hvass (1963), figure on p. 23 (coloured, small but quite attractive).

Page 86.

Zosterops atriceps atriceps G. R. Gray

Additional references.

Zosterops atriceps; Boucard, Cat. Av., 1876, p. 231 (Batchian); Page, Bird Notes N. S. 4, 1913, p. 3 (Is. of Batchian); Ripley, Peabody Mus. Bull. 19, 1964, p. 6 (Batjan Island at Gandasuli).

Zosterops atriceps atriceps; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 306 (Batjan Island).

Page 87.

Zosterops atriceps fuscifrons Salvadori

Additional references.

Zosterops fuscifrons; Page, Bird Notes N. S. 4, 1913, p. 3 (Is. of Gilolo or Halmahera).

Zosterops hypoleuca; Page, Bird Notes N. S. 4, 1913, p. 3, 6 (New Guinea).

Zosterops atriceps fuscifrons; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 305 (Halmahera).

---

1) Originally published as Alverdens Fugle, København, 1961 (not seen).

Page 88.

Zosterops atriceps dehaani van Bemmel

Additional reference.

Zosterops atriceps dehaani; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 305 (Morotai Island).

Zosterops mysorensis Meyer

Additional references.

Zosterops mysorensis; Boucard, Cat. Av., 1876, p. 231 (Mysore I.); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 589 (Biak Island); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 308 (Biak Island).

Zosterops mysoriensis; Page, Bird Notes N. S. 4, 1913, p. 3, 6 (Is. of Misori).

Page 91.

Zosterops meeki Hartert

Additional references.

Zosterops meeki; Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 589 (Tagula (Sudest) Island).

Zosterops atrifrons meeki; Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 307 (Tagula).

Page 92.

Zosterops hypoxantha hypoxantha Salvadori

Additional references.

Zosterops sp.; Pöhl, Mus. Godeffroy Cat. IX, 1884, p. 16, 19, 20 (Duke of York).

Zosterops hypoxantha; O. Meyer, Natur und Offenbarung 52, 1906, p. 579, 656 (Vuatom); Page, Bird Notes N. S. 4, 1913, p. 2, 5 (New Britain).

Zosterops fuscicapilla hypoxantha; O. Meyer, Beitr. Fortpfl.-biol. Vögel 8, 1932, p. 228 (Vuatom); O. Meyer, Beitr. Fortpfl.-biol. Vögel 9, 1933, p. 134 (Vuatom); O. Meyer, Die Vögel des Bismarckarchipel, 1936, p. 27 (NB = Neubritannien).

Zosterops furcicapilla; O. Meyer, Beitr. Fortpfl.-biol. Vögel 10, 1934, p. 141 (Vuatom).

Zosterops minor hypoxantha; Gilliard & Le Croy, Bull. Am. Mus. Nat. Hist. 135, 1967, p. 182, 211, 213 (New Britain).

Zosterops atrifrons hypoxantha; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 308 (New Britain and adjacent islands (Uaton, Mioko)).

Nidification. O. Meyer (1932) found in two cases an incubation period of 11 to 12 days. The nests he examined contained always but two, never three eggs. He also gave measurements of a set of eggs (1933) and stated that on Vuatom the species breeds throughout the year (1934).

Page 94.

Zosterops hypoxantha ultima Mayr

Additional reference.

Zosterops atrifrons ultima; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 308 (New Hanover and New Ireland).

Page 95.

Zosterops hypoxantha admiralitatis Rothschild & Hartert

Additional references.

Zosterops fuscicapilla admiralitatis; O. Meyer, Die Vögel des Bismarckarchipel, 1936, p. 28 (Ma. = Manus).

Zosterops admiralitatis; Boschma, Versl. Rijksmus. Nat. Hist. 1930-1935, 1938, p. 38 (Admiraliteits eilanden).

Zosterops atrifrons admiralitatis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 308 (Manus).

Page 98.

Zosterops fuscicapilla fuscicapilla Salvadori

Additional references.

Zosterops fuscicapilla; Oustalet, Bull. Soc. Philomat. Paris (17), 2, 1878, p. 55 (Nouvelle-Guinée); Page, Bird Notes N. S. 4, 1913, p. 2, 5 (Arfak Mountains); Brongersma & Venema, Het Witte Hart van Nieuw Guinea, 2nd ed., 1960, p. 95 (Sibil) [1]).

Zosterops; Schulze, Zeitschr. Morph. Oek. Tiere 30, 1936, p. 31 (Weylandgebirge).

Zosterops fuscicapilla fuscicapilla; Gilliard & Le Croy, Bull. Am. Mus. Nat. Hist. 123, 1961, p. 83 (Hindenburg Mountains: Unchemchi, 5450 feet); Ripley, Peabody Mus. Bull. 19, 1964 (before 8 June), p. 11, 73 (Ilaga, Swart and Baliem Valleys); Mees, Zool. Verh. 66, 1964 (8 July), p. 22 (Sibil); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 588 (mountains of Vogelkop, Snow and Cyclops Mountains); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 308 (distribution).

Distribution. The range of this subspecies in the central mountains, that by Brongersma & Venema (1960) had been extended east to include the Sibil Valley, was further extended to the Hindenburg Mountains by Gilliard & Le Croy (1961). Gilliard found *Z. fuscicapilla* very uncommon in the areas surveyed during his 1954 expedition, which may mean that it actually reaches its eastern boundary of distribution there.

Page 98, line 21: for *fuscicapilla,* read *fascicapilla.*

---

1) Also translations of this book in many other languages.

Page 100.

Zosterops fuscicapilla crookshanki Mayr & Rand

Additional references.

Zosterops fuscicapilla crookshanki; Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 588 (mountains of Goodenough Island); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 308 (Goodenough Island).

Page 101.

Zosterops buruensis Salvadori

Additional references.

Zosterops buruensis; Page, Bird Notes N. S. 4, 1913, p. 2 (Is. of Bouru); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 308 (Buru).

Page 104.

Zosterops kühni Hartert

Additional references.

Zosterops novae guinea; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Amboina and Ceram).

Zosterops Kuhni; Berlioz & Pfeffer, Bull. Mus. d'Hist. Nat. Paris 37, (1965), 1966, p. 914 (Mont Salahutu, Amboine).

Zosterops kuehni; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 309 Amboina, and one record from Ceram)).

Page 104, 5th line from bottom, substitute:

First collector. Examination of the archives of the Rijksmuseum van Natuurlijke Historie has revealed that the specimen of *Z. kühni* from Wahai was not collected by Bernelot Moens, but by the military surgeon E. Benjamins. Moens acted merely as intermediary in forwarding the collection to Leiden (cf. Mees, 1965).

Page 105, line 7: delete the words "in his".

Page 106. In Table VI, for *novaguinea,* read *novaeguineae.*

Page 108.

Zosterops novaeguineae novaeguineae Salvadori

Additional references.

Zosterops novae guinea; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (New Guinea).

Zosterops novaeguineae novaeguineae; Croizat, Panbiogeography II, 1958, p. 697 (Arfak Mts.); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Vogelkop (Arfak Mountains)); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 309 (Arfak Mountains).

Page 109.

Zosterops novaeguineae aruensis Mees

Additional references.

Zosterops novae guinea; (pt.) Page, Bird Notes N. S. 4, 1913, p. 2 (Aru Is.).

Zosterops novaeguineae aruensis; Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Aru Islands); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 309 (Wokam and Kabroor, Aru Islands).

Status. The species must be rather common on the Aroe Islands, for it has been taken by almost all collectors who have visited them. Recently I found specimens in the collections of the Macleay Museum (2) and the South Australian Museum. Though there is no date or collector's name on their labels there is little doubt that they were obtained by Cockerell in 1872.

Page 111, line 12-13: for *novaeguinea,* read *novaeguineae.*

Page 111.

Zosterops novaeguineae wuroi Mayr & Rand

Additional references.

Zosterops novaeguineae wuroi; Croizat, Panbiogeography II, 1958, p. 697, 704 (Wuroi River by the Oriomo River); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Wuroi); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 309 (coast of southern New Guinea, west of mouth of Fly River).

Page 112.

Zosterops novaeguineae wahgiensis Mayr & Gilliard

Additional references.

Zosterops novaeguineae; Hitchcock, Emu 63, 1964, p. 361 (Uinba, Kubor Range).

Zosterops novaeguineae wahgiensis; Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Bismarck Mountains); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 309 (Wahgi Valley, Kubor Mountain, south and north slope of Bismarck Mountains).

Page 112, line 13: for *shaw-mayeri,* read *wahgiensis.*

Page 113, 9th line from bottom: for Glyldenstolpe, read Gyldenstolpe.

Page 114, 10th line from bottom: for ".... Wahgi Valley among ....", read: "Wahgi Valley; among ....".

Page 115.

Zosterops novaeguineae crissalis Sharpe [1])

Additional references.

Zosterops crissalis; Page, Bird Notes N. S. 4, 1913, p. 1 (South-eastern New Guinea).

Zosterops novaeguineae crissalis; Croizat, Panbiogeography II, 1958, p. 697, 704 (Southeastern New Guinea); Mees, Emu 62, 1962, p. 220 (Southeastern New Guinea); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (mountains of southeastern New Guinea, 3800 to 7700 ft); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 309 (mountains of southeastern New Guinea).

Page 117.

Zosterops novaeguineae oreophila Mayr

Additional references.

Zosterops novaeguineae orephila; Croizat, Panbiogeography II, 1958, p. 697 (Northeastern New Guinea (Huon Peninsula: Saruwaged Mts.)).

Zosterops novaeguineae oreophila; Mees, Emu 62, 1962, p. 220 (Huon Peninsula); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Saruwaged Mountains); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 309 (mountains of the Huon Peninsula).

Zosterops novaeguineae magnirostris Mees

Additional references.

Zosterops novaeguineae magnirostris; Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (north New Guinea coast near sea level, opposite Vulcan (Manam) island); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 310 (Awar).

Page 119.

Zosterops lutea lutea Gould

Additional references.

Zosterops lutea; Boucard, Cat. Av., 1876, p. 231 (Australia); Anonymus, Austr. Mus. Rep. for. 1897, 1898, p. 27 (no locality); Page, Bird Notes N. S. 4, 1913, p. 2 (N. Australia); (pt.) Leach & all., Off. Checkl. Birds Austr., 2nd ed., 1926, p. 93 (Trop. N.A.-W.Q. (Norman R.)); Barrett, Austr. Bird Life, 1945, p. 182 (from tropical northern Australia into western Queensland); (pt.) Leach, An Austr. Bird Book, 9th ed. (Morrison), 1958, p. 172 (N.A.-W.Q. (Norman R.)); (pt.) Keast, Bull. M. C. Z. 123, 1961 (March), p. 387 (the north [of Australia]); Frith & Davies, Emu 61, 1961 (June), p. 110 (Adelaide River area); Lendon, Avicult. Mag. 71, 1965, p. 48 (Darwin); Lendon, Austr. Bird Watcher 2, 1966 (June), p. 204 (Ludmilla Creek and Shoal Bay, N. T.); Keast, Australia, 1966, p. 157 (Kimberleys); Galbraith, Emu 66, 1967, p. 290 (Ayr, Qld.).

Zosterops gulliveri; Page, Bird Notes N. S. 4, 1913, p. 2 (Norman River, Gulf of

---

1) Colman (New Guinea Bird Soc. Newsl. 22 and 24, 1967) reports having collected *Z. novaeguineae* at Mt. Kaindi and the Watut Valley near Bulolo. I have not traced Mt. Kaindi, but the Watut Valley is in an area whence the species was not hitherto known. The subspecific identity of these birds remains to be established.

Carpentaria); Hall, Austr. Bird Maps, 1922, p. 129 (northern half of Australia).

Zosterups lutea; Condon, S. Austr. Nat. 23, 1945, p. 10 (Northern Territory).

Zosterops; J. Gilbert in Whittell, Lit. Austr. Birds, Hist., 1954, p. 95 (no locality = Greenhill Island).

Zosterops lutea lutea; Wynne, Key-List Birds, 1956, p. 91 (N. Australia); Deignan, Rec. Am.-Austr. Exp. Arnhem Land IV, 1964 (Oct.), p. 423 (Darwin); Storr, Spec. Publ. W. Austr. Mus. 4, 1967 (28 Feb.), p. 54 (distribution in Northern Territory); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 311 (distribution).

Distribution. As indicated in part II of this revision (p. 124, footnote), I now regard *hecla* as a synonym of the nominate race, the range of which can therefore be extended to include the north coast of Western Australia to as far west as Hecla Island. The subspecies *lutea* and *balstoni* probably merge gradually, but the gap still existing in known distribution between Wotjulum and Hecla Island (one of the least known parts of Australia), may serve as a convenient racial boundary.

Galbraith (1967) made a passing reference to an individual of *Z. lutea* observed at Ayr on the eastern coast of Queensland, in March 1964. As previous records of the species' occurrence in Queensland, are confined to the Gulf of Carpentaria, this is a surprising observation. I have written to Mr. Galbraith for particulars, which he has most kindly supplied (in litt., 23-X-1967): "We saw this single *Zosterops lutea* in tall and rather open mangroves near Ayr, before we started our collecting programme. It was alone, with no *Z. lateralis* in sight. We came later across large numbers of the species on the Gulf of Carpentaria, but did not see it again on returning to the east coast". Galbraith also referred to an observation by Seaton (1956) which I had previously rejected (this revision, part II, p. 123), but he agrees now that it deserves little attention: Seaton did evidently not realise that the record was in any way unusual, and moreover its locality, Edge Hill, appears to be inland from Cairns, not near the coastal mangroves. This leaves us with the single observation from Ayr. It is no reflection on the competence of the observers that I am reluctant to accept the record until confirmed by additional observations. Mr. Ey was with Mr. Galbraith when the bird was seen, and as a resident of Ayr he might be able to shed additional light on the matter, but he has not yet replied to a letter of enquiry.

Voice. In my notes the song is described as most attractive and varied, a rapid, high, happy and extended song which shows a remote resemblance to that of *Prunella modularis,* but is also in many respects very different, being of longer duration, more varied, and friendlier, softer (King Edward River near Kalumburu, 13-VI-1960). The song is quite different from that of *Z. lateralis gouldi.*

Moult. Specimens collected in June and July 1960 at Kalumburu and Wyndham all show heavy moult.

Nidification. Previously I mentioned that no eggs of either race of *Z. lutea* were known to have been taken before 1900. The H. L. White Collection, however, contains a clutch of four eggs, identified as *Zosterops albiventris*, collected near Normanton, Queensland, on 3-XII-1897, by E. Drew. The name Drew is not familiar to me, and is not mentioned by Whittell (1954), but if the data are correct and the eggs have not been misidentified as to family, they must belong to *Z. lutea*, the only silvereye occurring near Normanton.

Page 125.

Zosterops lutea balstoni Ogilvie-Grant

Additional references.

Zosterops lutea; Hall, Vict. Nat. 17, 1900 (9 Aug.), p. 62 (Point Cloates); (pt.) Leach & al., Off. Checkl. Birds Austr., 2nd ed., 1926, p. 93 (Carnarvon); (pt.) Leach, An Austr. Bird Book, 8th ed. (Barrett), 1939, p. 84 (trop. N. A.); (pt.) Leach, An Austr. Bird Book, 9th ed. (Morrison), 1958, p. 172 (N. A.); Keast, Bull. M. C. Z. 123, 1961, p. 388, 416 (Hamersley and Kimberley segments); Serventy & Whittell, Birds W. Austr., 3rd ed., 1962, p. 364 (many localities in Western Australia); Serventy & Marshall, C.S.I.R.O. Div. Wildlife Res. Techn. Pap. 6, 1964 (April), p. 14, 16, 22 (Barrow Island, Lowendall Island, Hermite Island); Storr, Spec. Publ. W. Austr. Mus. 2, 1964 (31 Dec.), p. 81 (Depuch Island); Serventy & Whittell, Birds W. Austr., 4th ed., 1967 (May), p. 376 (many localities in Western Australia); (pt.) Hill, Austr. Birds, 1967, p. 256 (from Shark Bay...).

Zosterops balstoni; Whitlock, Emu 17, 1918, p. 178 (Barrow Island).

Zosterops lutea balstoni; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 311 (Western Australia, from the Péron Peninsula and Dick Hartog Islands to western Kimberley District (King Sound)).

Distribution. Additional localities given by Serventy & Whittell (1962) are Pelican Island in Sharks Bay, Airlie, Large and North Sandy Islands off Onslow, and Lowendall Island. In May 1960, I observed, and in most cases collected, the species at Learmonth, Exmouth Gulf; Mundabullangana; Pardoo Sands in a patch of mangrove near the 116 mile post (that is 116 miles from Port Hedland); 36 miles N. E. of Wallal Downs Hsd. in dry scrub and bushes, and at La Grange in mangrove. My observations prove that the species occurs — if not as a breeding-bird at least in wandering parties — all along the Eighty Mile Beach, which explains why there is no morphological break between birds of the North-West and Kimberley Divisions. Previously (this revision, pt. II, p. 130-131) I expressed mild surprise about this. In May and June 1962 staff members of the Western Australian Museum obtained a small series on Depuch Island near Port

Hedland and one on Legendre Island, Dampier Archipelago. On the other hand there do not seem to exist records from Dirk Hartog Island; my previous inclusion of this island in the range of *balstoni* was based on careless reading of Campbell (1919).

Habits, etc. When camping near Cossack in May 1960, I noted an interesting daily routine. The ruins of the town of Cossack are situated on a tongue of high sandy country, projecting northwards, with mangrove on both sides. This tongue of dry ground is covered with *Acacia* thickets, and we were camped behind a hill on its eastern side. It appeared that the birds roosted in the mangrove, but spent the day foraging in the *Acacia*. Each morning with the first rays of the sun, small groups and flocks of up to about forty individuals would come flying overhead, from the tall mangrove along the creek east of us, to the dry ground west of us. Towards 17.30 hrs movement in the opposite direction would begin, the birds returning to their night quarters. In daytime one would hardly see a *Zosterops* in the mangrove, but they were plentiful in the *Acacia* bushes on the dry ground.

Page 126, 2nd line from bottom: for Dirk Hartog, read Barrow Island.

Page 127, 3rd line from bottom: for Kearthland, 1898 observed...., read Keartland, 1898) observed...

Page 129, 12th line from bottom: insert a comma between the words flocks and at.

Page 135.

Zosterops griseotincta griseotincta G. R. Gray

Additional references.

Zosterops griseotincta; Boucard, Cat. Av., 1876, p. 230 (Louisiade A.).

Zosterops griseitincta; Page, Bird Notes N. S. 4, 1913, p. 2 (Louisiade Is.).

Zosterops griseotincta griseotincta; Croizat, Panbiogeography II, 1958, p. 727 (Conflict Group and Duchâteau Island); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 591 (Duchâteau and Conflict groups).

Zosterops griseotincta aignani; Croizat, Panbiogeography II, 1958, p. 727 (Misima and Deboyne Islands); Rand & Gilliard, Handb. New Guinea Birds, 1967, p. 591 (Misima (St. Aignan) and Deboyne group).

Page 137.

Zosterops griseotincta longirostris Ramsay

Additional references.

Zosterops longirostris; Page, Bird Notes N. S. 4, 1913, p. 2 (Heath I.).

Zosterops griseotincta longirostris; Croizat, Panbiogeography II, 1958, p. 727

(distribution); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Heath Island (Rogeia), East and Hastings Island (Bonvouloir group) and Alacaster Island); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 311 (Heath [= Rogeia] Island, Bonvouloir group, and Alcester Island).

Page 138.

Zosterops griseotincta pallidipes De Vis

Additional references.

Zosterops rennelliana; Croizat, Panbiogeography II, 1958, p. 726, 727, 782, 801 (Rennell Island); Rand & Gilliard, Handb. New Guinea Birds, 1967 (March), p. 591 (Rossel Island); Mayr in Paynter (editor), Check-List Birds XII, 1967 (Aug.), p. 311 (Rossel Island).

Page 139, line 23: for Archipalago, read Archipelago.

Page 139.

Zosterops griseotincta eichhorni Hartert

Additional reference.

Zosterops griseotincta eichhorni; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 311 (Nissan, Nauna, and Long Island).

Page 142.

Zosterops griseotincta rennelliana Murphy

Additional references.

Zosterops rennelliana; Croizat, Panbiogeography II, 1958, p. 726, 727, 782, 801 (Rennell Island); Gaud, Nat. Hist. Rennell Isl. IV, 1962, p. 31, 36, 47, 49 (l'île Rennell); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 312 (Rennell Island).
Zosterops rennellianus; Gaud, Nat. Hist. Rennell Isl. IV, 1962, p. 49 (lîle Rennell).

Parasites. This form is known to be a host of the feather mites *Anhemialges gracillimus* and *Mouchetia viduata* (cf. Gaud, 1962).

Page 143.

Zosterops vellalavella Hartert

Additional reference.

Zosterops vellalavella; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 312 (Vellalavella and Bagga).

Page 145.

Zosterops luteirostris Hartert

Additional reference.

Zosterops luteirostris luteirostris; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 312 (Gizo).

Page 146.

Zosterops splendida Hartert

Additional reference.

Zosterops luteirostris splendida; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 312 (Ganonga).

Page 148.

Zosterops kulambangrae kulambangrae Rothschild & Hartert

Additional reference.

Zosterops rendovae kulambangrae; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 312 (Kulambangra, New Georgia, Vangunu, and Gatukai).

Page 149.

Zosterops kulambangrae paradoxa Mees

Additional references.

Zosterops rendovae; Page, Bird Notes N. S. 4, 1913, p. 2 (Is. of Rendova).
Zosterops rendovae rendovae; Mayr in Paynter (editor), Check-List Birds XII, 1967 p. 312 (Rendova).

Discussion. The necessity, under the International Rules, of a transfer of the specific name *rendovae* from the bird of Rendova to that of San Christobal was demonstrated by me fourteen years ago. Mayr (1965) has refused to acknowledge this, saying that: "Galbraith (1957) has well stated the reasons for retaining the name *rendovae* for the Rendova White-Eye . .". Unfortunately Mayr appears to have overlooked both my comment (this revision, pt. II, 1961, p. 160-162) and Galbraith's (1962, p. 76-77) own change of stand. The changes in nomenclature effected by me are clearly dictated by the International Rules, and could only be undone by a decision of the International Commission on Zoological Nomenclature. The fact that in a period of fourteen years nobody has deemed it worth to apply to that body, would, as it appears to me, greatly weaken the case for a return to the nomenclature adopted by Mayr.

Page 150.

Zosterops kulambangrae tetiparia Murphy

Additional reference.

Zosterops rendovae tetiparia; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 313 (Tetipari).

Page 151.

Zosterops murphyi Hartert

Additional reference.

Zosterops murphyi; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 313 (Kulambangra).

Page 154.

Zosterops metcalfii exigua Murphy

Additional reference.

Zosterops metcalfii exigua; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 310 (Buka, Bougainville, Shortland, and Choiseul).

Page 156.

Zosterops metcalfii metcalfii Tristram

Additional references.

Zosterops metcalfii metcalfii; Mayr & Camras, Field Mus. Nat. Hist., Zool. 20, 1938, p. 464 (Ysabel); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 310 (Ysabel and St. George Islands).

Zosterops metcalfii floridana Rothschild & Hartert

Additional reference.

Zosterops metcalfii floridana; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 310 (Florida Island).

Page 158.

Zosterops rendovae rendovae Tristram

Additional references.

Zosterops ugiensis ugiensis; Galbraith & Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 9, 1962, p. 76 (San Christoval); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 313 (San Christobal).

Page 162.

Zosterops rendovae oblita Hartert

Additional references.

Zosterops ugiensis oblita; Galbraith & Galbraith, Bull. Brit. Mus. (Nat. Hist.), Zool. 9, 1962, p. 75 (Guadalcanal: Betilonga, Turipava); Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 313 (Guadalcanal).

Page 164.

Zosterops rendovae hamlini Murphy

Additional reference.

Zosterops ugiensis hamlini; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 313 (mountains of Bougainville).

Zosterops stresemanni Mayr

Additional reference.

Zosterops stresemanni; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 313 (Malaita).

Page 165.

Zosterops sanctae-crucis Tristram

Additional reference.

Zosterops sanctaecrucis; Mayr in Paynter (editor), Check-List Birds XII, 1967, p. 314 (Santa Cruz Island).

SUMMARY AND CONCLUSIONS

Introduction

The introduction to the first part of this revision was written in an optimistic vein, in the expectation that a careful revision would lead to the clarification of the more intriguing problems of speciation and evolution. As the systematic work progressed this optimism has gradually evaporated. The very factor which first made the Zosteropidae seem such a promising object of study, the abundance of morphologically very similar species, has prevented a synthesis. In a comparatively little-known group a museum-worker has at best nothing but eidonomy, distribution, and some superficial information on habitat and behaviour to go on. Moreover, such facts as are known of behaviour, nidification, song, etc. appear to confirm the uniformity of the group, and may therefore not contribute much to an elucidation of relationships. All these points are discussed in the following sections, so that I need not elaborate on them here.

Far from being the synthesis they ought to have been, the concluding sections consist of a number of unrelated items, placed in a haphazard sequence. I can only hope that, nevertheless, some items will be useful to colleagues who find themselves confronted with similar or related problems. One fact in particular has struck me when working through theoretical and philosophical literature: the quantity and diversity of works on biological subjects are such, and the richness and variation of Nature is so limitless, that it is possible to select examples in support of whichever theory, no matter how unlikely or absurd in itself, one cares to launch of defend.

Theoretical and practical classification

This revision was preceded by a paper on classification, dealing with some of the "aberrant" genera (Mees, 1953). Subsequently, in the first part of this revision (1957), I gave a preliminary list of genera, species and subspecies.

The sequence of genera and species adopted in that list was based on a combination of geography and considerations of relationships. Wherever birds were evidently closely related, I arranged them in groups, but when there was no clear evidence, a roughly geographical sequence was adopted, going from west to east, and then turning from Australia through the Pacific in a north-westerly direction. In accordance with geographical convenience, of the aberrant genera, *Lophozosterops* was listed first; this had moreover the advantage that it is the largest of these genera and appears close to *Zosterops*. *Lophozosterops* was followed by several small genera, some of which I thought might have been derived from *Lophozosterops* rather than directly from *Zosterops*.

As far as the genus *Zosterops* was concerned, I have in subsequent parts of this revision adhered to the sequence published in 1957, with a few exceptions, the most important one of which is that *Z. murphyi* (a species I had not yet examined in 1957) was recognized as a member of the *Z. griseotincta* group, and therefore changed places with *Z. metcalfii*. The sequence of the other genera had to be changed anyway because of the removal of *Hypocryptadius cinnamomeus*. Beyond that, it is mainly for the sake of uniformity and because I do not have any real objection, that I have now adopted the sequence which Mayr (1965a) proposes to use in the "Check-List of Birds of the World" (but see the discussion of the genus *Tephrozosterops* for further arguments).

Mayr (1965a) has adopted, in the genus *Zosterops*, a sequence considerably different from that used by me, the main difference being that he has adhered less strictly to the geographical sequence, and given more weight to his hypothetical ideas of their relationships. This difference in approach reveals perhaps a fundamental difference in character between Mayr and me. Mayr appears to be an optimist and an idealist, with a great and doubtless justified confidence in his own systematic judgment, which is supported by a considerable experience. On the basis of this he ventures to speculate on the affinities of species and goes so far as to state: "It is characteristic of the present status of bird taxonomy that the relationship of species and subspecies within the family can be worked out down to the most elaborate details...." (Mayr & Vaurie, 1948, p. 238). With the lapse of time it is clear that Mayr has receded somewhat from this position of remarkable confidence for more recently he has written (23-XII-1963): "All you say about the difficulty, if not impossibility of finding out relationships among the species of *Zosterops* is only too well known to me. However, I continue to be an incorrigible optimist, and much against my better judgment I try and try again". Of course, I do not for a moment suggest that Mayr has failed to recognise the difficulties, but even where he discusses these, he throws in a beam of optimism, expressing the hope that closer study of calls, song and behaviour would lead to a better understanding of relationships.

My own approach differs in that I am of a less optimistic nature, and have considerably less faith in my judgment. In this revision I have gone as far as I dared in suggesting relationships, but usually admitted inability to recognize any clear affinities. This means that, beyond a certain point, I do not see any use in speculating about affinities, and a logical consequence of this is a closer adherence to a geographical sequence.

The same difference in approach is apparent in the generic classification. Mayr (1965a, and in litt.) inclines to the view that the genera *Tephrozosterops, Madanga, Lophozosterops, Oculocincta* and *Heleia* form a natural group, and could perhaps all be united. I, on the other hand, though not excluding the possibility that Mayr is right, regard it as more likely that at least some of these genera were derived independently from *Zosterops*.

It appears justifiable to discuss the practical and theoretical sides of classification in this connection, even though I realise very well that all this has been said and written before and more competently.

The usual approach to classification in ornithology, especially in groups of small-sized birds of which no fossils are known, is to go by their eidonomy: one compares series of skins of different species, and their degree of resemblance is assumed to reflect their actual relationship. There is little doubt that in many instances this method, the only one permitted by extant knowledge, results in a fair approach to the coveted natural system. The Zosteropidae, however, perhaps more than any other group of birds, demonstrate the weakness of the method which presupposes a speed of evolution (morphological and genetical differentation) remaining equal in all organisms and throughout time. In the Zosteropidae we have very good evidence that morphological resemblance as a criterion for actual relationship breaks down entirely. Mayr (1965a) is well aware of this: "I know of no other group of birds in which close relatives, for example the subspecies of *Zosterops atrifrons* or the semispecies of the superspecies *griseotincta,* may differ more from each other than do distantly related species. Indeed some Oriental species are almost indistinguishable from African forms, from which they must have been isolated since remote times".

The obvious consequence is that morphological resemblance must be used with the utmost caution as a criterion for judging relationships. In this revision I have tried to exercise such care, and I consider that beyond this, attemps at a sequence on the basis of supposed relationships become meaningless.

Even if, however, all actual relationships were completely known, a natural sequence according to relationships would be impossible to construct for the simple and obvious reason that a list is one-dimensional, and speciation and relationships are at least three-dimensional. Let us take the simplest example, that from a species A three lines of evolution can be derived simply presented in two dimensions as follows: M - L - K - J - A - B - C -

$$\text{D - E} \begin{array}{l} \nearrow \text{F - G} \\ \searrow \text{H} \end{array}$$

We agree that A is the most "primitive" species from which the other lines are derived, and therefore should come first. But now, compressing this two-dimensional sequence into one, what are we to do? The two species closest to A are B and J, but it would be misleading to place these next to each other, since B is closer to C than to J, and J is closer to K than to B. There is thus a choice: either we relate each species to A only, and make our sequence accordingly, which means that quite distant species like M and H follow each other, or we follow each line of relationship to the end. In the first case we would get a sequence A - B - J - C - K - D, etc., in the second: A - B - C - D - E - F - G - H - J - K - L - M. Though I would prefer the second sequence, it will be seen that there is a break between G and H (where one has to go back to E), and a far more important break between H and J.

In this simple example, there is a third solution. If we abandon the provision that the most "primitive" species must come first, we can take the sequence: M - L - K - J - A - B - C - D - E - H - F - G.

Superficially this would appear a fair solution, but its great weakness is that it can only be done when have no more than two lines of evolution going out from A. In the present case the difficulties we are trying to avoid turn up at E, and we cannot repeat the performance. Moreover this sequence actually means that we start at a side branch of the family tree, climb down to the trunk (A) and than go up another branch again. In tree-shape it would look as in fig. 21.

It is instructive to note that in *Zosterops,* in some instances I have preferred the first method, and Mayr the second. For example, I have first treated *Z. atrifrons,* and had this followed by its various derivatives which include *Z. atriceps.* Mayr, on the other hand, had *Z. atriceps* precede *Z.*

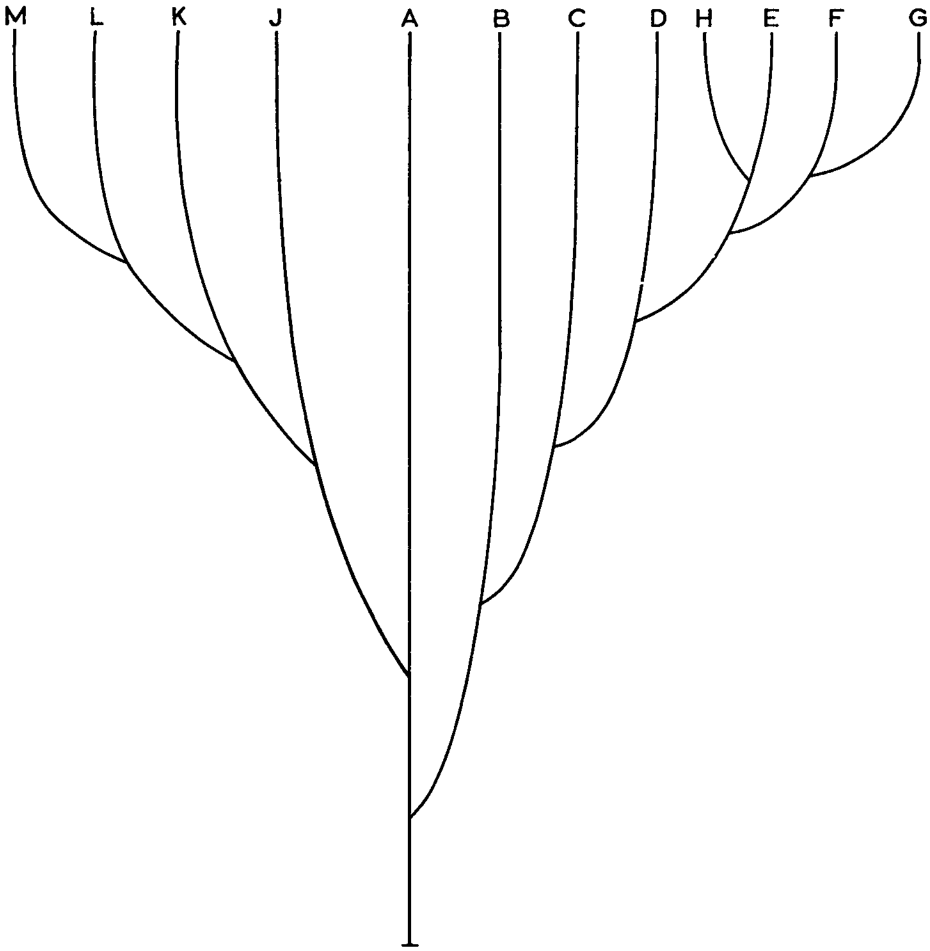


Fig. 21. Hypothecial family-tree, illustrating the difficulty if adequately expressing relationships in a linear sequence.

atrifrons, though Mayr and I are in agreement as to the relationships of these species.

The illustrated difficulty is not the only one encountered by the idealists in search of a natural system. In the Zosteropidae for example, certain species are derived from subspecies of other species (see p. 325). Similarly, there is every reason to assume that *Zosterops* is the oldest genus and that all other genera have been derived from it. This would mean that in *Zosterops* there are several species which are more closely related to certain other genera than to other species of *Zosterops* which they morphologically resemble. Should, therefore, for example the subspecies of *Z. lateralis* be interrupted, in a check-list, to place *Z. strenua* next to *Z. l. familiaris* and *Z. albogularis* next to *Z. l. lateralis*? I know of only one revision in which this has been done: Vaurie (1949) who treats *Dicrurus montanus* amongst the races of *D. hottentottus,* and he has not repeated this in the check-list (Vaurie, 1962). The conflict underlying these difficulties is that between historical distance (in time) and actual morphological-genetical distance. To pursue the historical line regardless of the others, would lead to nomenclatural chaos, a matter I have discussed in another paper (Mees, 1962a). Mayr (1965d, p. 83-84) has since come with exactly the same objection.

One other system of classification has to be discussed here as in ornithology it has found at least one very competent defender (Moreau, 1961), and is widely used in systematically less well-known groups; it is that of alphabetical sequence. It certainly has the advantage of being simple and of making, in large groups, each species easy to find. On the other hand, besides that every time a name is changed there has to be a reshuffle, the system plays havoc with zoogeography, and especially in a well-known group like birds is unsatisfactory in that it entirely conceals the relationships that are actually known to exist [1]). This is particularly undesirable in those forms where (as is frequently the case) it is uncertain or disputable whether they should be regarded as species or races (think of *Z. grayi* and *Z. uropygialis, Z. meeki* and *Z. hypoxantha* as related to *Z. atrifrons,* the species of the *Z. griseotincta* group, etc.). To be consistent therefore, perhaps each subspecies should be listed alphabetically, but this would really

---

1) Ridpath & Moreau (1966) have accepted the full consequences of the alphabetical sequence. Their only concession to established classification is that they separate Non-Passerines from Passerines, but within these groups they list the families, and within the families the genera, and within the genera the species, alphabetically. Thus, the Accipitridae are separated from the Falconidae by Aegothelidae, Alcedinidae, Anatidae, etc., the Tytonidae are separated from the Strigidae by the Turnicidae. In the family Muscicapidae, *Colluricincla* is separated from *Pachycephala* by *Myiagra,* etc. Moreau (1966), separated the Fringillidae from the Emberizidae by the Eurylaimidae.

be the end of ternary nomenclature and a return to pre-Darwinian philosophy. Moreau (1961) admittedly suggested a system of numbering to indicate members of species-groups, but if one goes that far it is more logical to group the related species together rather than have them widely scattered. I agree therefore with Mayr (1965b) that this system has no future in ornithology. Even in little known taxa I would usually prefer the geographical grouping to the purely random one that the alphabetical sequence is. On the other hand, its practical advantage in little-known groups is obvious, and I have actually used the alphabetical sequence in some recent systematic papers (Mees, 1962b, 1964a). The reasons were that I was unable to make any intelligent guess as regards their interrelationships and in addition that the majority of species dealt with are of a very wide distribution (circum-tropical marine fishes), so that a geographical sequence appeared also of little use. According to Moreau (in litt.), Mayr's (1965b) paper and my own remarks are a misrepresentation; he considers the numbering the essence of his proposals, and the separation of no significance at all, being purely typographical. This means that there is no essential difference between the usual system of grouping by supposed relationship, and Moreau's system of numbering by supposed relationship. The practical difference is that in the former system all related species are placed together, giving at a glance an insight in size and distribution of the group, whereas in the latter one has to hunt through the alphabet to bring together all species with the same numbers. I cannot possibly see that this alternative is more convenient.

The difficulties here discussed are caused by the fact that the word "relationship", so generally used, could mean any of at least four different kinds of relations:

1. — Gross external similarity: this is in systematic practice the usual meaning of the word.

2. — Historical relationship: descent from a common ancestor in the not remote past (theoretically a subdivision is possible, as one can go either by time only, or by number of generations).

3. — Genetical affinity: similar genetical and cytological constitution.

4. — Extent of interfertility and hybridization. This is not the same as (3), because sometimes much genetical and cytological change fails to affect interfertility (so that forms quite distinct by other criteria, do still successfully interbreed and are therefore regarded as conspecific), whereas elsewhere a slight amount of change, sometimes nothing but a difference in call (Perdeck, 1957), prevents interbreeding, so that genetically extremely similar forms have to be treated as different species.

The processes listed under the four points are connected in only a very loose way, and unless one knows clearly to which point one wants to give the greatest value in judging relationships, all discussions on this subject are bound to remain inconclusive, even in the extremely unlikely case that everything concerning each of the four points is known. "Phylogenetic systematics", my category 2, is perhaps philosophically and theoretically quite satisfactory, and many systematists believe in it (Hennig, 1950; Kiriakoff, 1959), or think they do, but I fail to see how it can ever find full practical application. However strong the theoretical controversy between the typological (category 1) and phylogenetic (category 2) systematics may be, in practice they are exactly the same. Kiriakoff (1966) has also arrived at this conclusion, which means that the whole argument is a difference in philosophy and holds no promise of any practical application (see also Gisin, 1964). It follows that the "natural system" as envisaged by many authors is a fiction; the best we can hope for is a consciously subjective approach, based on the little that is known.

Let us, after this long theoretical diversion, return to a comparison of the actual classifications proposed by Mayr and me. The first point that strikes me when reading Mayr's paper, is that, by his own admission, all changes in sequence effected by him are speculative: we are in full agreement as to the limits of the various species-groups which show more or less convincing relationships. Even so, his sequence is as inconsistent as mine, and as far as I can see no improvement over it. For example, Mayr begins his sequence with *Z. erythropleura,* and makes *Z. ceylonensis* follow *Z. palpebrosa,* supporting the last-mentioned shift with the words: ".... I have placed it after *palpebrosa* and closer to some of the Indonesian species from which it might possibly have been derived". In effect, this produces the result in Mayr's system, that *Z. ceylonensis* is followed by *Z. conspicillata,* which does not seem to make much sense to me. Moreover, when beginning the sequence with *Z. ceylonensis* and *Z. palpebrosa,* and working from west to east, I definitely had in mind the African species of the genus, which would precede the Indo-Australian species in the sequence I followed. Though Mayr states that the African and Oriental forms "must have been isolated since remote times", the examples of a few other passerine birds, like *Ixos madagascariensis* 1) and *Copsychus,* show that this needs not be true,

1) Whether or not the drastic reduction in number of genera first proposed by Delacour (1943), followed by Delacour & Mayr (1946), Delacour (1947), and Deignan (1960), is justified, is not, at present, for me to decide, but if it is followed, the genus called *Hypsipetes* by Deignan, should be known as *Ixos,* on the grounds of incontestable priority. *Ixos virescens* Temminck, 1825, is the type of the genus by monotypy, for though Temminck clearly intended the name for a whole group of bulbuls, only *I. virescens* is specifically mentioned in its original description. The name *Ixos* is neither

and in placing *Z. ceylonensis* first I did have in mind this possibility. Morphologically it is close to *Z. maderaspatana.* Though this is quite as speculative as Mayr's speculations which I have just condemned, the affinities of *Z. ceylonensis* could just as well lie in the west as in the east. Also it is very likely that a species like *Z. abyssinica,* still present in the Yemen, extended right across the southern edge of Arabia during the last glaciation, i.e. until not more than 15000 years ago, if not indeed during the Neolithic humid episode in these latitudes, ca. 6000 years ago.

Z. wallacei was moved up in the sequence though Mayr agrees that it is an old and peculiar endemic. I believe that to be consistent with his morphological rather than geographical weighting, Mayr should have placed it at the end of the genus, preceding or following *Z. cinerea.* His argument for putting it earlier in the sequence as: "It seems distantly related to the western group of species", appears to bring him very close to the "cladists" who elsewhere (Mayr, 1965d) he has condemned so fervently.

Discussing *Z. natalis,* Mayr stated that: ".... there is much to indicate that this species is closer to one of the east Indonesian or Australian species (*chloris, lutea,* etc.) than to any of the Malaysian species". Unfortunately, Mayr failed to give any information as to what this "much" is. He placed the species between *Z. metcalfii* and *Z. lutea.* Having field-experience with both *Z. natalis* and *Z. lutea* I can state that in habitat and song, as well as in morphology, they are as different as any two species of *Zosterops* might be expected to be. Probably the nidification (incubation period, etc.) is also different, but that of *Z. lutea* is insufficiently known.

The preceding notes were not designed to show that the sequence proposed by Mayr is wrong or inferior to mine, but only that it does not appear to be superior either. In the following list I have therefore adhered to the sequence adopted in 1957, with the few minor changes mentioned in the beginning of this section.

A REVISED LIST OF THE INDO-AUSTRALIAN ZOSTEROPIDAE

Genus *Zosterops* Vigors & Horsfield

Species 1. *Zosterops ceylonensis* Holdsworth

Species 2. *Zosterops palpebrosa* (Temminck)

1. *Zosterops palpebrosa nilgiriensis* Ticehurst
2. *Zosterops palpebrosa egregia* Madarász

pre-occupied, nor a nomen oblitum. I cannot at all agree with Deignan's (1942) argument that *Turdus phoenicopterus* Temminck, a species not mentioned in the original diagnosis, would be the type of *Ixos,* and his point of view finds no support in Art. 68 (c) of the Code (Stoll & al., 1961).

3. *Zosterops palpebrosa salimalii* Whistler
4. *Zosterops palpebrosa palpebrosa* (Temminck)
5. *Zosterops palpebrosa nicobarica* Blyth
6. *Zosterops palpebrosa siamensis* Blyth
7. *Zosterops palpebrosa williamsoni* Robinson & Kloss
8. *Zosterops palpebrosa auriventer* Hume
9. *Zosterops palpebrosa buxtoni* Nicholson
10. *Zosterops palpebrosa melanura* Hartlaub
11. *Zosterops palpebrosa unica* Hartert

Species 3. *Zosterops erythropleura* Swinhoe

Species 4. *Zosterops japonica* Temminck & Schlegel

1. *Zosterops japonica japonica* Temminck & Schlegel
2. *Zosterops japonica stejnegeri* Seebohm
3. *Zosterops japonica alani* Hartert
4. *Zosterops japonica insularis* Ogawa
5. *Zosterops japonica loochooensis* Tristram
6. *Zosterops japonica daitoensis* Kuroda
7. *Zosterops japonica simplex* Swinhoe
8. *Zosterops japonica hainana* Hartert
9. *Zosterops japonica batanis* McGregor
10. *Zosterops japonica meyeni* Bonaparte

Species 5. *Zosterops salvadorii* Meyer & Wiglesworth

Species 6. *Zosterops atricapilla* Salvadori

1. *Zosterops atricapilla atricapilla* Salvadori
2. *Zosterops atricapilla viridicata* Chasen

Species 7. *Zosterops everetti* Tweeddale

1. *Zosterops everetti everetti* Tweeddale
2. *Zosterops everetti basilanica* Steere
3. *Zosterops everetti forbesi* Bangs [1])
4. *Zosterops everetti boholensis* McGregor
5. *Zosterops everetti siquijorensis* Bourns & Worcester
6. *Zosterops everetti mandibularis* Stresemann
7. *Zosterops everetti babelo* Meyer & Wiglesworth

1) Probably a synonym of *Z. e. basilanica*.

8. *Zosterops everetti tahanensis* Ogilvie-Grant
9. *Zosterops everetti wetmorei* Deignan

Species 8. *Zosterops nigrorum* Tweeddale

1. *Zosterops nigrorum nigrorum* Tweeddale
2. *Zosterops nigrorum luzonica* Ogilvie-Grant
3. *Zosterops nigrorum aureiloris* Ogilvie-Grant
4. *Zosterops nigrorum meyleri* McGregor
5. *Zosterops nigrorum richmondi* McGregor

Species 9. *Zosterops montana* Bonaparte

1. *Zosterops montana montana* Bonaparte
2. *Zosterops montana difficilis* Robinson & Kloss
3. *Zosterops montana steini* Mayr
4. *Zosterops montana seranensis* Stresemann
5. *Zosterops montana obstinata* Hartert
6. *Zosterops montana ternatana* Stresemann

Species 10. *Zosterops natalis* Lister

Species 11. *Zosterops flava* (Horsfield)

(*Z. chloris* group, species 12-15; 16?)

Species 12. *Zosterops chloris* Bonaparte

1. *Zosterops chloris chloris* Bonaparte
2. *Zosterops chloris flavissima* Hartert
3. *Zosterops chloris mentoris* Meise
4. *Zosterops chloris intermedia* Wallace [2])
5. *Zosterops chloris maxi* Finsch

Species 13. *Zosterops citrinella* Bonaparte

1. *Zosterops citrinella citrinella* Bonaparte
2. *Zosterops citrinella harterti* Stresemann
3. *Zosterops citrinella albiventris* Reichenbach

Species 14. *Zosterops grayi* Wallace

Species 15. *Zosterops uropygialis* Salvadori

2) Includes subsp.? from Dodepo Island.

Species 16. *Zosterops consobrinorum* Meyer

Species 17. *Zosterops anomala* Meyer & Wiglesworth

Species 18. *Zosterops wallacei* Finsch

(*Z. atrifrons* group, species 19-24)

Species 19. *Zosterops atrifrons* Wallace

1. *Zosterops atrifrons atrifrons* Wallace
2. *Zosterops atrifrons nehrkorni* W. Blasius
3. *Zosterops atrifrons surda* Riley
4. *Zosterops atrifrons subatrifrons* Meyer & Wiglesworth
5. *Zosterops atrifrons sulaensis* Neumann
6. *Zosterops atrifrons stalkeri* Ogilvie-Grant
7. *Zosterops atrifrons minor* Meyer
8. *Zosterops atrifrons chrysolaema* Salvadori
9. *Zosterops atrifrons rothschildi* Stresemann & Paludan [1])
10. *Zosterops atrifrons gregaria* Mayr
11. *Zosterops atrifrons delicatula* Sharpe

Species 20. *Zosterops atriceps* G. R. Gray

1. *Zosterops atriceps atriceps* G. R. Gray
2. *Zosterops atriceps fuscifrons* Salvadori
3. *Zosterops atriceps dehaani* van Bemmel

Species 21. *Zosterops mysorensis* Meyer

Species 22. *Zosterops meeki* Hartert

Species 23. *Zosterops hypoxantha* Salvadori

1. *Zosterops hypoxantha hypoxantha* Salvadori
2. *Zosterops hypoxantha ultima* Mayr
3. *Zosterops hypoxantha admiralitatis* Rothschild & Hartert

Species 24. *Zosterops fuscicapilla* Salvadori

1. *Zosterops fuscicapilla fuscicapilla* Salvadori
2. *Zosterops fuscicapilla crookshanki* Mayr & Rand

---

1) An intergrade or hybrid between the races *minor* and *chrysolaema*, probably not worth an own name.

Species 25. *Zosterops buruensis* Salvadori

Species 26. *Zosterops kühni* Hartert

Species 27. *Zosterops novaeguineae* Salvadori

1. *Zosterops novaeguineae novaeguineae* Salvadori
2. *Zosterops novaeguineae aruensis* Mees
3. *Zosterops novaeguineae wuroi* Mayr & Rand
4. *Zosterops novaeguineae wahgiensis* Mayr & Gilliard
5. *Zosterops novaeguineae crissalis* Sharpe
6. *Zosterops novaeguineae oreophila* Mayr
7. *Zosterops novaeguineae magnirostris* Mees

Species 28. *Zosterops lutea* Gould

1. *Zosterops lutea lutea* Gould
2. *Zosterops lutea balstoni* Ogilvie-Grant

(*Z. griseotincta* group, species 29-34)

Species 29. *Zosterops griseotincta* G. R. Gray

1. *Zosterops griseotincta griseotincta* G. R. Gray
2. *Zosterops griseotincta longirostris* Ramsay
3. *Zosterops griseotincta pallidipes* De Vis
4. *Zosterops griseotincta eichhorni* Hartert
5. *Zosterops griseotincta rennelliana* Murphy

Species 30. *Zosterops vellalavella* Hartert

Species 31. *Zosterops luteirostris* Hartert

Species 32. *Zosterops splendida* Hartert

Species 33. *Zosterops kulambangrae* Rothschild & Hartert

1. *Zosterops kulambangrae kulambangrae* Rothschild & Hartert
2. *Zosterops kulambangrae paradoxa* Mees
3. *Zosterops kulambangrae tetiparia* Murphy

Species 34. *Zosterops murphyi* Hartert

Species 35. *Zosterops metcalfii* Tristram

1. *Zosterops metcalfii exigua* Murphy
2. *Zosterops metcalfii metcalfii* Tristram
3. *Zosterops metcalfii floridana* Rothschild & Hartert

Species 36. *Zosterops rendovae* Tristram

1. *Zosterops rendovae rendovae* Tristram
2. *Zosterops rendovae oblita* Hartert
3. *Zosterops rendovae hamlini* Murphy

Species 37. *Zosterops stresemanni* Mayr

Species 38. *Zosterops sanctae-crucis* Tristram

(*Z. lateralis* group, species 39-43)

Species 39. *Zosterops lateralis* (Latham)

1. *Zosterops lateralis gouldi* Bonaparte
2. *Zosterops lateralis halmaturina* A. G. Campbell
3. *Zosterops lateralis lateralis* (Latham)
4. *Zosterops lateralis familiaris* Mees
5. *Zosterops lateralis ramsayi* Masters
6. *Zosterops lateralis chlorocephala* A. J. Campbell & S. A. White
7. *Zosterops lateralis tephropleura* Gould
8. *Zosterops lateralis griseonota* G. R. Gray
9. *Zosterops lateralis nigrescens* F. Sarasin
10. *Zosterops lateralis melanops* G. R. Gray
11. *Zosterops lateralis vatensis* Tristram
12. *Zosterops lateralis tropica* Mees
13. *Zosterops lateralis valuensis* Murphy & Mathews
14. *Zosterops lateralis flaviceps* Peale

Species 40. *Zosterops strenua* Gould

Species 41. *Zosterops tenuirostris* Gould

Species 42. *Zosterops albogularis* Gould

Species 43. *Zosterops inornata* E. L. Layard

Species 44. *Zosterops explorator* E. L. Layard

Species 45. *Zosterops flavifrons* (Gmelin)

1. *Zosterops flavifrons perplexa* Murphy & Mathews
2. *Zosterops flavifrons gauensis* Murphy & Mathews
3. *Zosterops flavifrons brevicauda* Murphy & Mathews
4. *Zosterops flavifrons macgillivrayi* Sharpe
5. *Zosterops flavifrons efatensis* Mayr
6. *Zosterops flavifrons flavifrons* (Gmelin)
7. *Zosterops flavifrons majuscula* Murphy & Mathews

Species 46. *Zosterops xanthochroa* G. R. Gray

Species 47. *Zosterops minuta* E. L. Layard

Species 48. *Zosterops samoensis* Murphy & Mathews

Species 49. *Zosterops conspicillata* (Kittlitz)

1. *Zosterops conspicillata saypani* Dubois
2. *Zosterops conspicillata rotensis* Taka-Tsukasa & Yamashina
3. *Zosterops conspicillata conspicillata* (Kittlitz)
4. *Zosterops conspicillata hypolais* Hartlaub & Finsch
5. *Zosterops conspicillata semperi* Hartlaub
6. *Zosterops conspicillata owstoni* Hartert
7. *Zosterops conspicillata takatsukasai* Momiyama

Species 50. *Zosterops cinerea* (Kittlitz)

1. *Zosterops cinerea cinerea* (Kittlitz)
2. *Zosterops cinerea ponapensis* Finsch
3. *Zosterops cinerea finschii* (Hartlaub)

Genus *Tephrozosterops* Stresemann

Species 1. *Tephrozosterops stalkeri* (Ogilvie-Grant)

Genus *Madanga* Rothschild & Hartert

Species 1. *Madanga ruficollis* Rothschild & Hartert

Genus *Lophozosterops* Hartert

Species 1. *Lophozosterops javanica* (Horsfield)

1. *Lophozosterops javanica frontalis* (Reichenbach)
2. *Lophozosterops javanica javanica* (Horsfield)
3. *Lophozosterops javanica elongata* (Stresemann)

Species 2. *Lophozosterops squamiceps* (Hartert)

1. *Lophozosterops squamiceps squamiceps* (Hartert)
2. *Lophozosterops squamiceps stachyrina* (Stresemann)
3. *Lophozosterops squamiceps striaticeps* Riley
4. *Lophozosterops squamiceps analoga* (Stresemann)
5. *Lophozosterops squamiceps heinrichi* (Stresemann)
6. *Lophozosterops squamiceps stresemanni* (van Marle)

Species 3. *Lophozosterops goodfellowi* (Hartert)

1. *Lophozosterops goodfellowi goodfellowi* (Hartert)
2. *Lophozosterops goodfellowi malindangensis* (Mearns)
3. *Lophozosterops goodfellowi gracilis* Mees

Species 4. *Lophozosterops superciliaris* (Hartert)

1. *Lophozosterops superciliaris superciliaris* (Hartert)
2. *Lophozosterops superciliaris hartertiana* (Rensch)

Species 5. *Lophozosterops pinaiae* (Stresemann)

Species 6. *Lophozosterops dohertyi* Hartert

1. *Lophozosterops dohertyi dohertyi* Hartert
2. *Lophozosterops dohertyi subcristata* Hartert

Genus *Oculocincta* Mees

Species 1. *Oculocincta squamifrons* (Sharpe)

Genus *Heleia* Hartlaub

Species 1. *Heleia mülleri* Hartlaub

Species 2. *Heleia crassirostris* (Hartert)

1. *Heleia crassirostris crassirostris* (Hartert)
2. *Heleia crassirostris junior* (Rensch)

Genus *Chlorocharis* Sharpe

Species 1. *Chlorocharis emiliae* Sharpe

1. *Chlorocharis emiliae emiliae* Sharpe
2. *Chlorocharis emiliae trinitae* Harrisson
3. *Chlorocharis emiliae fusciceps* Mees
4. *Chlorocharis emiliae moultoni* Chasen & Kloss

Genus *Woodfordia* North

Species 1. *Woodfordia superciliosa* North

Species 2. *Woodfordia lacertosa* (Murphy & Mathews)

Genus *Rukia* Momiyama

Species 1. *Rukia oleaginea* (Hartlaub & Finsch)

Species 2. *Rukia ruki* (Hartert)

Species 3. *Rukia longirostra* (Taka-Tsukasa & Yamashina)

Genus *Megazosterops* Stresemann

Species 1. *Megazosterops palauensis* (Reichenow)

Genus incertae sedis

Genus *Hypocryptadius* Hartert

Species 1. *Hypocryptadius cinnamomeus* Hartert

Ecology as an aid in classification

Where the usual morphological characters on which the systematist is accustomed to rely for his classification give so little hold, it is not surprising that weight has been given to ecology. Though ecology and geographical replacement had, naturally, been considered in previous classifications, Stresemann (1939), stimulated by Bartels's (1937) discovery that belly-colour is not necessarily a specific character, was the first to attempt ecological classification on a large scale. Many of Stresemann's theories have since been disproved, but his paper is of a refreshing originality and gives many interesting lines of thought. Mayr (1944a) continued on this way and, practically abandoning such morphological evidence as was available, attempted a classification in which nearly all lowland- and mangrove-inhabiting forms of the Indo-Australian region were united into one species. Delacour & Mayr (1946), dealing with the avifauna of the Philippines, believed also in further simplification as evidenced by their remark that *Z. nigrorum*: "... is either a representative of the Australo-Moluccan species *lutea* or a yellow-bellied group of forms of the Oriental White-eye (*Z. palpebrosa*)". Later Delacour (1947) and Voous (1948) went even farther.

Much of my work (from 1954 onwards) has been devoted to showing that the all-inclusive species accepted by the mentioned authors represented an oversimplification not justified by the known facts. The truth is of course that, just as morphology can change between subspecies, and on a smaller scale from population to population, ecology can also change (cf. Timoféeff-Ressovsky, 1943). Just as morphologically static species are rare, species with a static ecology will certainly not be found in a group like the Zosteropidae in which so much speciation is going on. Moreover it should be kept in mind that the ecological knowledge hitherto used is only of the most superficial kind, amounting to little more than a general idea of the vertical ranges of the species involved.

There is now enough evidence to show that ecology can and does vary within a species. For example, in *Zosterops palpebrosa* the subspecies *nilgiriensis* is confined to the hills with a lower limit of about 400 m, but *Z. p. egregia* goes down to sea level, and even occurs on coral islands (the Laccadives). *Z. p. auriventer,* which morphologically and geographically comes in between the nominate race and *Z. p. buxtoni,* is confined to lowland and mangroves, and the adjacent *Z. p. buxtoni* inhabits the hills with an approximate lower limit of 200 m (cf. Mees, 1951). *Z. chloris maxi,* on Lombok a lowland bird ranging up to 1200 m, is further West exclusively an inhabitant of small coral islands, never touching on larger islands.

The examples given, to which more could easily be added, suffice to show that ecology as such is a very unreliable guide to relationships. Many different species have become adapted to a similar habitat in different regions, and even when they replace each other geographically, like *Z. everetti* and *Z. nigrorum,* this needs not mean a close affinity, as further discussed in the next section.

COMPETITION AND EVOLUTION

The notion that animal species influence each others numbers by competition (and predation) is not new. In ornithology, in particular Lack (1944 and later papers) has tried to explain differences in habitat and morphology between closely related species on the basis of what with Hardin (1960) might be called the Competitive Exclusion Principle.

Though the whole theory of evolution from Darwin onwards has been based on the acceptance of competition as its driving force, there exists still doubt and controversy about its meaning. For the present purpose a useful definition appears to me the one given by Birch (1957, p. 6; see also Klomp, 1961) that: "competition occurs when a number of animals (of the same or of different species) utilize common resources the supply of which is short; or if the resources are not in short supply, competition occurs when the animals seeking that resource nevertheless harm one other in the process".

The circumstantial evidence for competition is quite good: in fact if it did not occur, there would be no upper limit to the number of animals that could inhabit the Earth. *Homo sapiens* is now facing the fact that since the resources of the Earth are not unlimited, there is an upper limit to the number of individuals it can adequately feed.

Notwithstanding the somewhat derogatory remarks made by Andrewartha & Birch (1954, p. 463: "this elusive phenomenon"), interspecific competition is also clearly established on the basis of indirect, as well as plenty of direct evidence. It is necessary to mention here that I am also convinced that competition has its influence on morphology and ecology, because much of what follows is critical of literature on the subject. The ecological theories developed by Lack and others are so plausible that one is apt to overlook how poor, if not actually erroneous, much of the evidence given in their support is. This, of course, does not disprove the theories, but it shows that far more, and especially more careful and critical work is necessary.

A complete survey of the problems involved would inflate this section out of proportion. Therefore I shall confine myself to a discussion of the examples that evolutionists have taken from the Zosteropidae. The theoretical consequences of variability and dimorphism on small islands appeared, however, of sufficient interest to justify a more extensive treatment.

The two results of competition which would have played a role in the Zosteropidae, are ecological differentiation (shifts in habitat), and morphological differentiation.

Stresemann (1939, p. 162) assumed interspecific competition to explain differences in vertical distribution between races of *Z. palpebrosa*, but as I have demonstrated (Mees, 1951, p. 205-207) it is unlikely that in the area discussed by Stresemann (Java), competition can have played an important role, because some of the supposedly competing species (*Z. chloris maxi, Z. flava, Z. palpebrosa)* are nowhere in contact. The usual upper limit of *Z. palpebrosa* in Java is at about 1600 m, but on some mountains where *Z. montana* occurs also (Mts. Tjerimai, Dieng) it goes up to 2500 m, and there is no evidence that on those mountains in Western Java where *Z. montana* is absent (Mts. Salak, Pangerango-Gedeh, Patoeha, Tangkoeban Prahoe), *Z. palpebrosa* ranges higher than on those where both species are present. Similarly, in Sumatra, where *Z. montana* and *Z. atricapilla* occur in the mountains, there is no evidence that the vertical range of *Z. palpebrosa buxtoni* differs from that on Western Java, where these two are absent. The examples given by Stresemann do therefore not look very promising as evidence for habitat separation as a result of competition. Professor Stresemann (in litt., 23-VII-1951) agrees: "Alle Ihren Ausführungen stimme ich ohne Einschränkung zu, auch denen, die meinen eigenen Erörterungen von 1931 und 1939 widersprechen. Diese hatten ja zum Teil nur den Charakter von Arbeitshypothesen . . . .".

Lack (1944, p. 277) has cited *Z. palpebrosa* as a "striking instance" of the influence of interspecific competition on habitat, concluding that: "Clearly *Z. palpebrosa* is limited in habitat primarily through competition with related species of *Zosterops*". Later (Lack, 1947, p. 30), discussing the same species, he concluded once more that: "These differences in habitat in different regions are obviously correlated with the presence or absence of related species".

It will be obvious that this example has now lost its base and can no longer be used. Nevertheless, the idea of differentiation in habitat as a result of competition is so attractive that I gave in to similar speculations to explain the, for their species aberrant, habitat of *Z. palpebrosa auriventer* and *Z. palpebrosa williamsoni* (Mees, 1954, p. 148). I have now grave doubts about the validity of this explanation. For one thing, *Z. everetti tahanensis*, the species supposed to be responsible for a gradual eviction of *Z. p. auriventer* from its normal hill habitat, appears to be an inhabitant of heavy forest [1]), whereas *Z. palpebrosa* (for example *buxtoni* of Java and Sumatra), though sometimes occurring in forest, finds its greatest abundance in forest edges, gardens and other more open types of vegetation. Therefore I cannot think that competition would have been so severe that *Z. p. auriventer* was driven

1) I note, however, that Thompson (1966) recorded *Z. e. tahanensis* from cacao plantations and secondary forest.

out of its usual habitat into an entirely new one. Though this remains also speculative, I am now inclined to look in a different direction for an explanation. It may be possible that *Z. palpebrosa,* being an inhabitant of forest edges and half-open country, has colonised Malaya at some time in the past during a slightly less humid period, perhaps during the maximum extension of the Soenda Shelf, when the right sort of habitat would have been present, and that subsequently, when with increasing humidity the heavy jungle expanded, it might have gradually retreated to the mangroves and adjacent, lighter vegetation types. In several respects this hypothesis is also unsatisfactory, for there is no reason why the species, under the hypothetical conditions described above, could not just as well have changed its habitat preference to heavy forest.

An alternate explanation would be that *Z. p. auriventer* originated as a chance colonist of some small and low island, where it happened to survive and became adapted to mangroves, after which it could begin its expansion. The fact that geographically and morphologically *auriventer* fills the gap between the nominate race and *buxtoni,* makes it unlikely that *auriventer* could have originated in that way, though there is little doubt that its present wide distribution (on the Natoena Islands, Bangka and Borneo), almost certainly due to recent expansion of range, was assisted by its ecological preference.

If it is true that competition becomes more severe, the more similar the competing individuals are, it will be clear that intraspecific competition will usually be more severe than interspecific competition. If it is also true that interspecific competition leads to differentiation in size, and especially in size and shape of the bill, which is correlated with a differentiation in the exploitation of food resources, it follows that under conditions where interspecific competition is greatly reduced, for example on small islands with only a limited number of bird species, though with a good variety of food and habitats, uniformity would lead to increased competition, but strong variation, polymorphism, as well as increased sexual dimorphism, would lead to less severe competition, and therefore be of selective advantage.

I know of only few authors who have worked along these lines. Rand (1952) described sexual dimorphism in size and shape of the bill; his illustration of the grebe *Aechmophorus occidentalis* being of particular interest, though he was unable to say if this difference is correlated with any difference in feeding behaviour or food.

Rand also discussed the "classical case of structural difference between the sexes, correlated with a difference in food habits", the Huia, *Heteralocha acutirostris.* Rand appears not to have realised that there an entirely different principle is involved, not that of avoiding competition, but that of active co-operation between the sexes, working as a unit, which presumably led to a more efficient exploitation of food resources.

Voous (1955) found on the fairly small islands of Aruba (area 190 km^2), Curaçao (area 443 km^2), and Bonaire (area 288 km^2) a great amount of individual variation in bill-size of *Mimus gilvus*, that he has tried to explain as due to exploitation of a great range of sources of food in diverse habitats. Though Voous did not go so far as to point out selective advantages of this great ecological tolerance, his example supports the theoretical postulation made above. On the other hand Grant (1965a) stated that in his study of insular birds: "..... no support was found for the theory of Voous (1957) that island birds (*Mimus polyglottus* on the Caribbean islands in particular) have longer bills because they feed on a greater variety of types of food" [1]). Without wanting to side with one of these authors, I have to point out that Voous based his remarks on *Mimus gilvus* on Aruba, Curaçao and Bonaire only, and never extended them to cover other species elsewhere. *Mimus polyglottus* was not even mentioned by him, and he never made a generalisation, so that the fact that Grant was unable to demonstrate a similar trend elsewhere, in other species, does not disprove the explanation given by Voous for a special case. Moreover it is peculiar that Grant (1965a, p. 360; 1965b, p. 56) comes with the explanation that in insular birds: "the bill is longer because it deals with a greater range of food-sizes .... there is ecological evidence for this theory from the Tres Mariás, as well as from other islands". I fail to see that there is an essential difference between "a greater variety of types of food" and "a greater range of food-sizes".

Selander (1966) described sexual differences in bill-length in two species of insular West-Indian woodpeckers and gave a thorough review of the whole problem of sexual dimorphism and niche utilisation. Though the examples given are suggestive, Selander mentioned that a third insular species of woodpecker shows no sexual dimorphism, and if one thing becomes clear from his discussion, it is how complicated the whole problem is and how little firm evidence there is. Grant (1965b, p. 60-61) has criticised the earlier work of Selander & Giller (1963) in which it was stated that insular woodpeckers have a greater sexual difference in bill-size than continental forms.

The matter of variability of island populations is of much theoretical interest as it is obvious that the ideas here discussed, of the selective advantage of increased variation on small islands, are exactly the opposite of those discussed in the section "Vulnerability of island populations" (p. 356), that

---

1) The reference should rather have been to an earlier paper (Voous, 1955).

island birds will become uniform genetically. Even though it is possible that both selective systems operate, it should be noted that there is not much evidence in support of either. In the Geospizinae Lack (1945, 1947) found decreased variability in the birds of certain small islands, presumably constituting small populations, but not in others, and though Mayr (1965c) has grasped at this in support of his hypothesis of genetical uniformity, Lack's (1947, p. 91-93) own conclusion was that: "The view that the more abundant forms are the more variable therefore receives but meagre support in Darwin's finches". Moreover Bowman (1961, p. 269) found that Lack had made an error in his calculations, and that actually one of the species, *Geospiza conirostris* reaches its greatest variation in bill-size on one of the smallest islands. Lack further refers to Miller's (1941, p. 365-367) study of *Junco* species, in which no reduced variation was found in small and isolated populations. Far from supporting Mayr's argument, Lack's and Miller's results therefore appear to contradict it.

Museum collections, usually brought together in a haphazard way, often tend to be deficient in material from small islands, and mainland material is often from widely scattered localities, so that geographical variation (instead of individual variation) has an influence.

The individual variation I have found in small insular populations is, naturally, directly correlated with the number of individuals measured, and when good series were available (*Z. strenua, Z. tenuirostris*) there was no evidence of decreased variability compared with widely ranging species. On the other hand I cannot find evidence of any increased variation or of increased sexual dimorphism either.

In this connection, the fact that in small populations aberrations (the most obvious ones are albinos and other plumage aberrations) appear to be more frequent than in large populations, indicates that the genetic homogeneity is not so great as suggested by Mayr (1965c) and that the decrease in number of mutations as a consequence of small numbers, may to a certain extent be counterbalanced by a less rigid selection against such mutations. I realise of course that plumage aberrations may be due to an increase in frequency of recessive factors already present, rather than to new mutations. Miller (1941, p. 366) mentions that certain characters are especially variable in insular species of *Junco,* and suggests as an explanation, that mutation pressure would not be counteracted by selection pressure to the degree that it is in other juncos. Actually Mayr (1963, chapter 17) himself has brought together evidence that small and isolated populations may have and maintain an appreciable genetic variability.

Since Stresemann's (1931) revision, Norfolk and Lord Howe Islands, with respectively three and two species of *Zosterops* obviously derived from *Z. lateralis,* have received the attention they deserve from zoogeographers and evolutionists. Nevertheless a careful analysis has not been made, and consequently the facts have been misinterpreted.

Lack (1944), for example, has tried to make much of the differences in size between the successive colonists. The accepted theory being that where two closely related species slightly differ in size (and ecology), competition will increase this difference, the larger of the two becoming larger, the smaller becoming smaller, with the result that competition would become less severe (see also Lack, 1947, p. 144, 148; Hamilton, 1961, p. 184) [1]). In the case of Lord Howe and Norfolk Islands it seems to have been overlooked, however, that not only the first arrivals (*Z. strenua* and *Z. albogularis*), but also the second set, *Z. tenuirostris* and *Z. lateralis tephropleura,* are larger than *Z. lateralis* from which they must have been derived. It seems clear, therefore, that not competition, but the small-island effect is responsible for most of the differences. This effect would operate in the same direction, towards larger size, on both earlier and later colonists, the earlier ones having proceeded farther on the inevitable path.

With reference to the preceding paragraphs, it must be noted that the large size of *Z. tenuirostris* on Norfolk Island cannot be the result of "pressure" from the latest arrival, *Z. l. lateralis.* Unfortunately the name *Z. l. norfolkensis* has gained wide acceptance, and obviously suggests an endemic subspecies of Norfolk Island. Actually there is convincing evidence that *Z. l. lateralis* colonised the island as recently as 1904 (North, 1904). Murphy & Mathews (1929) were unable to distinguish Norfolk Island specimens from New Zealand material, and I agree that there is no difference. *Z. tenuirostris,* therefore, has gained its specific characters, including large size, long before the arrival of *Z. l. lateralis.* On the other hand, Lack's remark that on such small islands separation by habitat would be almost

1) On several occasions Lack (1947, 1963, p. 303) has stressed that, for this differentiation to take effect, some difference must already exist. It is peculiar that this point is apparently not generally understood. In a review, Bock (1963) has shown how much confusion his lack of understanding has caused. Nevertheless, in Newton (1967, p. 86) one reads: "Competition for food is often held partly responsible for evolution, and also for the maintenance, of ecological differences between related species; but it need not, of course, be solely responsible for their production, since it can only operate once the species come together, by which time they might already differ in ecology". In the same paragraph also: "Even if two incipient species did have similar ecology on first meeting, one would as a rule be more efficient than the other on certain foods or in a certain habitat. The first requirement for successful coexistence would then be that each developed a preference (through natural selection) for that habitat or food with which it was most successful".

impossible, is at present not true on Norfolk Island, because, as I have pointed out in the discussions of these species, *Z. albogularis* and *Z. tenuirostris* are forest birds, while *Z. l. lateralis* is not. It should be noted at once that there is no reason for enthusiasm: prior to settlement there was presumably but one habitat on Norfolk Island: forest. Therefore the native birds would of necessity have been forest birds as the ecological niche open country was not available. This human-made habitat was later invaded by *Z. l. lateralis.*

Hamilton (1962, p. 62-63) has speculated about the Zosteropidae of Cameroon Mountain and the islands in the Gulf of Guinea. As proof either way is impossible, I need not discuss his contentions.

Lack mentions that on Lord Howe Island, *Z. lateralis tephropleura*: "....seems to be being replaced by another form of *Z. lateralis,* recently introduced artificially by man — a good example of what happens when two forms with closely similar ecology meet in the same region". The facts are different: Hindwood (1940) makes quite clear that the introductions were made at a time that the native species had become scarce as a result of predation by rats. Nevertheless it is, fortunately, the native subspecies which has survived, not the introduced one. Moreover, as Lack, correctly, treats *tephropleura* as a race of *Z. lateralis,* the introduction of other subspecies would not lead to extinction through competition as Lack's remark quoted above appears to suggest, but would rather lead to a loss of identity of the endemic subspecies as a result of hybridisation with the introduced birds. The fact that no visible trace of hybridisation exists in *Z. l. tephropleura,* proves that either the introductions of *Z. l. lateralis* were entirely unsuccessful in that the birds failed to breed, or that they were outnumbered so greatly by *Z. l. tephropleura* that they could not materially affect the genetical constitution of the latter. Surely, when two subspecies with closely similar ecology meet, what most likely will happen is hybridisation.

Historical and zoogeographical considerations on some species and subspecies

In this section I have brought together notes and speculations on origin and age of a few forms, that appeared too extensive to incorporate in the main body of this work; as they have a bearing on certain theoretical problems, they are not out of place here.

Beginning in the Bay of Yokohama, stretching in a southern direction, is a chain of islands known as the Seven Islands of Izu. South of these is the Nanpo Archipelago. These islands, besides harbouring several other

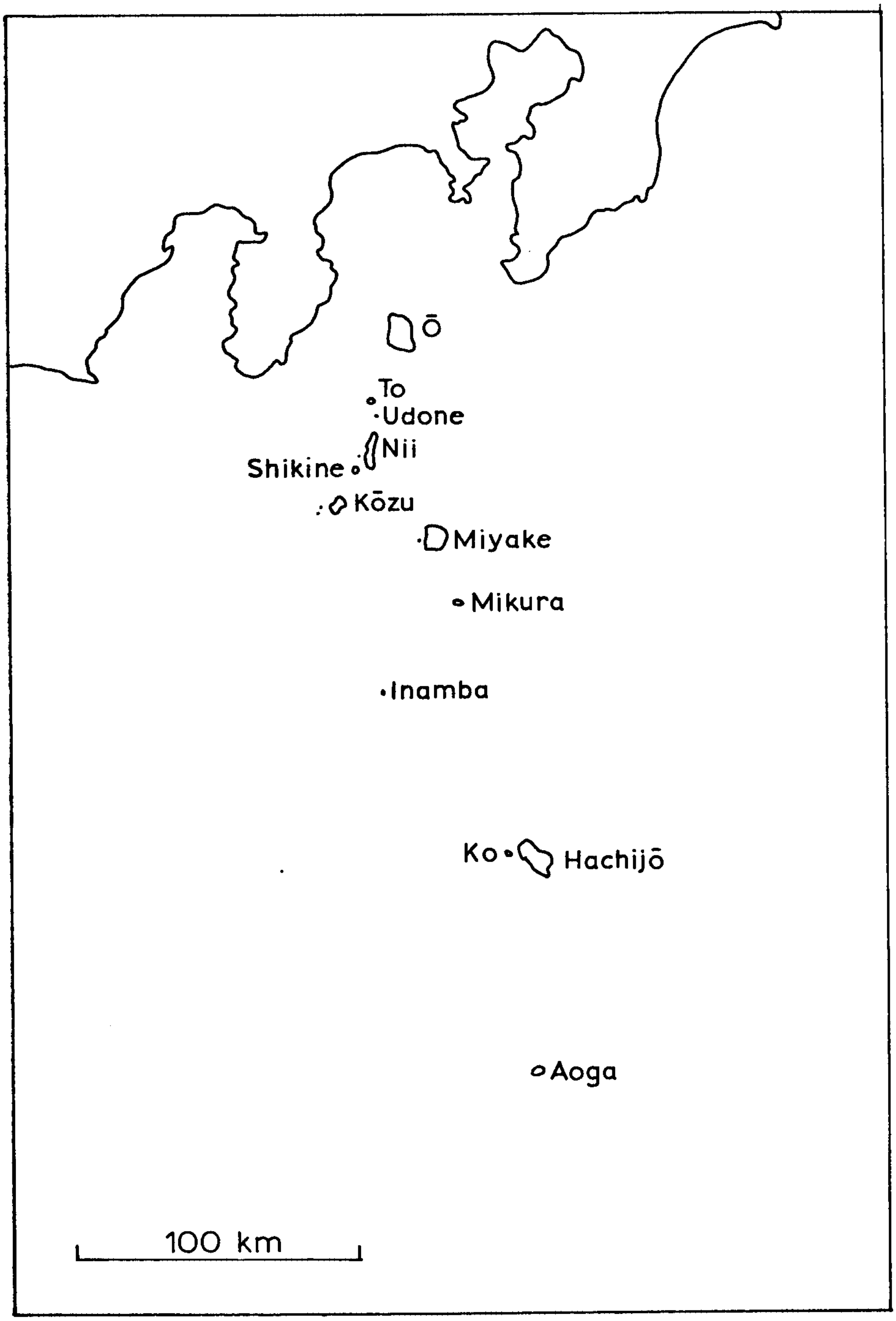


Fig. 22. The distributional area of *Zosterops japonica stejnegeri*.

endemic bird-forms, are the home of *Zosterops japonica stejnegeri*, a well-marked race that is known from the islands. Ō, Nii, Miyake, Mikura, Hachijo and Aoga (fig. 22). The interesting feature in this distribution is that the shortest distance between some of these islands is much greater than that between other islands it inhabits and the Japanese mainland. For example, Ō is less than 25 km from the mainland, but the gap between Mikura and Hachijo is 80 km, and that between Hachijo and Aoga about 65 km. Nevertheless, *stejnegeri* has never been found on the Japanese mainland, while all the islands mentioned are inhabited by morphologically identical populations, which suggests a fairly frequent contact between them. It could be argued that individuals of *stejnegeri*, crossing over to the mainland, would soon be assimilated by the mainland population, and that the infrequent occurrence of wanderers of a race superficially so similar, would anyway be likely to go unnoticed. This is a valid argument. A second one is that *Z. j. stejnegeri* would have become adapted to life on small islands, and therefore avoid the mainland, though individuals might wander from island to island. The extent to which the island habitat differs from the adjacent mainland or indeed the extent to which the various islands differ beween themselves, remains to be ascertained. In this respect I note that the island nearest to the mainland, Ō, is not very small, it has a length of about 18 km and its highest peak is over 600 m, which indicates that there may be a variety of habitats not unlike the mainland.

There is another side to the problem. As *stejnegeri* is obviously derived from *japonica*, there must at least once have been a successful colonisation by nominate *japonica*. Here, one could assume that *Z. j. japonica* would only rarely cross the sea, so that a resident population on the island would have plenty of time to develop into a distinct subspecies. After that, the occasional straggler from Japan might be expected to be absorbed. A difficulty is that Japanese authors have recorded the race from the islands as a winter visitor. Vaurie (1958), apparently in an attempt to avoid the difficulties set forth here, has queried the occurrence of the nominate race on the islands: ".... it is difficult .... to be certain about the Seven Islands. Apparently, the smaller race of Japan is a better singer than the native *stejnegeri* and is imported to the Seven Islands as a cage bird. It is possible that the specimens of nominate *japonica* reported from these islands were birds that had escaped". This explanation, however, is too simple, for Marquis Yamashina has informed me (in litt., 3-II-1959) that actually *Z. j. japonica* is a regular migrant to the Seven Islands of Izu, where it spends the winter together with the endemic race *stejnegeri*.

The Yamashina Museum has the following specimens of nominate *japonica,* collected in the field, from the Seven Islands of Izu: Niijima, between 10 and 20-I-1934; Kozujima, between 23 and 26-I-1934; Miyakejima, 18-I-1934; Hachijojima, 10-II-1930; Torijima, 30-I-1930. Individuals of the nominate race are only seen in the winter months. On rare occasions individuals are brought to the islands as cage birds, but they have no connection with the specimens listed above. These specimens were compared by Dr. Yamashina with material from Honshu, and found to be identical in every respect. There can be no reasonable doubt therefore that they are migrants from the main island.

Of course there is nothing unusual in individuals of one race of a bird species wintering in the range of another. Nominate *Z. japonica* is a common winter visitor also to Tanega and Yaku: amongst a small series of five specimens from Tanega, collected in November 1904, which I received on loan from the American Museum of Natural History, four are nominate *japonica,* and only one belongs to the resident *insularis.* Eight specimens from Yaku in the same collection, taken in October 1904, are all *insularis*; perhaps October is too early for great numbers of *japonica* to have reached the island? The difference between these islands and the Seven Islands of Izu is, however, that the former are south of the breeding range of nominate *japonica,* whilst the latter are at the same latitude. Or must we assume that the winter visitors to the Seven Islands are birds from the extreme north of Japan, and that the mainland populations opposite the islands are sedentary? If this is true, how have the Seven Islands been colonised, and how did the island populations spread from island to island?

A striking example of separation in habitat between related forms is that of *Z. lateralis chlorocephala.* This well-marked subspecies is confined to the small coral islands constituting the Capricorn and Bunker Groups at the southern end of the Great Barrier Reef (fig. 23). Unlike the Seven Islands of Izu, the Capricorn Islands are coral islands on the continental shelf within the 200 m line, which means that the sea surrounding them would have been land up to about 15.000 years ago, while the growth of these coral islands could have commenced only after the shelf became submerged. The geology of the area has recently been studied by Maxwell & Maiklem (1964), and Professor Maxwell (in litt., 23-II-1967) has been so kind to provide me with more particulars: "It is extremely difficult to obtain accurate age determinations on these reefs and the more recent workers are not in agreement. In the bores on Heron and Wreck Island, reef sediment extends to depths of 520 feet, with terrigenous sands occurring in a narrow interval at 300 feet and in a very wide interval below 520 feet. It is reason-

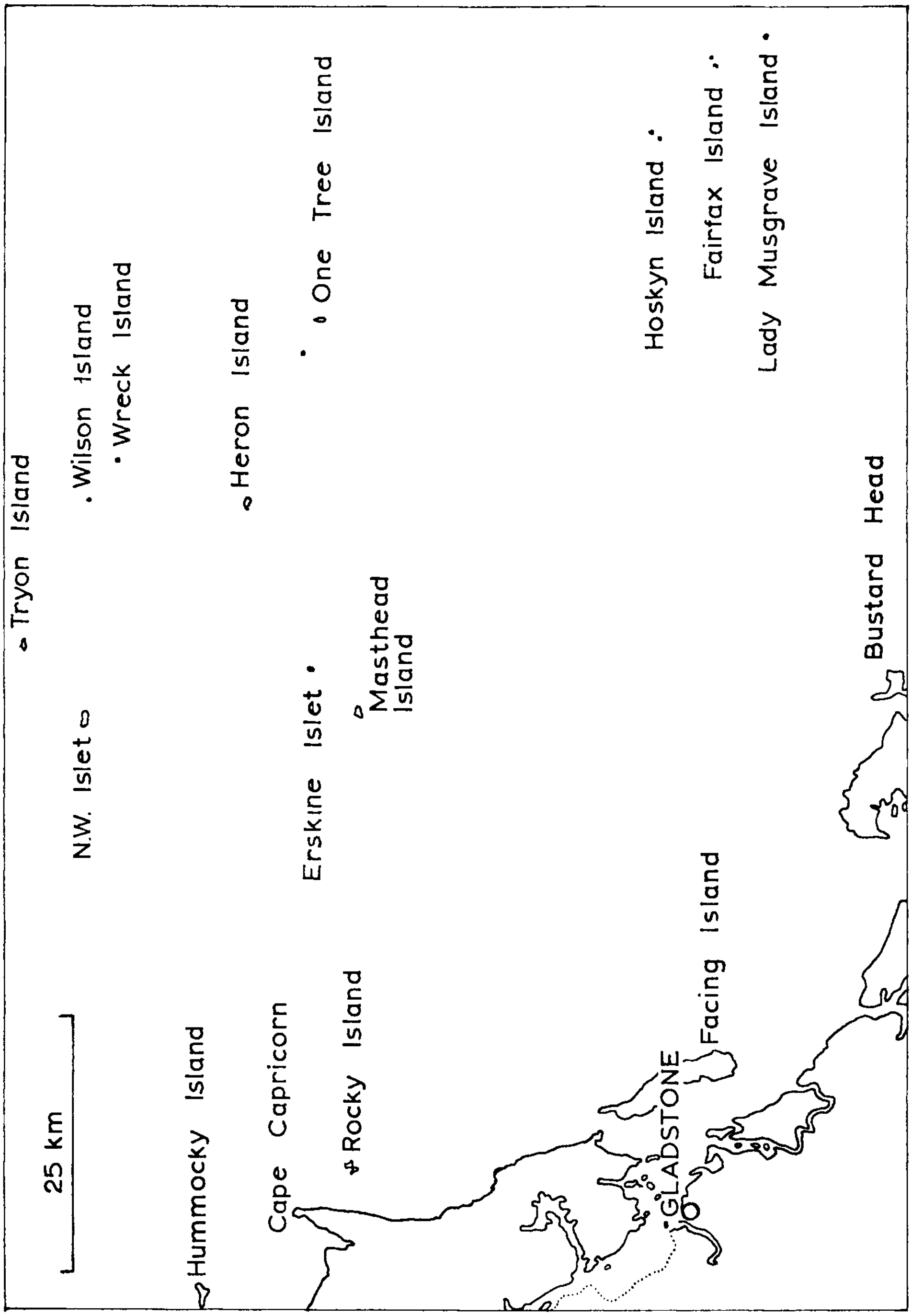


Fig. 23. The distributional area of *Zosterops lateralis chlorocephala*, a race confined to coral islets of the Capricorn and Bunker groups.

able to assume that the reefs have been isolated from the land at least since the 300 feet incursion, the age of which has not been determined. It is not true to assume, though, that the entire shelf would have been exposed during the sea level low some 15.000 years B.P. because the present surface may be higher (through reef growth and reef sedimentation) than it was at that time. All the islands of the Capricorn and Bunkers are true reef cays, composed entirely of carbonate sand". This shows clearly how cautious one must be in drawing conclusions. Another possibility is that even in periods of lower sea-level there were always off-shore islands, inhabited by populations ancestral to *Z. lateralis chlorocephala,* and that as these became submerged, the birds simply moved over to the newly emerging islands where they live now. Nevertheless, it is likely that *Z. l. chlorocephala* is a very young subspecies, and its comparatively enormous size demonstrates the survival value of large size on these small islands. Its coloration, which is similar to that of birds of the opposite mainland, suggests that the islands have been colonised from there, and not for example by migrants from Tasmania or southern New South Wales. A look at the map should convince anybody that it is quite inconceivable that these birds would move freely from coral islet to coral islet but miss the nearby Australian continent. There can be no doubt therefore, that the birds restrict themselves to these islands by habitat preference. It is not so difficult to visualise how the mainland and insular subspecies keep separated now, having such a different habitat, but one would like to know how the islands were originally colonised and how the strong difference in habitat preference necessary for the continued existence of *Z. l. chlorocephala* originated.

In literature, there exists some controversy on geographical versus ecological speciation, or at least a lack of clear understanding (e.g. Yapp, 1951). Much of this discussion appears pointless because the two factors are rarely clearly separable (in this I thoroughly agree with Andrewartha & Birch, 1954, p. 713; see also Mayr, 1947; Cain, 1953). On the Capricorn Islands it is probably not the geographical barrier, but the ecological barrier which counts most.

The only feasible explanation of the situation as found at present is that at one time a few individuals of the mainland race did breed successfully on the islands (but that this was an exceptional occurrence), increased in numbers for years, and after they had acquired their preference for small islands, began to spread to other islands. The faculty of small island inhabitants to spread from island to island will be fully discussed below; it must have developed subsequent to the preference for small islands. Unexplained remains why, in contrast, the subspecies *Z. l. gouldi* and *Z. l.*

halmaturina appear to move freely from island to island, and show no indication of morphological differentiation on offshore islands.

As briefly mentioned on a previous page (p. 7), the plumage characters of *Z. albogularis* strongly suggest descent from *Z. l. lateralis,* or rather from the ancestors of this race at a time when it had already acquired its present subspecific characters. The pale throat of *Z. albogularis* combined with its deep-brown flanks, are so suggestive that a different interpretation is hardly possible. *Z. strenua, Z. tenuirostris* and *Z. lateralis tephropleura* agree much better with *Z. l. familiaris* of the opposite Australian mainland; the first and last-mentioned forms are in colour practically identical with

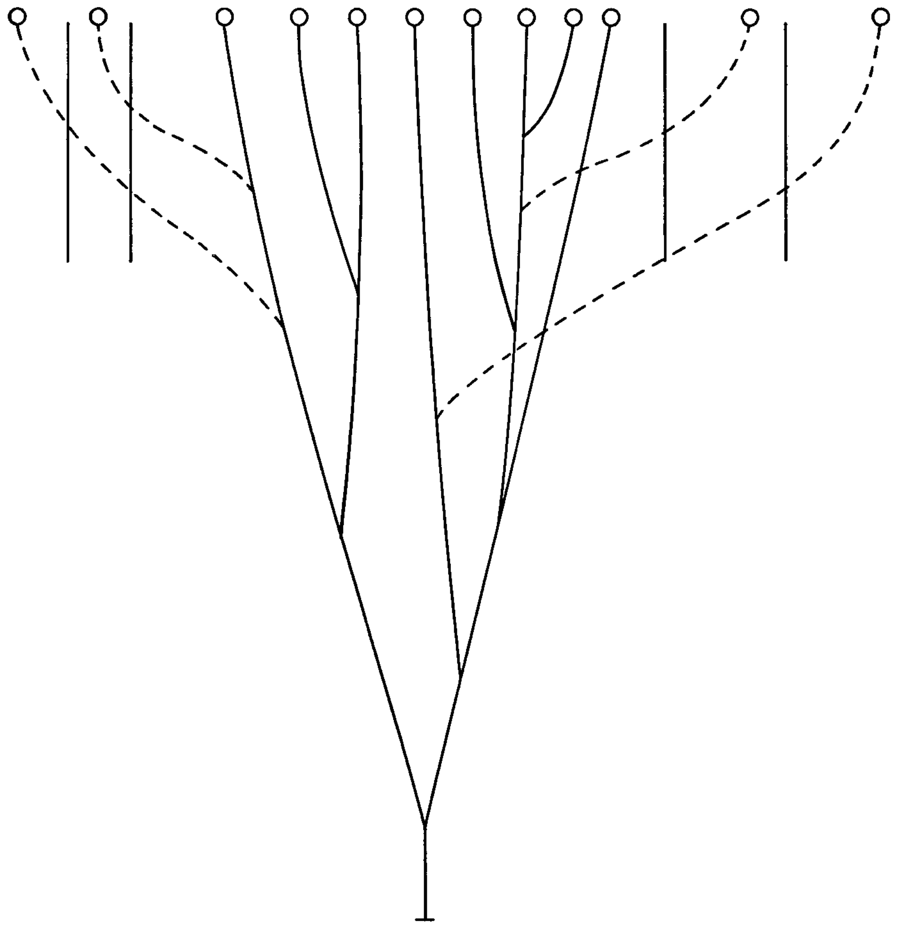


Fig. 24. Hypothetical evolutionary tree, showing the kind of relations existing in the *Zosterops lateralis* group. The broken lines indicate how species may have branched off from subspecies.

Z. l. familiaris, and *Z. tenuirostris* differs by the greater extent of yellow on the under surface, evidently a recently acquired character.

The conclusion that the differentiation of the species *Z. albogularis*, *Z. tenuirostris*, and *Z. strenua*, now specifically distinct from *Z. lateralis*, took place after the subspecies *Z. l. lateralis* and *Z. l. familiaris* had already acquired their racial status, appears inevitable. Here then, is a clear example of difference in speed of speciation: in time *Z. albogularis* and *Z. l. lateralis* are more closely related to each other than the latter is to *Z. l. familiaris*, in other words, *Z. albogularis* developed into a species in a much shorter time than *Z. l. lateralis* and *Z. l. familiaris* needed to develop into subspecies. The same pertains to *Z. strenua* and *Z. tenuirostris*. Naturally there is nothing unusual in the existence of differences in speed of evolution and speciation — it would be much stranger if such differences did not exist — but such a situation can only rarely be demonstrated.

Fig. 24 presents a hypothetical evolutionary tree showing the kind of relations found in the *Z. lateralis* group. The four vertical bars indicate species-gaps, the broken lines indicate species that have developed from subspecies. No attempt has been made to make the figure a true picture of relations in the *Z. lateralis* group.

Plumage characters

Colour of underparts. It has now been well established that belly colour is not necessarily a specific character. *Z. palpebrosa*, *Z. montana*, and *Z. kulambangrae*, have both grey- and yellow-bellied races; of the species-pair *Z. grayi* and *Z. uropygialis*, one has a grey, the other a yellow belly; *Z. lateralis* is grey-bellied, but its derivative *Z. tenuirostris* has a yellow under surface. In Africa the same is found in *Z. pallida-capensis-virens* and in the *Z. senegalensis* group.

In Africa, yellow underparts are the more common condition, and Moreau (1957, p. 321-322) assumes that there grey-bellies have been derived from yellow-bellies. In the Indo-Australian region, in all cases which lend themselves to analysis, the process appears to have been in the other direction, from grey- to yellow-bellied. The clearest example is *Z. montana* (cf. pt. I, p. 173-174), in which several populations appear to be in various stages of transition from grey- to yellow-bellied. In *Z. tenuirostris* it is also evident that the yellow under surface is an acquired character, no other species of the *Z. lateralis* group having it. In *Z. palpebrosa* and *Z. grayi-uropygialis* the position is less clear and could be explained either way.

The way *Z. montana* is building up yellow-bellied populations indicates that in this species at least, the acquisition of yellow underparts is a gradual process, that must be genetically multifactorial: a yellow median streak, which tends to expand, first going through a stage of extreme variability in extent of yellow on the underparts (southern Philippines, Celebes), and then leading through the stage of *Z. m. difficilis* (yellow-bellied but with grey still showing through on the flanks) to the entirely yellow-bellied subspecies of the Moluccas.

In a study of *Z. palpebrosa* in Java I concluded that there also the differences between grey (*buxtoni*) and yellow (*melanura*) underparts cannot be due to a single genetical factor (Mees, 1951, p. 211-212), this contrary to the opinions previously expressed by Murphy (1929, p. 2) and Stresemann (1931, p. 204). Later, Moreau (1957, p. 321, 409-410) agreed with me.

Naturally, the fact that in a few instances the development has gone from grey to yellow, does not mean that it may not, in Africa and elsewhere, have also gone from yellow to grey. Since I do not believe in such obsolete dogmas as the irreversibility of evolution, both processes could have been at work. In fact several species are in the process of losing yellow pigment from parts of their body, or have even entirely lost it (*Z. cinerea*).

Neither Moreau nor I have been able to find any adaptive significance in the colour of the belly; though it is possible and even likely that yellow on some parts, for example a yellow throat, and also brightly coloured flanks, may assist in recognition, it looks as if in many instances belly-colour is due to genetical accident rather than to selection, or in other words, is a by-product rather than a result of direct selection.

It is peculiar how, since it has been shown that belly-colour is not a specific character, opinion has tended to go to the other extreme and to dismiss it as a "phase". As mentioned on a previous page (p. 249), Deignan (1963a), followed by Mayr (1967), revived the idea for *Z. p. siamensis,* and Mackworth-Praed & Grant (1963, p. 469) regarded *Z. pallida atmorii* as: "the grey-bellied phase of *Zosterops virens virens*". It should therefore be repeated that "phases" are not known to occur in the Zosteropidae. Even the enigmatic *Z. vaalensis,* which Moreau (1957, p. 383) regarded as: "a localized xanthochroic variety of *pallida*" is, as Mr. P. A. Clancey (pers. comm.) was first to mention to me, doubtless a hybrid between *pallida* and *virens,* an interpretation supported by its localized occurrence and great individual variation (see also Clancey, 1967, p. 322) [1]).

---

1) Moreau (l.c.) knew of only six specimens of *Z. vaalensis* in collections, hence it is of interest to record a male from Potchefstroom, 5-VI-1896, RMNH no. 4315.

The possible recognition-value of belly-colour needs investigation; the fact that in South Africa (*Z. pallida* and races) and on Java (*Z. palpebrosa*) it does not in any way prevent interbreeding, indicates that it is at most of minor importance. The similarity of some sympatric species makes it likely that song is more important for recognition than morphology.

Eye ring. The most obvious plumage character of the Zosteropidae is of course the white eye-ring. In most species it is so conspicuous, that it is difficult not to assume some functional significance, presumably recognition-value. There does not, however, appear to be any evidence for this, and some extremely similar and overlapping species, as *Z. p. palpebrosa* and *Z. japonica simplex*, do not differ in development of the eye-ring. Both these species are familiar cage birds and it would be rewarding to study their interrelations when they are brought together.

Loral-line. Kunkel (1962) has discussed the behaviour of "Zirkeln" (a term introduced by Heinroth and elaborated by Lorenz) in *Zosterops palpebrosa*. This led him, still following Lorenz (1949), to a description and a very suggestive photograph of the "Zirklergesicht" of these birds. With "Zirkeln" is meant the food-searching behaviour during which a bird pushes his bill into a small hole or crevice, opens it with some force, and looks down its bill to see if anything edible is inside. A dull black loral line would, in this behaviour, have the function of more or less guiding the eye in the right direction, and at the same time its dull dark coloration would ensure that no reflections which might hinder eyesight can occur.

Inasmuch as dark lores occur frequently in birds, which makes it likely that they have a functional significance, Kunkel's suggestion appears very attractive, and I have no doubt that it is at least partly correct. On the other hand, I need only refer to *Zosterops nigrorum* (this revision, pt. I fig. 9) to demonstrate that in closely related subspecies a dark loral line can be present or absent, and that the white eye-ring can be interrupted in front or be continuous. Nevertheless, the great majority of species has the eye-ring interrupted in front and this may well be of use to a bird when looking forward to his bill. I would not rigidly adhere to the specialized behaviour of "Zirkeln" but rather suggest that during all feeding behaviour it would be useful to have a good view towards the bill. This, of course, is only important if the bird can really focus its eye to a few centimetres distance. This would require tremendous powers of accomodation, as have indeed been demonstrated in birds (Zosteropidae have not been studied in this respect).

WING-FORMULA

Moreau (1957, p. 418) concluded that in African Zosteropidae: ".... wing-formula is not of taxonomic value. Nor does it seem to have a consistent ecological relationship". So far as the Indo-Australian Zosteropidae are concerned, I can agree with the first part of Moreau's conclusion, but not with the second. Before discussing this further, however, something has to be said about measuring of wing-shape: unfortunately Moreau and I used different methods. Moreau took the difference in length between the 2nd and the 3rd primaries as a measure of wing-shape, assuming a direct correlation between the size of this difference and the wing-length; in other words the greater the difference between primaries 2 and 3, the longer the wing. It is evident that he regarded birds with the relatively longest 2nd primaries as the most blunt-winged, as the following quotation may show: "Two forms of African *Zosterops* are more blunt-winged than any others; both the pale-bellied birds of south-western Africa (*pallida*) and the yellow birds of the northern savanna (*senegalensis*) have the difference between the second and third primaries as little as 2 mm. in some specimens and the sixth little or no longer than the second".

I, on the other hand, took the relative length of the 2nd primary as compared with all other primaries as a criterion, and called a wing blunt, or rounded, when the 2nd primary is relatively short, pointed when it is relatively long. It can be easily seen therefore, that what I call a pointed wing is what Moreau calls a blunt wing and the other way round. I believe that the figures of wings given in different parts of my revision (pt. I fig. 2, pt. II fig. 1, pt. III fig. 1) demonstrate that my method is correct [1]), though probably an even better picture of actual wing-shape might be obtained by measuring the difference between the longest (usually the 3rd or 4th) and the shortest (10th) primaries, or the first secondary, and relating this to the length of the wing, as was done by Kipp (1959). My own experience with what has since become known as the "Kipp'sche Handflügel-Index", is that in small birds as the Zosteropidae, because of differences in preparation, this method is not satisfactory (Mees, 1956, p. 655).

To return to the ecological, or perhaps better functional relationship: it has been demonstrated, notably by Rensch (1936, p. 353; 1938, p. 299; 1939, p. 194-195), Meise (1938) and Kipp (1942) that in many groups of birds

1) See also Rensch (1938, p. 299): "...die den vorderen Flügelrand bildenden, flugmechanisch besonders wichtigen Schwingen sind bei den nördlichen Rassen oftmals relativ länger als bei den südlicheren Rassen des gleichen Rassenkreises".

races or species which are strongly migratory, tend to have longer, more pointed wings than their sedentary relatives.

Let us now consider the wings of the migratory species and subspecies of *Zosterops*.

Zosterops erythropleura strongly migratory 4>2>5 or 5>2>6.
Zosterops japonica japonica weakly migratory 6>2>7.
Zosterops japonica simplex moderately migratory 5>2>6 or 2 = 6.
Zosterops lateralis lateralis strongly migratory 5>2>6.
Zosterops lateralis familiaris probably weakly migratory 5>2>6 or 6>2>7.

By comparison we have the following data for sedentary populations. Of *Z. japonica* I have not enough information, but *Z. j. loochooensis* has 6>2>7. Of *Z. lateralis* much information is available. *Z. l. lateralis* (invariably 5>2>6), *Z. l. gouldi* (sometimes 5>2>6, usually 2 = 6 or 6>2>7), *Z. l. halmaturina* (usually 5>2>6, but also 2 =6 and 6>2>7), *Z. l. familiaris* (5>2>6 or 6>2>7), *Z. l. ramsayi* (2 = 6 or 6>2>7), *Z. l. chlorocephala* (6>2>7), *Z. l. tephropleura* (7>2>8 to 8>2>9), *Z. l. nigrescens* (8 = 2 or 8>2>9).

From this I consider it justified to conclude that in *Zosterops*, as in other birds, there is a distinct relation between shape of wing and migratory habits. *Z. erythropleura*, the most strongly migratory species of all, has also the most pointed wings, and in *Z. lateralis* the strongly migratory nominate race has the most pointed wings, whereas the very sedentary endemic races of small islands (*tephropleura, nigrescens*) have the bluntest wings. When checking through the pages of this revision one will see that generally species endemic to small islands tend to have blunt wings. A blunt wing is also known to be an adaptation to life in forest (Stegmann, 1962), a pointed wing to life in open country (Miller, 1931, and later authors).

An apparent exception to this regularity is *Madanga ruficollis*, but it must be said that the few specimens known of this species are in such a poor condition that a definite evaluation of its wing-formula must wait for fresh material, and nothing is known of its way of life.

As far as Moreau's African results are concerned, none of the African species is known to be migratory (Moreau, in litt.), and for that reason the more extreme type of pointed wing may not occur. Is it possible that Moreau's two "blunt-winged" populations, *pallida* and *senegalensis* are more mobile than other African populations? Certainly both appear to have extensive ranges in comparatively open country, hence require good powers of flight.

Van Tyne & Berger (1959, p. 79) have fulminated against the method of counting and numbering primaries from the outermost inwards. They may have perfect phylogenetical grounds for their opinion, which, however, in the light of recent research is doubtful: admittedly Stegmann (1961, 1962) has given support for the theory that reduction of primaries occurs distally, but no mention is made of the increase in number of primaries which has also occurred (Stresemann, 1963) and would make any attempt at rigid homologisation dangerous and pedantic. Moreover, Stresemann (1963, p. 455) found that at least in one species, the grebe *Centropelma micropterum*, which has only ten primaries instead of eleven, usual in its family, the reduction took place in the metacarpal region, and not at the tip of the wing. This invalidates Van Tyne & Berger's dogmatic statement referred to above. However this may be, the mentioned authors overlook that in dry skins of small passerine birds it is almost impossible to distinguish primaries from secondaries, so that one only knows what one is counting, when working from the distal primary inwards. It is this practical argument which has induced me to use this system of counting.

Tongue

Ten years ago (pt. I, p. 6-7), I discussed the tongue as a structure of possible systematic significance. After demonstrating that the majority of descriptions found in literature is erroneous, being based on Gadow's (1883) erroneous description and figure, I concluded that: "Anyhow, the shape of the tongue has very little, if any, phylogenetic significance as I hope to prove in a later contribution".

When the sentence quoted was written, I still expected that much variation in the structure of the tongues would be found, and in particular that some of the larger species might not be nectar-suckers, and therefore would not have brush-tongues. In the years that have passed since, I have, however, had an opportunity to examine tongues of many more species and found that all without exception are brush-tongues. These include *Z. palpebrosa, Z. natalis, Z. montana, Z. chloris, Z. lutea, Z. lateralis, Z. cinerea* and *Lophozosterops goodfellowi*, as well as several African species. The descriptions by North (1906) and Taka-Tsukasa & Yamashina (1931) show that the aberrant species *Woodfordia superciliosa* and *Rukia longirostra* have also brush-tongues.

At an early stage it was found that Mr. Moreau was working along the same lines, studying tongues of African Zosteropidae, and as there was little point in duplicating each others work, I forwarded my collection of tongues to Mr. Moreau, for inclusion in a comprehensive paper he is writing on the tongues of Zosteropidae, and their nectar-feeding habits. Therefore the only reason for me to discuss tongues again, is to retract my earlier statement that the shape of the tongue has no phylogenetic significance. As a brush-tongue occurs, without known exception, in all Zosteropidae, it, and the nectar-feeding habit from which it derives its purpose, must be quite old, and as such is of considerable phylogenetic significance. Whether or not there is, within the family, variation helpful in establishing relationships cannot be known until the tongues have been studied, but I am not optimistic as feeding-behaviour would probably have an overriding influence on their morphology.

Voice

Moreau (1957, p. 418-419) has paid some attention to song as a possible ancillary character to establish relationships in the African Zosteropidae, and arrived at a negative conclusion. Mayr (1965a) remained hopeful: "White-eyes have characteristic songs and call notes, and perhaps analysis of these and other behavioral characters may lead to a better understanding of relationships".

Unfortunately it is almost impossible to gain an idea of a bird's song and calls from verbal descriptions, though even such descriptions as exist do not support Mayr's statement just quoted; far from having characteristic songs and call-notes, it looks as if in voice the various species are as similar as in behaviour. The "lost chicken call", which I have called the searching-call (p. 26), and the "sparrow-like chirp" have been recorded from a great variety of species.

When in 1964 I visited South Africa in connection with the Second Pan-African Ornithological Congress, held at Pietermaritzburg, naturally one of my main aims was to observe and hear *Zosterops pallida virens*. As this species is very common in the environments of Pietermaritzburg, I was quite successful, and made, with *Z. l. gouldi* as a basis for comparison, the following notes:

The contact-call. Not clearly different from that of *Z. l. gouldi*.

The searching-call, as uttered by a solitary bird that had lost its companions: "....chēēuw.... chēēuw....". This call differs from the ordinary contact-call only in its plaintive quality and resembles that of *Z. l. gouldi*.

Call of alarm and agitation. Practically the same as in *Z. l. gouldi,* rendered: "jhìrr . . . . . jhìrr . . . . ." in my notes.

Song. More varied and melodious than *Z. l. gouldi,* but generally speaking remarkably similar so that I recognised the song at once as of a *Zosterops.*

Following my stay in Natal, I spent some weeks in the Inyanga Highlands of Southern Rhodesia, where I observed the local subspecies of *Z. senegalensis.* My notes on this species are incomplete, but the song appeared indistinguishable from that of *Z. pallida virens,* and therefore also close to that of *Z. l. gouldi,* but slightly faster and more melodious. The similarity of song between *Z. pallida* (of which *virens* is a subspecies, cf. White, 1965, p. 297; Clancey, 1966: the controversial *Z. vaalensis* is most likely a hybrid between *pallida* and *virens*) and *Z. senegalensis* has been noted by others (Moreau, 1957).

Summarizing it may be said that the resemblance between *Z. p. virens* and *Z. l. gouldi* in all their utterances is quite remarkable, the two so geographically distant species speak the same language, though with clearly different accents. When in addition I recall that the song of *Z. lutea* is quite distinct, (cf. p. 289) and that *Z. natalis* has no real song at all (cf. p. 274), it will be clear that on the basis of present knowledge, I find it impossible to share Mayr's optimistic expectations.

On the other hand subjective opinions and interpretations are only of limited value. What is now needed is to make good mechanical records of songs and calls.

There is also a theoretical reason why similarity in voice should not automatically be taken as evidence for close relationship. There is some evidence (*Phylloscopus collybita* in Spain is always quoted in support of it) that where two closely related species overlap, their songs tend to differentiate, for reasons of recognition. This would lead to clear differences in voice between related species, whereas species only remotedly related might still have very similar calls and songs because no selection for differentiation has taken place.

Sexual dimorphism

The measurements given in the revision indicate that there is a slight difference in average size (as expressed by wing-length) between the sexes, females usually being smaller than males. Counting only those populations in which from either sex not less than five individuals have been measured, I find that in *Zosterops* in 51 instances the males average larger, in 16 instances the females. In the other genera, almost all of which differ from

Zosterops by larger size, so that also the difference becomes larger and easier to measure, these figures are 16 and two respectively. It is possible that in the larger species not only the absolute difference, as a simple relation of size, but also the relative difference is greater (Rensch, 1950).

Of the exceptions only those of which good series have been measured deserve some special discussion; they are in particular *Z. palpebrosa buxtoni, Z. palpebrosa melanura, Z. flava,* and *Z. lateralis gouldi.* These four forms are very small, so that the sexual difference would be small also, and the difference found is negligible (*buxtoni*: 0.04 mm; *melanura*: 0.19 mm; *flava*: 0.02 mm; *gouldi*: 0.13 mm), and without statistical significance. Moreover, though fair series of each of these forms were measured, it is equally true that the material was heterogeneous, brought together by many different collectors, including native preparators, so that probably a large proportion of these birds is missexed. Therefore I consider it safe to conclude that in the Zosteropidae males generally average slightly larger (1-2% in wing measurement) than females. Marples (1945) found a similar difference in *Zosterops l. lateralis,* and Moreau (1957) mentioned it for the African species. Whether there are exceptions to this rule cannot be said until many more reliably sexed specimens have been measured.

It is of interest to compare this slight difference with that found in birds of similar size belonging to a family that is usually regarded as related. In some species of Nectariniidae: *Nectarinia jugularis, Nectarinia aspasia* (= *N. sericea*) and *Anthreptes malacensis,* I found a sexual difference in wing-length of about 10% (Mees, 1964b, 1965, 1966). These species further differ from the Zosteropidae in that there is a pronounced sexual dimorphism in plumage, and that they lack the sociability of most Zosteropidae, in fact are very pugnacious. In this connection I draw attention to Mottram's (1915) opinion that sociable birds show less secondary sexual dimorphism than solitary birds, and to Amadon's (1959) paper on sexual differences in size among birds. More investigations in this direction might reveal interesting correlations.

Is there also a sexual difference in plumage in the Zosteropidae? From time to time authors have claimed, of various species, that males are slightly brighter in colour than females. One gets an impression, however, that sometimes such a difference was mentioned because, in common with other groups of birds, one expected such a difference to exist, rather than that it was based on actual unbiased observation. Therefore it appears unnecessary to discuss those incidental records.

A more serious attempt to analyse a possible sexual difference was made by Kikkawa (1963). It is generally known that in *Z. l. lateralis* there is a certain amount of individual variation in colour of flanks (darker or lighter brown) and throat (more or less tinged with yellow). Obviously a satisfactory description of such differences is very difficult, but Kikkawa has made a commendable attempt, from which he concluded that in three properties of the flank-colour, which he called: "hue", "value", and "chroma", there is sufficient difference between the sexes to enable one to judge the sex of living birds in the hand. He added that his observations of Australian forms of *Z. lateralis* indicate that in a pair, regardless of the actual intensity of the colour, the male has the darker flanks (it is not made clear if here he is still referring to the nominate race only, or also to the Australian continental races). Kikkawa's last statement would imply, either that all males are separable from all females on flank characters, or that females always pair up with males which have darker flanks than their own.

Comment on Kikkawa's paper was not long in coming. McKean (1965), another ornithologist with a great experience in handling and ringing *Z. lateralis,* stated: "On dissecting some 20 Silvereyes, I found that sex could not be reliably determined by plumage differences. However, the Silvereyes dissected were not taken during the breeding season and it is possible that the plumage variation I encountered which had no reliable correlation with sex is attributable to a geographical cline in colouration. The criteria given by Kikkawa (1963) for New Zealand Silvereyes may yet prove reliable for local birds during the breeding season".

Because museum material is usually so unreliably sexed that no conclusions can be drawn from it, in arriving at my own opinion, I have relied entirely on specimens of *Z. l. lateralis* from Canberra presented to me by the C.S.I.R.O. Wildlife Division, prepared by Hitchcock and Schodde, and material from Tasmania collected and prepared by Green. In this material (6 ♂, 7 ♀) I have been unable to find any difference between the sexes. Incidentally, I found to my surprise that some birds with very dark flanks, both males and females, are marked as immature by condition of gonads and pneumatisation of skull.

Naturally, I do not deny the possibility that in some species of *Zosterops* there is a difference in brightness of plumage between the sexes, and I hope to stimulate authors who have previously only mentioned it in a casual way, into presenting detailed information. In one species, *Z. flava,* I believe to have observed such a difference, but the series of females was inadequate.

In conclusion I would say that a difference in plumage between the sexes of *Z. l. lateralis* has not yet been proved and more in general, that there is no proof of any sexual dimorphism in Zosteropidae, except a slight difference in size.

Relative dimensions

In a paper on *Chlorocharis emiliae* (Mees, 1956) I mentioned the fact that the smaller race *moultoni* has a relatively shorter tail than the larger nominate race. I noted that: "Probably it is more than mere coincidence that several small species of Zosteropidae have relatively the shortest tails found in the family.... it would seem that in Zosteropidae reduction of size is correlated with a proportionally even greater reduction of tail-length". In an attempt to explain this I discussed and rejected the possibility of allometric growth, and suggested that reduction in relative tail length might be a functional consequence of the reduction in size.

Very soon afterwards Moreau (1957, p. 336) demonstrated similar relations in African members of the group, noting that: "..... in the shortest-winged populations the tails average only about 67% of the length of the wings, while in the longest-winged tails average about 76%". Moreau's conclusion was that tails appear to be proportionally longer in cooler climates, as Snow (1954, 1955) had found in Paridae. Unfortunately, none of the Indo-Australian Zosteropidae is so widely distributed that such effects would show up clearly, and the issue is further complicated by the fact that all subspecies inhabiting the greatest latitude, and which from our point of view would be most promising, are more or less migratory (*Z. j. japonica, Z. j. simplex, Z. l. lateralis*).

The *Chlorocharis*-paper referred to above was written before I had been able to study more than a small proportion of the Indo-Australian Zosteropidae, mainly the Malaysian species. Besides the examples given at the time, *Zosterops flava, Oculocincta squamifrons*, and *Chlorocharis emiliae*, the other species of this area also seemed to conform: in *Zosterops palpebrosa* the small eastern races have relatively shorter tails than the larger western races, in *Z. japonica* the larger races tend to have relatively the longest tails, and *Z. everetti, Z. nigrorum*, and *Z. montana* show the same tendency.

When working on part II of my revision, however, I began to feel grave doubts about the validity of this size-relation rule, for in *Z. chloris-Z. citrinella* it is just the other way round: the smallest subspecies (*mentoris*) has relatively the longest tail, the largest subspecies (*chloris*) the shortest, and as fair series were measured (19 specimens of *mentoris* and 39 of *chloris*) this could hardly be due to some measuring-error. The same applies to the three subspecies of *Z. rendovae*. In *Z. atrifons* there does not appear to be any clear correlation between wing-size and tail-length, and the same can be said of *Z. novaeguineae* and the *Z. griseotincta* group. In *Z. lateralis* the smallest subspecies, *Z. l. gouldi* has relatively a very long tail, and the giant *Z. albogularis* scores only a moderate 69.2%.

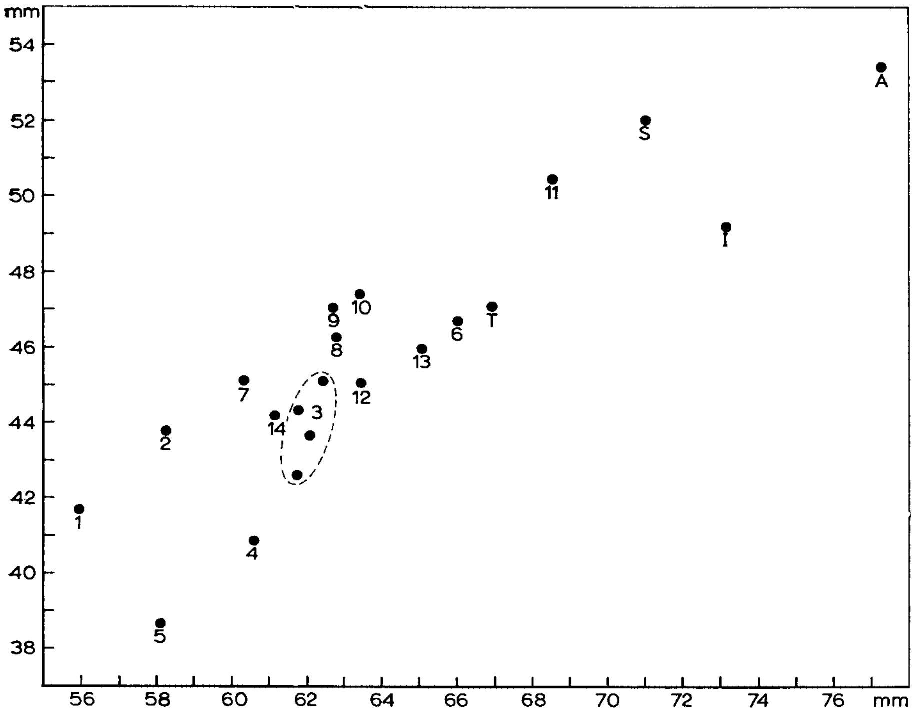


Fig. 25. Graph showing the relation between wing-length (horizontal) and tail-length (vertical) in the *Zosterops lateralis* group. The numbers correspond with the numbers the subspecies bear in the text and in the systematic list; the letters are: A = *Z. albogularis*; I = *Z. inornata*; S = *Z. strenua*; T = *Z. tenuirostris*.

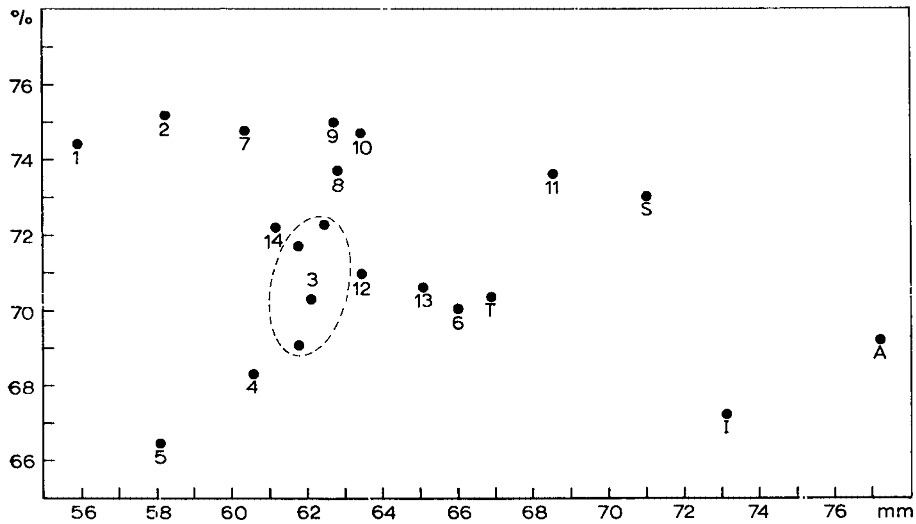


Fig. 26. Graph showing the relation between wing-length (horizontal) and tail-length as a percentage of wing-length (vertical) in the *Zosterops lateralis* group. Note the absence of a clear relation between size and relative length of tail. Explanation of symbols as in fig. 25.

Moreau (1957, fig. 4) has given a graph of the simple relation between length of wing and tail. Inasmuch as this means only that the largest species have also the longest tails, the correlation is not surprising, and holds, in a general way, for the Indo-Australian Zosteropidae (fig. 25). There does appear to be an absolute lack in correlation, however, between size and relative length of tail, as illustrated for the *Z. lateralis* group (fig. 26). When comparing Moreau's fig. 5, it is obvious that two of his groups, the South African and the Southern Tropical, show a similar lack of correlation, and this makes the whole point unconvincing.

As it has been stated that for purely mechanical reasons larger birds must have a relatively shorter tarsus than smaller birds (Dilger, 1956, p. 187), I have also plotted the tarsus-length against the wing-length (fig. 27). The line across the graph shows the length of tarsus each species would have if its relation wing:tarsus was the same as that of the smallest subspecies (*Z. l. gouldi*). It will be oberved that there is no evidence of any change in tarsus:wing ratio in relation to size; in view of the different functions of wing and tarsus, this is surprising.

In the ratio wing:bill (fig. 28) there is, on the other hand, a suggestion of a shift with increasing size, the largest forms having relatively larger bills. It is, however, no more than a suggestion, inadequate as a basis of explanatory theories.

Z. montana is an example of how populations of one species can differ under presumably almost identical ecological conditions; on the various mountains, populations of large and small birds are distributed in an apparently haphazard way, some of the smallest populations being nearest to some of the largest (for example those on Mt. Papandajan, av. wing 55.7 mm and Mt. Tjerimai 57.9 mm; Bali 55.0 mm, and Lombok 57.61 mm; Flores 55.67 mm and Mt. Moetis, Timor 60.0 mm; north and central Celebes 53.9 mm, Latimodjong, south-central Celebes 57.0 mm). *Z. montana* is interesting from another point of view; in Africa, Moreau (1957, p. 331) found that: "....no population of small *Zosterops*, with wing averaging less than 58 mm., occurs above 5000 feet". All populations of *Z. montana* would live above 5000 ft (1500 m), even though individuals may occasionally go down to 1100 m. The material from Mt. Papandajan, for example, was collected at an altitude of 2500 m, which is over 8000 ft. Nevertheless, the smallest population of *Z. montana* (from Luzon) has an average wing-length of only 53.7 mm, about the same as the typical lowland bird *Z. japonica meyeni* has on the same island (average 53.8 mm), and only a little larger than *Z. nigrorum aureiloris*, apparently mainly an inhabitant of hilly country and moderate heights (average 52.1). Naturally,

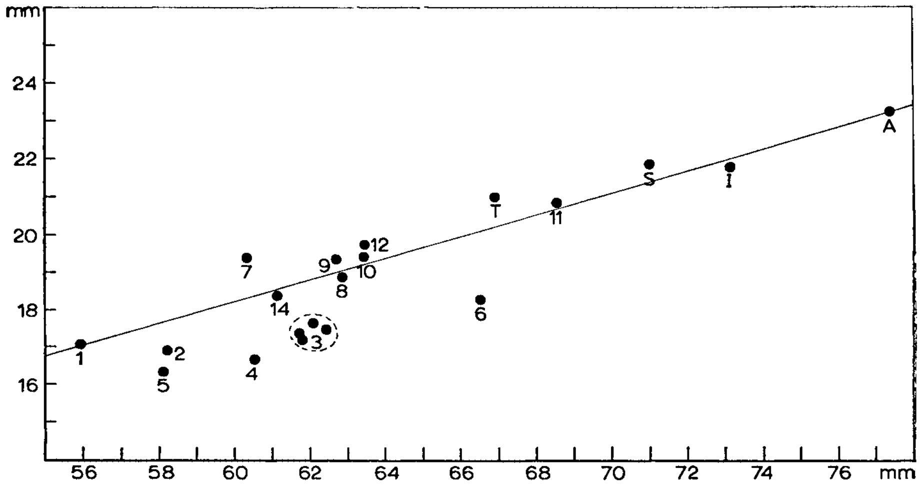


Fig. 27. Graph showing the relation between wing-length (horizontal) and tarsus-length (vertical) in the *Zosterops lateralis* group. Explanation of symbols as in fig. 25. The line indicates the position the dots would have if all forms had the same proportions as the smallest subspecies.

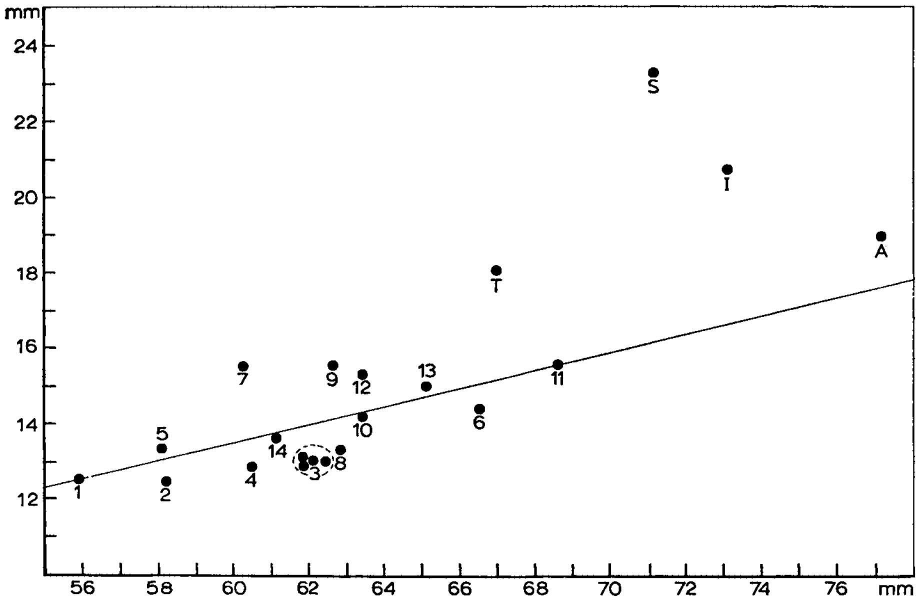


Fig. 28. Graph showing the relation between wing-length (horizontal) and length of the entire culmen (vertical) in the *Zosterops lateralis* group. Symbols as in fig. 25. The line indicates the position the dots would have if all forms had the same proportions as the smallest subspecies.

I realize very well that here I am comparing different species and that nobody has ever claimed Bergmann's and other rules to apply interspecifically, but Moreau, whose work I am discussing now, does regard certain dimension-correlations as of general application in African members of the genus *Zosterops*. Going over Moreau's figures I find that his statement quoted above is not quite correct in his own material, as his Population no. 69, from 6000 ft, averages only 57.7 mm.

Moreau (1957, p. 331) found also that the populations of the highest levels, those of the upper levels of Mt. Kenya and of the Kivu volcanos, appear to consist of birds a little smaller than might have been expected, and suggested two factors to explain this: gene-flow from lower altitudes, where the birds are smaller, and marginal ecological conditions, implying poorer feeding. Neither factor could have had much influence in *Z. montana*; the first for the obvious reason that there are no populations at lower altitudes, the second because one can reasonably expect that a species confined to those high levels, would be thoroughly adapted to them, and live there under its optimal ecological conditions.

This leads us to Bergmann's rule, that birds living in cooler climates, or at greater altitudes (which amounts to the same), are larger than those living in warmer climates. A very good example is *Z. novaeguineae*, in which all montane races differ from all lowland races by their larger size. This supporting example is balanced by the *Z. atrifrons* group, of which the lowland member *Z. atriceps dehaani* is the largest of all, much exceeding in size even the mid-mountain subspecies of New Guinea.

Moreau (1957) has found a distinct and statistically highly significant correlation between wing-length and altitude. In *Chlorocharis emiliae* I have been unable to demonstrate any difference in size between birds collected below 8000 feet and above 10000 feet, though without knowledge of the amount of vertical movement that can take place this result is not worth much. Harrisson (1956) doubts that the species breeds below 10000 feet.

The preceding discussion of the various ecogeographical rules, and of the findings of Moreau and Snow looks very negative. This negative result, obviously, does not mean that I doubt the validity of those rules, whose wide application has been demonstrated in many instances. It rather means that in the Indo-Australian group of the Zosteropidae matters are complicated by various other factors which mask or counteract the better known rules. The two authors mentioned worked with widely distributed continental species (though this does not apply to the mountain populations of East Africa), a situation that might have for the present purpose essential differences from that of the Indo-Australian region, where ranges are insular.

In discussions of size-differences, thoughts of allometric growth keep coming up in ornithological literature. For example, Mayr & Vaurie (1948, p. 255) mentioned in Dicruridae: " .... a tendency for an allometric increase of bill length with increasing size", and Rensch (1950) tried to explain sexual differences in size with it. In a previous publication (Mees, 1956, p. 654) I have gone into this matter, and found that several claims of allometric growth in birds and mammals were ill-founded and open to a different interpretation. The figures given in this revision show that there is no evidence of allometric size-relations in Indo-Australian Zosteropidae, and I continue to see size-relations as governed by functional (including ecological) factors. It should be mentioned that other authors who have made careful studies of size-relations, e.g. Lack (1947), Kramer (1960), Grant (1965a), rejected allometric growth as a factor of any clear significance, and Mayr (1963, p. 324) has also abandoned it, though Hamilton (1961) and Grant (1966) still mention it. Of course, it was against non-functional allometries only that the criticism of Kramer and myself was directed, for nobody will deny the existence of functional allometries, and "Funktionsgerechte Allometrien" were in fact the subject of Kramer's (1960) paper.

This section cannot be concluded without some remarks about the reliability of the measurements. My experience, based on thousands of birds measured, is that the wing-length can be taken with fair accuracy, variation when a specimen is measured more than once being rarely over one per cent, and usually less. With the tail, however, it is an entirely different matter, its length appears to a much greater degree dependent on the way a specimen has been prepared, and measuring is also more difficult; moreover many prepared specimens lack one or more rectrices. Checking through the measurements given in this paper, one will find that the individual variation in wing-length in homogeneous populations, even when large series are measured, is rarely more than about 10 %. The variation in tail-length, however, goes regularly up to 20 %. Part of this variation is doubtless due to difficulties of measuring, but real differences in variability may be involved. As Moreau (1957, p. 336) has mentioned, selection pressure on the tail, which presumably is a less specialised structure than the wings, may be less rigid, and therefore allow of a greater individual variation. This is the reason that in contradistinction to some previous authors I have not paid much attention to differences in tail-length, measured in small series, and have rarely mentioned them in diagnoses of subspecies. This variation is also evident in the four groups of *Zosterops l. lateralis,* as shown in figures 25 and 26.

Bill and tarsus, being hard structures, are easier to measure, but with the tarsus it is sometimes difficult to decide down to which scute exactly one must measure.

It may cause wonder that in the figures 25-28 only the *Z. lateralis* group has been considered. The reason is that this group gives an unequalled range of variation in size, mean wing-length in its members varying from under 56 to over 77 mm. In other groups, variation in size is so limited that trends in relative proportions would be for that reason impossible to demonstrate.

The small-island effect

In the preceding pages repeated reference has been made to what I have called the small-island effect, the phenomenon that when in the Zosteropidae closely related forms occur on large islands or on continents, as well as on small islands, the forms occurring on the smallest islands are usually the largest. In other words: the smaller the island, the larger the bird occurring on it. Let us first have a look at the supporting evidence (table XII). In the middle column the names of the insular species and subspecies appear, in the left hand column the names of the subspecies of the nearest larger land-mass to which they appear closest, and in the right hand column the size-characters in which the former differ from the latter.

A tendency towards large size in insular populations is not only found in Zosteropidae, but appears to occur in many passerine birds. Rensch (1930) and Chasen (1935, p. ix, xii) mentioned it for Malaysia, and Amadon (1953) for islands in the Gulf of Guinea. In some other families it is more striking than in the Zosteropidae; in particular in the Nectariniidae a tendency towards large size on small islands is generally accepted as being the rule (Salomonsen, 1953, p. 254; Rand & Rabor, 1960, p. 439). It is very striking in *Nectarinia aspasia*, where very large subspecies are found on islets off the north coast of New Guinea (Mees, 1965).

The examples and references given above concern large overall-size, as expressed by wing-length, but proportions may also be affected. Murphy (1938) found that of North American passerine birds 78 % of the insular populations have relatively larger bills than their mainland counterparts and recently Grant (1965a, 1965b) has analysed the avifauna of the Tres Marias Islands, Nayarit, Mexico, and found for wing and tail no particular general trend (about as many island populations are smaller as larger than their mainland counterparts), but that the insular birds incline to larger bill and tarsus. Perhaps it should be noted here that both Murphy and Grant have taken figures from literature, and therefore at least partly from the same sources, so that their studies are not independent.

TABLE XII

Z. palpebrosa palpebrosa (South-East Asia)	*Z. p. nicobarica* (Nicobars and Andamans)	bill larger
Z. japonica japonica (main islands of Japan)	*Z. j. stejnegeri* (Seven Islands of Izu)	bill much longer, all dimensions larger
	Z. j. alani (Volcano Islands)	bill larger and broader, all dimensions larger
	Z. j. insularis (small islands S. and S.W. of Japan)	bill larger
Z. japonica meyeni (Luzon)	*Z. j. batanis* (small islands between Luzon and Formosa)	larger in all dimensions
Z. everetti basilanica (southern Philippines)	*Z. e. babelo* (Talaut Islands)	larger in all dimensions
Z. nigrorum nigrorum (Negros, Panay, Masbate)	*Z. n. richmondi* (Cagayancillo)	larger in all dimensions
Z. lateralis lateralis (Tasmania, etc.)	*Z. albogularis* (Norfolk Island)	much larger in all dimensions
Z. lateralis familiaris (south-east Australia)	*Z. l. chlorocephala* (Capricorn Islands)	larger in all dimensions
	Z. l. tephropleura (Lord Howe Island)	bill and tarsus larger
	Z. strenua (Lord Howe Island)	much larger in all dimensions
	Z. tenuirostris (Norfolk Island)	bill much longer, all dimensions larger
Z. lateralis (*griseonota*?) (New Caledonia)	*Z. inornata* (Lifu)	much larger in all dimensions

Several other points have to be considered, to clarify the discussion. One factor which for some reason has never been mentioned in the literature consulted by me is the size of the islands involved. Murphy and Grant just compared insular subspecies with mainland ones.

Mayr & Vaurie (1948), in a study of the Dicruridae, did not find much correlation between island size and body size (as expressed by length of the folded wing) in their table 5, where they made comparisons between Ceram and Boeroe, Lombok and Sumatra, etc., none of which come in my class of small islands. But their table 9, where they make no mention of the "small-island effect", shows that the populations of seven small islands on the drowned Soenda Shelf are all larger than those of the nearest larger land-masses.

The second factor is that, while small birds tend to be larger on small islands, it looks as if large birds (perhaps birds of prey and owls in particular) incline to small size on small islands. The same apparently holds true for mammals (Forster, 1964, also Hooijer, pers. comm.). Thirdly, there are the familiar ecogeographical rules according to which birds inhabiting hot lowlands would be smaller in size, though perhaps with larger protruding parts, than their relatives living in cooler places. As the Zosteropidae (and also the Nectariniidae, to which reference has been made) are essentially tropical in distribution, one might expect on small islands in the tropics and the subtropics, with an even climate, a certain amount of selection for small size (see for example Mayr, 1942, p. 89). If this is true, there ought to be for each bird species a certain size of island, where the pressure of the "small-island effect" towards larger size, and the pressure of Bergmann's rule towards smaller size balance. On the other hand Junge's (1936) measurements show that on the not very small island of Simaloer (1738 km^2), nevertheless all birds of the smaller species which have differentiated, are larger than their Sumatran counterparts. This shows that the small-island effect can operate also on islands as large as Simaloer. The few endemics of adjacent tiny Poeloe Babi (ca. 40 km^2) are very much larger again.

Naturally, for a fair evaluation of the position, those instances in which there is no evidence of a "small-island effect", or in which it is not so clear, have also to be mentioned.

Z. palpebrosa egregia on the Laccadives does not appear to have differentiated from mainland birds, and though I am well aware of the danger inherent in explaining away everything that does not fit my preconceived notions, this may indicate that the Laccadives have been colonised so recently that there has not been time for any obvious increase in size. Actually the few birds of the Laccadives that I have examined, average rather larger than those of the opposite mainland (cf. pt. I, table I), but until more material from the islands becomes available, it will be impossible to say if this difference is real.

As regards *Z. chloris chloris* and *Z. citrinella albiventris,* both these subspecies are the largest of their species (cf. pt. II, table I), and therefore they appear to confirm rather than contradict the small-island effect. *Z. chloris intermedia* shows this even more clearly as its smallest representatives occur on the mainland of Celebes and on the largish islands of Soembawa and Flores, whereas the small intervening islands, particularly Kalao Toea and Madoe, are inhabited by large individuals (cf. pt. II, p. 38, 41-42; also Meise, 1929).

Z. chloris maxi remains as the only subspecies in which there appears to be an opposite trend. The general pattern of distribution, as well as the geological history (Soenda Shelf) indicate that this subspecies is of an eastern origin; nevertheless the western populations, which are confined to tiny islands, average smaller than the eastern populations which include the moderately large island of Lombok in their range.

In the New Hebrides, there is a tendency for subspecies of *Z. lateralis* and *Z. flavifrons* to be larger on the smaller islands (cf. table I, table VI).

The species and subspecies of the *Z. griseotincta*-group do not lend themselves for analysis, because they all inhabit fairly small to small islands, but in the central group of the Solomon Islands, the species inhabiting the smallest island, *Z. luteirostris,* is also the smallest in size (pt. II, table VII), so that the relation does not exist.

Reviewing the evidence as a whole, the conclusion that a small-island effect exists in the Indo-Australian Zosteropidae appears justified. This conclusion, of course, does not, in itself, contribute anything to an explanation of this peculiar phenomenon. The only thing that can be said on the basis of this evidence, is that on small islands there is either some kind of selection for increase of size, or an absence of selection for small size.

It is worth nothing that, other than Grant's (1965a, 1965b) finds on the Tres Marias Islands, the small-island effect does not affect bill and tarsus only in Zosteropidae. Remarkable is that *Z. lateralis tephropleura* has a long bill and tarsus with a wing-length that has apparently not changed much, and that *Z. l. chlorocephala* shows a greatly increased bulk, as expressed by wing-size, without a corresponding increase in size of bill and tarsus (see fig. 27 and 28).

The first to attempt an explanation of the small-island effect was Rensch (1930, p. 165-167). It is unfortunate that Rensch gave as an example the avifauna of the Anamba Islands as described by Oberholser (1917), for many of the subspecies of alleged large size described by that author are of problematic validity. Rensch's (1930, 1933, p. 57) explanation is that very small islands undergo strong cooling at night, so that their average temperatures are lower than those of larger land masses; conforming with Bergmann's rule, this would lead to a larger size of their inhabitants.

At the same place Rensch explained a slight increase in size of birds inhabiting the Lesser Soenda Islands, as compared with their relatives on Java, by the drier climate of the former. This would lead to cooler nights, hence to a lower average temperature. Reasoning thus, Rensch reduced this to another example of the general applicability of Bergmann's rule.

In retrospect, we cannot blame Rensch that at the time he was pre-occupied with the ecogeographical rules, to the understanding of which he has contributed so much, and that in the case just listed he doubtless went too far, ascribing all differences to climatic factors. As just mentioned, on the island of Simaloer many of the smaller birds show an increase in size over their Sumatran counterparts. Simaloer is fairly large, covered with heavy forest, and has a rainfall of about 3500 mm a year (Anon., 1920). Rensch also fails to explain why large species of birds and mammals would show a decrease in size on small islands, since climatic factors would have an influence in the same direction on all animals, independent of size.

It appears evident therefore, that the ecogeographical rules alone cannot fully explain the small-island effect (though of course I do not preclude the possibility that they may have an influence), and that a different, or at least complementary, factor (or factors) has to be looked for.

Though I have no explanation to offer for the problem of size-changes on islands, my own thoughts go in the direction of predation and possibly also competition as a contributing factor. It is perhaps justified to assume that, where interspecific influences do not exist, normal intraspecific competition would favour the larger and stronger individuals. In large and rich faunas, however, this selection would be counteracted by predation pressure, which might tend to concentrate on larger individuals (these being perhaps slower and anyway easier to detect). Following this hypothesis, on small islands, predation pressure would be less severe, and therefore provide less of a check on increases of size. Large birds, on the other hand, including birds-of-prey, would be less subjected to predation, and their size would be ruled by different factors. Dwarfism of large birds and mammals on small islands might be a result of the smallness of their territory. It is obvious that on small islands, the larger an animal, the smaller the number of individuals it can support. If a large mammal manages to decrease in size and diminish its food-intake, other factors remaining equal, the same area should be able to support a greater number of individuals, increasing its chances of survival correspondingly. In this hypothesis, the reversal of the trend towards larger size which existed in mammals until the Pleistocene, which is now well-documented (Hooijer, 1950 and pers. comm.), may be due in part to hunting-pressure by man who about that time became a dominant species.

Obviously these speculations are without scientific value; what at present is still needed are more raw data to give the whole phenomenon of changes in size on islands a healthy statistical base.

Nidification

I have already drawn attention to the remarkable uniformity of the Zosteropidae as regards nidification, particularly in the structure of their nests and the coloration of their eggs (pt. I, p. 17). In the ten years that have since passed much additional information has become available, and though this has not essentially altered the position, another review appears useful.

Nests have now been found of some of the most aberrant species, including *Zosterops wallacei, Lophozosterops dohertyi, Heleia crassirostris* and *Chlorocharis emiliae*, and they are all of the usual type, cup-shaped and suspended in the fork of a twig, or sometimes placed in a vertical fork. The uniformity earlier commented upon has been confirmed by these additional finds.

A remarkable development is the discovery of spotted eggs in two aberrant but presumably not at all closely related species, *Zosterops wallacei* and *Lophozopsterops dohertyi.* Naturally such spotted eggs, especially where the spots are large as in *L. dohertyi,* appear at first sight very different from anything hitherto known in the Zosteropidae, but it should not be overlooked that in both species the ground colour of the eggs remains the normal pale blue. Therefore these eggs do not seriously affect the general uniformity of the group. The very distinct *Heleia crassirostris* has ordinary plain eggs.

The reports of both blue and white eggs in the same subspecies and the same population have puzzled me: originally I thought of true dimorphism in this character, but having examined more eggs, my impression is that it is rather a matter of ordinary variation: some clutches are blue, others pale blue, and others so pale blue as to look practically white.

The number of eggs to a clutch is normally two or three, and not infrequently four and even five. Possibly the clutch-size follows the well-known geographical rule (Rensch, 1938; Moreau, 1944) that it is larger in temperate regions than in the tropics (table XIII) 1).

TABLE XIII

Clutch-size in Zosteropidae 2)

Zosterops ceylonensis	2-3
Z. palpebrosa nilgiriensis	2, rarely 3
Z. palpebrosa egregia	2-4, once 5
Z. palpebrosa palpebrosa	4 less often 3, once 5
Z. palpebrosa nicobarica	2
Z. palpebrosa auriventer	3-4
Z. palpebrosa buxtoni	2
Z. palpebrosa melanura	2
Z. japonica japonica	4-5
Z. japonica stejnegeri	3-4
Z. japonica loochooensis	4
Z. japonica simplex (mainland)	4
Z. japonica simplex (Formosa)	2-3
Z. japonica batanis	3-5
Z. japonica meyeni	(3)
Z. montana montana	2
Z. natalis	2, less frequently 3
Z. flava	2-3
Z. chloris intermedia	2-3, once 4
Z. chloris maxi	2
Z. citrinella albiventris	(4)
Z. atrifrons atrifrons	(2-3)
Z. hypoxantha hypoxantha	2, rarely 3
Z. lutea lutea	2-3, once 4
Z. lutea balstoni	2-3
Z. griseotincta griseotincta	3
Z. lateralis gouldi	2-3, occasionally 4
Z. lateralis halmaturina	2-3
Z. lateralis lateralis	3-4, sometimes 2
Z. lateralis chlorocephala	2-4
Z. lateralis griseonota	2-4
Z. lateralis flaviceps	3, sometimes 4
Z. tenuirostris	2-4
Z. xanthochroa	2-4
Z. minuta	2-4
Z. conspicillata conspicillata	2-3
Z. conspicillata owstoni	1
Lophozosterops javanica frontalis	2
L. dohertyi dohertyi	2
Heleia crassirostris crassirostris	2-3
Woodfordia superciliosa	(2)

1) Mayr (1963, p. 325) stated that this rule is denied by Kipp (1948), but Kipp's whole paper is based on its firm acceptance.

2) Figures based on less than three clutches are placed in parenthesis.

The table appears to indicate that clutches are largest in the temperate regions, in *Z. japonica* and the southern non-tropical races of *Z. lateralis*, but the differences are slight and, in view of the very few clutches known from most species, somewhat doubtful. A peculiar difference which appears to be fully established is between the subspecies of *Z. palpebrosa*, which has usually three to four eggs on the Asiatic mainland (with the possible exception of the race *nilgiriensis* which is reported to have more often two than three eggs), and invariably two in Java. As a large clutch-size is thought to be an adaptation to conditions of seasonal food-abundance the arid conditions of western India might have their influence (cf. Lack & Moreau, 1965), as opposed to the more even climate of Java, but how then can the difference between Java (*buxtoni, melanura*, 2 eggs) and Malaya (*auriventer*, 3-4 eggs) be explained? It will be clear that Lack's (1954, p. 37) suggestion of day-length as a factor connected with clutch-size is also not applicable in this case, with subspecies inhabiting almost the same latitude.

An interesting question is that of geographic variation in size (measurements) of eggs. One expects larger subspecies to have larger eggs, and perhaps there are other regularities in variation, but large series of eggs, such as are rarely available, would be needed.

Case histories of the nidification of Zosteropidae exist only for *Z. pallida*, *Z. palpebrosa*, *Z. japonica*, *Z. lateralis* and *Z. natalis*.

It appears that both sexes participate in building the nest, incubation, and care of the young. The incubation-period varies in some species from just over ten to twelve days (*Z. palpebrosa*, *Z. lateralis*; see in particular Skead & Ranger, 1958, but also Gross, 1963, and Očko, 1965), and the fledging-period is of similar length. With an incubation-period of less than eleven days, as now definitely established through the careful work of Skead & Ranger (1958), the species of *Zosterops* concerned have the shortest incubation-period of any bird (cf. Nice, 1953). As I mentioned before, there does not appear to be uniformity in the genus *Zosterops*, as *Z. natalis* has an incubation-period of fifteen to sixteen days, and the young do not leave the nest until at least seventeen days old. The name and reputation of the recorder (Gibson-Hill, 1947) guarantee the reliability of his observations. Nothing is as yet known of the incubation-period of the larger species of *Zosterops* (a comparison between the three species of Norfolk Island would be especially interesting) or of any member of the other genera.

Before concluding this section it is worth stressing that even the largest and best-known collections, often brought together with loving care and at great expense, contain numbers of misidentified eggs. As an example, the three clutches in the H. L. White Collection identified as *Z. albiventris* have data as follows:

c/4, coll. E. Drew, near Normanton, Queensland, 3-XII-1897.

c/2, coll. S. W. Jackson, Belson's Scrub, Atherton, Barron River Valley, North Queensland, 23-XI-1908.

c/4, coll. H. Elgner, Darnley, North Queensland, 22-XII-1909.

On geographical evidence, and assuming that at least the family has been guessed correctly, it is quite clear that the first clutch must belong to *Z. l. lutea* (see also p. 290), the second, though collected by a very well-known ornithologist, to *Z. lateralis ramsayi*, and only the third to *Z. citrinella albiventris*. Again, as mentioned in the systematic section, eggs of *Z. l. lateralis, Z. tenuirostris* and *Z. albogularis* on Norfolk Island have been confused, and moreover of *Z. tenuirostris* a clutch-size of up to six has been recorded, which appears unlikely.

The H. L. White Collection was taken here as an example, not because I regard it as especially poor and unreliable, but on the contrary, because it is one of the best collections I know, representing a lifetime of collecting in which no cost and effort was spared. There is no reason to assume that other collections are more reliable; for comment on Nehrkorn's collection I refer to a previous part of this revision (pt. I, p. 95). See also Schönwetter's (1966, p. 691, and in other places) very pessimistic remarks.

Zosteropidae as colonists

As has been pointed out by Mayr and others authors, Zosteropidae have been particularly successful in the colonisation of small and remote islands. The small-island inhabitants can be roughly divided in two groups: highly modified endemics confined to one island or at most a few adjacent islands, and widely ranging forms. Examples of the former group are too numerous to mention here. Members of the second group are *Z. chloris maxi, Z. chloris chloris, Z. citrinella albiventris, Z. griseotincta eichhorni*. The essential difference between the two groups is that members of the former usually inhabit a single geologically fairly old island, while the widely distributed races have a partiality for coral islets of recent origin. A hypothetical explanation for this difference can be formulated as follows: birds inhabiting a single geologically stable island, which is large enough to support a population of sufficient size for an indefinite time, will tend to become more and more sedentary, especially when they live very isolated, as for example on Christmas Island in the Indian Ocean, Norfolk and Lord Howe Islands. A passerine bird leaving such an island, either by accident or on purpose, would have little chance of survival, and even less chance of establishing a breeding population elsewhere. Most birds leaving a remote island, say individuals of *Z. natalis* leaving Christmas Island, would probably perish in the attempt to go somewhere else, and even if they did reach land there would be many factors against successful colonisation: the nearest land, Java, would be ecologically different, harbour many competing species, while also on an island of that size even flocks would probably be easily dispersed, so that pair formation and reproduction would be unlikely to take place. This would count heavily where a species is concerned that has no song, and as a result of its living on a small island with a dense population, may not have a very strong flocking-instinct. It is easy to conceive therefore that in *Z. natalis* there would be an advantage in being sedentary. Christmas Island is such a good example because *Z. natalis* has actually been introduced to one of the islands of the Cocos-Keeling group, where according to Gibson-Hill (1950) it is thriving but has not colonised any other island of the atoll. The distance of Pulo Luar, where it occurs, to the nearest other island of the atoll is a little over two geographical miles.

Birds inhabiting coral islands of recent origin, on the other hand, are in an entirely different position. Besides in age, which is an important factor, coral islands differ in various other respects from the kind of islands just discussed. Many of them are so small that is is doubtful that each single island could support an indigenous population for any length of time, they usually are found in groups, and moreover as a habitat they must be very uniform, which means that any bird able to colonise one, will be able to live on all. Selection pressure on these islands would therefore not favour sedentary individuals, because sedentary populations confined to one small island run a great risk of being wiped out, but birds which easily move from island to island, perhaps not even accidentally but on purpose, for example because food conditions on those small islands with their rather uniform and poor flora and fauna might differ seasonally. That some widely-distributed inhabitants of coral-islands still have this faculty of dispersal is shown by the occurrence of *Z. chloris maxi* on Dwars-in-de-Weg, between Java and Sumatra, an island that was submerged, and its fauna presumably wiped out, during the Krakatau eruption of 1883.

The examples given are extremes; it is likely that in coral-island inhabitants which have greatly extended their ranges the selection pressure towards becoming sedentary, which is presumably always present, will become predominant, especially when remote islands or groups of islands have been colonised. In some such cases, especially where remote groups of islands are concerned, selection would probably favour a moderate mobility, sufficient to keep contact between the islands of one group, but not enough to lead to risky adventures farther away. The general situation of conflict between two interests: that to stay where one is, at presumably a slight risk, but with no particular reward, or the more risky one of moving out, compensated by the possibility of a great reward: new and uninhabited country, is found not only in insular birds, but is common to all birds with a specialized and discontinuous biotope. Recently I have drawn attention to it in connection with certain mangrove-inhabiting species of Australia (Mees, 1964c).

The ability of birds to colonise by flight is generally accepted, though one still hears occasional objections. Deignan (1963b), for example, tried to explain distribution of insular birds in the Pacific by assuming that: ". . . . . the ancestral forms were already existing and presumably dispered *prior* to the appearance of modern geography". Though this is doubtless, and has generally been accepted as, an important factor in the distribution of major groups, Deignan's attempt to relate it to the present-day distribution of subspecies in the Pacific appears doomed to failure. Anyway, with the knowledge that very small birds as *Sylvia borin* and *Phylloscopus trochilus* migrate each year from northern Europe to the southern part of Africa and back, that North American warblers have been found in England, etc., few ornithologists will have difficulty believing that small passerine birds in the Pacific can be good colonisers by flight. In this connection it is perhaps even of advantage if a bird is not a very strong flyer, because this, and perhaps an only moderately developed homing-instinct, might cause it to stay on an island it has accidentally reached. Generally speaking, however, I prefer the theory given in the preceding paragraph, that a degree of mobility is maintained in certain good colonisers, because of a selective advantage. This degree of mobility would include that, at least in some stage of the life-cycle, presumably in the immature individuals, attachment to a territory or to the place of birth is not too strong.

Migration

Four forms of *Zosterops* are known to be wholly or partly migratory: *Z. erythropleura*, *Z. j. japonica*, *Z. japonica simplex* and *Z. l. lateralis*. Of a fifth one, *Z. l. familiaris*, migration has not been proved but is likely, and it is almost certain for the intermediate populations of south-eastern Australia. It is not unexpected that the species which lives at the highest latitude, *Z. erythropleura*, is the most strongly migratory. In its breeding quarters it does not arrive before the second half of May, and leaves in September. Since its main winter quarters appear to be in Szechuan and the Burma-Siamese frontier area, the distance flown, twice a year, would be about 3500 km. Some individuals, like the one shot at Bokor (this revision, pt. I, fig. 5) would have migrated some 5000 km. The general direction of the migration is slightly south of south-west.

Because in the two migratory subspecies of *Z. japonica* (*japonica* and *simplex*) not the whole population migrates, it is not certain what distance the migrants cover. It is possible that the birds breeding near the northern limits of the range migrate, whereas the more southern populations are sedentary, in which case the distance covered by the migrants would be considerable, perhaps thousands of kilometres, or there might be a general and irregular movement southwards, in which case the northern birds would stay farthest north, and no individual need cover more than a few hundred kilometres. Nevertheless, the occurrence of migrants of *simplex* in southern Burma and on the Paracel Islands, indicates that considerable distances can be flown. *Z. j. japonica* is apparently less strongly migratory, as outside its breeding range it has been found only in Tanegashima, Yakushima, the Seven Islands of Izu, and the Riu Kiu Islands. It might be significant in this connection that *Z. j. japonica* has a more rounded wing than *Z. j. simplex*.

In the main body of this work I have given the available information on the migrations of *Z. l. lateralis*. The distance covered by at least some individuals is considerable. It is impossible as yet to speculate about percentages of the population staying in each part of its winter range, but the birds migrating to Brisbane would fly about 1600 km.

Some speculations about the migration of *Z. l. lateralis* may be in place here. As I have mentioned (p. 67), many of its aspects remain as obscure as ever, and the ringing-results have added rather than detracted from the apparent difficulties. From the known facts, it can be deduced that annually large numbers of birds migrate, but never the whole population; that whether a bird migrates or not depends not on its age, nor on its individual constitution.

In most migratory species, females tend to be more strongly migratory than males, and juveniles more than adults. At present there is no evidence that this rule holds true for *Z. l. lateralis* since of the examined mainland birds (migrants), eighteen were sexed as males, five as females. It would be easy to obtain certainty regarding this point by collecting and sexing a series towards the northern limit of the winter range, for example near Brisbane. Similarly some systematic collecting in Tasmania in winter should reveal if males outnumber females in that season.

The problems here mentioned are not restricted to the Zosteropidae, for Nice (1937) found the same in *Melospiza melodia*, where: ".... the difference between migrating and non-migrating ... has nothing to do with age and also is not a matter of inheritance". The case of *Z. l. lateralis* is even more interesting than that of *Melospiza melodia* as it is based on actual records, whereas Nice's birds were migrants by inference only, because in winter they were absent. The general problem of partial migration has been reviewed by Lack (1943-1944).

These negative factors do not bring us nearer to the solution of the problem of what does make the birds migrate. It is now generally accepted that the ultimate cause of migration is lack of food, but it is also generally known that most migratory birds leave before food becomes scarce. Proximate factors determining the migration from Tasmania might be: weather conditions, quantity of available food, density of population and probably others, or combinations of all these.

Even though migration takes place annually, it is likely that *Z. l. lateralis* shows a parallel with the irregular migrants or invasion birds of the Northern Hemisphere. Though I do not want to take this too far, it is worth mentioning that the factors food and density of population have received considerable attention in recent years. Svärdson (1957) and Formozov (1960) have demonstrated the correlation between migration and poor crops. Formozov (1960) even went so far as to state that lack of food induces migration, and that migration does not take place until the food supplies are exhausted. Berndt & Dancker (1960) and Berndt & Henss (1963, 1967), on the other hand, consider that density of population as such causes migration, even if food is still abundant. It is probably significant that Formozov dealt with birds which are dependent on one single food, whereas the species studied by Berndt and his collaborators have a far more varied menu. In his review of irruptive bird migration, Ulfstrand (1963) mentioned food, meteorological factors, and population density as factors.

People have questioned that lack of food could be a proximate cause of migration in a number of irregular migrants because such migrants, once on the move, have been known to by-pass areas rich in food (Ulfstrand, 1963, p. 786). In my opinion this objection is not conclusive. It appears very well possible that there are factors, including food, which decide if a bird migrates or does not migrate, but if it does migrate, it may well follow a traditional route to the end, and fly to its known winterquarters. This, in fact, is confirmed by the evidence of fixed winterquarters in partial and irregular migrants like *Zosterops l. lateralis*. Even typical invasion birds have been known to return to exactly the same spot in successive winters; for example *Bombycilla garrulus* (van Oordt, 1950). Lack (1943-44) already observed that in certain species of European songbirds, individuals do either migrate a long distance, or not at all.

This is as far as I can take it now. The answer to these questions must await the development of that fascinating but curiously neglected field of study, the migration of Tasmanian birds.

The reason that I have given this discussion is because it appears to me that a study of *Z. l. lateralis* and other partial migrants inhabiting Tasmania, could be a real contribution to an understanding of these movements. Contrary to the enormous expanse of northern Eurasia, Tasmania is a comparatively small island, where it ought to be possible to obtain information on food, weather conditions and population density before and during migrations.

Longevity

As is the case with most small tropical birds, reliable records of the life-span of Zosteropidae are scant. Mitchell (1911) found for *Z. palpebrosa* in captivity a life-span of up to 87 months: seven years and three months. Far more remarkable is the record by Schumacher (1964) who mentioned that of a pair of *Zosterops palpebrosa,* acquired in March 1940, and held in captivity, the female died in December 1961, while the male was still living on 1 November 1963. As the birds would have been not much less than three months old when received, the female would have died when 22 years old, and the male was still in good condition when nearly 24 years of age: certainly a most remarkable and unexpected lifespan for a small bird.

Naturally, where records as the above are concerned, one wonders if the recorder is entirely reliable or may, doubtless in good faith, have made an error. Information received from Dr. F. Richardson of the Washington State Museum (in litt., 29-VII-1966) reads as follows: "I knew Mrs. Schumacher, now dead, quite well and feel she was exceedingly careful with her records. She handed each of her birds with infinite care and patience and knew each one in detail". From this it looks as if it would be unfair to Mrs. Schumacher not to accept her record.

Other recent information has assisted in making me overcome a disinclination to accept the above record. Though bird-ringing on a large scale in Australia started only about ten years ago, there are now already records of a wild *Zosterops lateralis,* ringed as an adult at Mosman, N. S. W., on 3 February 1959 and still alive on 21 January 1966, over 83 months later, and of another one, ringed at the same place on 13 June 1959 and still about in July 1967, 97 months later (Anon., 1966a, 1967). Of a number of birds ringed at Cattai near Windsor, N. S. W., several were still about over 96 months later (Anon., 1966b), indicating that an age of seven or eight years is not unusual. More interesting information on the Australian populations may be expected in the future, as a result of the massive ringing programme. Though in New Zealand up to 1964 over 8000 birds have been ringed, over a number of years (Robertson, 1964), there are no recoveries quite as spectacular as the Australian ones. Nevertheless Kinsky (1960) recorded three individuals ringed at Mahina Bay (41° 17'S, 174° 55' E), in June and July 1954, which were retrapped in the same locality in May and June 1959, almost five years later.

I have discussed the longevity of *Zosterops* with Dr. H. N. Kluijver, whose opinion is that a lifespan of the length indicated above would not be impossible, in view of the small clutch size and the apparently often somewhat indifferent breeding success (Coomans de Ruiter, 1951). It is becoming increasingly clear that mortality can be greatly dependent on natality (Kluijver, 1966). As as generalisation it might perhaps even be said that by raising a great number of young, birds eventually kill themselves.

Vulnerability of island populations

It has been claimed that "land organisms of remote islands seem less efficient than continental types ... when a remote island receives new bird colonists from a mainland area, they often eliminate the original inhabitants. This is being demonstrated in New Zealand at the present time, where artificially introduced European birds are spreading rapidly at the expense of the native species" (Lack, 1947, p. 151).

Though history has doubtless seen many instances of elimination of one species by another, I do not believe that such sweeping generalisations should be made without a careful analysis of all factors involved. My own impression, based on observations in several places where birds have been introduced, is that the usual procedure has been, firstly, colonisation by *Homo sapiens*, with enormous changes in habitat, secondly, introduction of bird-species which thrive in such man-made habitats. Where no changes in habitat preceded introductions, I believe that native species, even on small islands, would usually be well able to hold their own. In New Zealand and Hawaii, the two examples given by Lack, the original habitat has been changed considerably, and the fact that under such conditions the native birds are unable to compete, says nothing whatsoever against their efficiency in their own natural habitat. Turbott (1961) stated that in New Zealand: "So far there has been no indication that introduced species "drive out" native species, as is so often popularly supposed", and Lack (1954, p. 201, 202) has changed to the same viewpoint, probably after reading Williams's (1953) paper.

On the other hand, the opinion I have seen expressed that in New Zealand (and other islands) the introduced birds have no influence on the native avifauna, because of ecological separation, may go too far the other way. By filling up all the new habitat the introduced birds will presumably prevent the native birds from gradually adapting themselves to some of the changed circumstances. They may also have been carriers of diseases. Even so, there are encouraging signs that the native birds of New Zealand are now over the worst period, which followed European impact. The appearance of the elusive and supposedly vulnerable kiwi in suburban gardens is an example.

Mayr (1942, p. 224) puts the matter of vulnerability of island species in a different way: ". . . . the smaller islands in particular may act as evolutionary traps, since the populations that live on them tend to become so uniform genetically that they are adapted only to the particular set of conditions under which they live. Thus there may be present almost no heterozygous individuals with concealed potentialities for preadaptation to sudden environmental change, with the result that such forms become exceedingly vulnerable to extermination". Mayr differs from Lack in that he puts the sudden environmental changes central; also in that he regards island birds as well adapted, not as "less efficient", and it will be evident from the preceding paragraphs that I agree (for criticism of the other part of Mayr's statement, see the next paragraph). On the other hand, an important reason why birds inhabiting small islands are vulnerable has nothing to do with their genetical constitution, but is a matter of very small numbers and extremely limited ranges, which causes that a single factor, for example abundance of rats (Lord Howe Island), or a lighthouse keeper's cat, can wipe out a species (*Xenicus lyalli*), whilst on a continent the same would be only an insignificant local factor, causing at most a temporary decrease in a small area (see Andrewartha & Birch, 1954, p. 663-665 for a succint review). In this connection it must be said that New Zealand, a favourite example for adherents of the insular theory of extinction, is not a small island; neither is Madagascar, where several extinctions have occurred. Mayr (1942) has given Borneo and New Guinea as examples of large islands where not a single bird species is known to have become extinct. But both, and in particular New Guinea, have a number of endemic birds of extremely limited distribution, confined to one valley or one mountain, and these would be as vulnerable as species inhabiting small islands. It looks rather as if New Guinea and Borneo have escaped losses of their avifauna because much of their natural vegetation is still intact.

Mayr (1942, as quoted above, 1965c), followed by Briggs (1966), appears to consider that genetic homogeneity of small populations (inbreeding) is the primary cause of extinction on islands, as their genetic composition would have become so uniform, that the most minute change of environmental conditions becomes fatal. Also (1965c, p. 1588): "The most important fact that emerges from this analysis is that faunal turnover on islands is far more rapid than previously recognized and that this turnover is characteristic not only for very small islands but occurs on islands of any size. Various considerations indicate that extinction is by no means necessarily caused by competition from new colonists or by new pathogens introduced by them. Rather one must assume the existence of a general vulnerability to changes which includes weather factors (hurricanes), climatic fluctuations, and biotic changes of any kind" [1]).

In this quotation, and in the paper it is taken from, I entirely miss a reference to the vulnerability of small populations as such, discussed by me in the preceding paragraph; also Mayr's opinion that the supposed fast turnover occurs on islands of any size and not only on very small islands, appears greatly to weaken the whole argument, which had as its starting point the supposed genetic homogeneity of very small populations. I fail to see that from the point of view of population genetics there would be much difference between large islands and continents, as bird populations on islands of the size of New Zealand and Madagascar might easily count hundreds of thousands of individuals. An interesting point in this connection is that several species which have become rare or extinct on the main islands of New Zealand, survive well on a number of small off-shore islands.

I am quite prepared to accept that on small islands, in small populations, genetic uniformity may be a factor, but for this to play a role, according to Mayr (1942, p. 236) himself, a population must preferably consist of far less than a thousand individuals. Especially in view of the large seasonal fluctuations known to occur in small birds, such populations are all in the danger zone of "accidental" extinction, and this appears to be more in agreement with Mayr's statement that: "In the case of many extinctions ....

---

1) Hurricanes appear to be an unfortunate example in this connection, for I cannot believe that they are very selective as to the genetic constitution of their victims. I would call them typical hazards for small populations with a limited distribution. In fact none of Mayr's examples appears particularly to support his thesis of genetic homogeneity as a cause of extinction.

there are no visible causes for the sudden disappearance of a form"; it is also in agreement with Miller's (1956, p. 263) opinion that extinction on islands may be due to cyclic fluctuations in small populations that occasionally reach the vanishing point.

It appears also questionable that birds on large land-masses are better able to adapt themselves to changing conditions; it looks rather as if their main advantage is their greater range, so that when adverse conditions in one area lead to a contraction of range, this is perhaps offset by an increase or an expansion elsewhere, and there remains always the possiblity of a recolonisation in more favourable periods. There are in Europe many examples of fluctuations in range on a scale that would have been fatal in a smaller area.

Even so I wonder if the amount of extinction on the continents of the Northern Hemisphere, as a result of the various periods of glaciation in the Pleistocene, has been much smaller than that occurring on many islands. Moreau (1966) has admirably summarized the increasing evidence that even so old and "stable" a continent as Africa has undergone a considerable amount of climatic change in the recent past, which could easily have led to much extinction as well as renewed speciation.

Many examples are known of colonisation of small islands by birds coming from larger land masses, and only a few the other way round [1]). Even though it has been generally accepted that larger land masses usually have a richer and more saturated fauna, so that a successful immigration might for that reason be more difficult, there is a lingering opinion that this provides proof of the lesser efficiency of insular birds. There is also a wonderful opportunity here for circular reasoning. Insular birds will never become insular endemics unless they are more or less sedentary to begin with. Probably an entirely different factor is involved. It is what one could call the funnel action of small islands. A small and remote island is visible from afar, and therefore will attract wandering birds from a great distance. Besides, and this is the more important factor, its small size and restricted number of habitats would cause that stray birds of the same species have a far greater chance of meeting each other than on a greater landmass, the island therefore actually brings them together. If, on the other hand, a bird accidentally reaches a very large island or a continent, chances that a second

1) It is difficult to be certain because when an insular bird invades a continent, it will very soon become impossible to recognise its insular origin. There is evidence that the fairly large island of Timor has played an important role in the colonisation by birds of the Australian continent (Mayr, 1944b). Miller (1956) mentioned that an insular race of *Vermivora celata* has established bridge-heads on the mainland peninsulas opposite the off-shore islands of southern California.

stray individual of its species will meet with it are negligible. It is peculiar that this factor is not generally realized; Miller (1966, p. 15), for example, believed that: "..... a dispersant leaving an island has a larger target in the form of the mainland, which situation may balance out its rarity", though ten years earlier he expressed opinions similar to mine (Miller, 1956, p. 268).

It appears to me that zoogeographical oddities as the occurrence of *Otus rutilus* on the oceanic island of Pemba, but not on the continental islands of Zanzibar and Mafia, or the African mainland, could be explained by this funnel effect rather than by assuming large-scale extinction (cf. Moreau, 1966, p. 331, 353).

Naturally I do not deny that insular birds can in certain respects be less successful in comparison with mainland birds. This has nothing to do with efficiency, but with the environment: one cannot expect a bird to be adapted to conditions not existing where it lives. For example a bird living on a small island without predators will not have a reaction to these predators and be very vulnerable when they are introduced. It is well-known that birds of uninhabited islands show little fear of man, because they do not yet know this mammal as the most ruthless predator of all times. Birds of continents, for example penguins of the Antarctic, show the same "stupid" confidence when they do not know man.

Fallacious reasoning is also that of Briggs (1966, p. 287), who discusses "dominant species" and comes out with the following:

"Varying degrees of dominance need to be recognized since dominant species may arise in either major or lesser evolutionary centers. For example, a species of land bird from southeast Asia would be expected to do well in Australia where the competition is less, but an Australian species would probably dominate in New Zealand, and a New Zealand species would be likely to succeed on the Chatham Islands. If two areas are occupied by about the same number of species, and thus have ecosystems of approximately equal stability, successful invasions could occur in both directions. This has evidently been the case in regard to the recent introductions that have taken place between Europe and North America".

Again it can be said that the majority of supposedly dominant species are those that are adapted to the artificial habitat created by man. The primary reason for their dominance is not a concealed genetical potency absent in other species, but the enormous expansion their habitat has undergone. The example given by Briggs is wrong, because the majority of species of land birds from southeast Asia could not possibly do well in Australia, as their habitat, humid tropical forest, is not available, except in the remote northern tip of Queensland. Indeed, because of the vengeance with which man attacks the forests all over the world, it is in south-east Asia the rich tropical forest that is most seriously threatened. Far from providing: "the proper environment for the production of dominant species" (Briggs, 1966, p. 288), many of its inhabitants are doomed or become confined to reserves consisting of a tiny fraction of their previous ranges. Birds of the tropical forest are, as a generalisation, also notoriously poor colonisers. It is perhaps interesting to point out that Briggs's theory is exactly the opposite of another time-honoured opinion, that species becoming "senile" gradually retire to the rich tropical surroundings, to linger on when in less favourable surroundings they become extinct.

Detached from the somewhat unfortunate example, the idea behind Briggs's theory is that a species originating in a rich fauna, where there would be strong competition, must be dominant over species originating from areas with fewer species, where competition would be less severe. This theory appears to have two weaknesses. The first is that, as intraspecific competition may be assumed to be stronger than interspecific competition, species of a poor fauna would not necessarily be subjected to less competition than species of a rich fauna, for a fauna poor in species might actually harbour more individuals than a fauna rich in species. The second is that faunas exceptionally rich in species would, also on theoretical grounds, tend to produce specialists unable to live outside their narrow niches, rather than species ready to dominate the world.

Extinction

Unnecessary extinction, through direct or indirect human influence, has not entirely by-passed the Zosteropidae. The evidence that three forms are extinct is such that the possibility of their being rediscovered appears very remote.

The three extinct forms are *Z. semiflava* (or, if one wants, *Z. mayottensis semiflava*), *Z. everetti everetti,* and *Z. strenua,* and it may be worth discussing the causes of extinction of each at some length.

Zosterops semiflava. This species was discovered in 1866 on Isle Marianne, Seychelles, where it still existed in 1890 (Abbott collected a specimen on 11 April 1890, USNM no. 119762; I have examined the skin, see also Ridgway, 1895). The next report was by Vesey-Fitzgerald (1940) who during a stay of seven years in the Seychelles, never managed to locate the species and was of the opinion that it had become extinct, an assumption which has since become practical certainty. The cause of the disappearance is not known, but a factor has doubtless been that Marianne is a very small island, less than one square mile according to Moreau (1957, p. 399). Moreau suggested that the extinction might have been caused by clearing of the forest to make place for coconut-groves, and this is repeated by Watson, Zusi & Storer (1963), who, however, appear to contradict it by stating that Marianne is wooded. Moreau's information (pers. comm.) came from the Seychelles Agricultural Department, and is therefore doubtless correct.

Too little has been published about the ecology of *Z. semiflava* as well as about ecological changes on Marianne, to make any explanation for the extinction more than guesswork, but human interference with the habitat has surely had an influence.

Zosterops everetti everetti, discovered in 1877, was confined to Cebu, where it still occurred in 1906. During a recent visit Rabor (1959, 1962) concluded that it has become extinct, with several other forest birds, as a result of the total deforestation of the island. The island of Cebu is not very small, and the present example shows how even on large islands wholesale habitat destruction can lead to speedy extinction.

Zosterops strenua, endemic to Lord Howe Island (13 km^2), was discovered in 1853 and continued to be common at least to 1914. Its extinction, together with several other endemic forms of Lord Howe Island, is known to be the result of an invasion by rats which came from a ship wrecked in 1918 (Sharland, 1929, p. 6).

Thus, of the three extinctions, one (*Z. e. everetti*) was certainly caused by habitat destruction, one (*Z. strenua*) by rats inadvertently introduced by man, and one *(Z. semiflava)* probably by habitat destruction. This means that for at least two, but probably all three extinctions, direct or indirect human interference is to blame.

In view of the great number of endemics confined to very small islands, which for that reason would be very vulnerable, the figure of three forms known to be extinct is perhaps better than might have been feared, but it should be realized that about the status of many of the most vulnerable forms nothing has been published for many years. A few examples: *Z. nigrorum richmondi* and *Z. n. meyleri,* each confined to a single very small island in the Philippines, have not been recorded since their descriptions, in 1904 and 1907 respectively. *Z. everetti forbesi* of Camiguin (South) is known from the original two specimens only, and nothing has been published on damage to the fauna of that island by recent volcanic activity or other causes. *Z. everetti babelo* and *Z. atrifrons nehrkorni* have not been recorded in this century. No information on many Pacific islands exists since the Whitney

South Sea Expeditions, about forty years ago. I could lengthen this list to cover a large percentage of the described forms.

Parasites

In the systematic parts of this work, parasites have been recorded under the different species and subspecies they have been found associated with, but it will be useful to have them all together in one list.

As very few parasites have as yet been recorded from the African Zosteropidae, and I had to consult the pertinent literature anyway, the African Zosteropidae have also been included in the list which therefore purports to give a survey of the parasites known from the whole family Zosteropidae.

The list is compiled from literature, but for several groups I had the help of specialists, who have added unpublished information. Moreover, the results were checked with the host-index of the Beltsville Parasitological Laboratory, and this yielded references to more literature. I believe therefore that, with the exception of information possibly contained in the few publications I have been unable to consult, listed below, the following list is complete.

The nomenclature of the Zosteropidae found in non-ornithological publications is often outdated, and sometimes misleading. Fain (1956, 1957, 1963), for example, described two species of mites from Ruanda-Urundi, one with the host *Zosterops senegalensis*, the other with the host *Z. virens scotti*, but in the country mentioned only one species of *Zosterops* is known to occur (Schouteden, 1966), which indeed is now regarded as a subspecies of *Z. senegalensis*. Obviously, identification of the hosts cannot always be certain without examination of the material, but judging mainly by geographical evidence, I have done as much as possible.

The virtual absence of Mallophaga may cause wonder. Information received from Dr. Theresa Clay (in litt., 18-IV-1967) is that she has a few specimens of unidentified Mallophaga from *Zosterops*, but is unaware of any published records; she has made no mention to me of Uchida's (1920, 1926) papers, perhaps because she regarded his identifications as too uncertain. For the Acarida I had the valuable help of Professors Atyeo and Fain and of Dr. Gaud. My colleague Mr. J. van der Land has helped with literature on worms, and Dr. F. G. A. M. Smit has informed me that no fleas are known from Zosteropidae.

Parasites have often been regarded as of utmost importance to unravel the relationships of their hosts, some parasitologists even going to extremes

List of parasites known from Zosteropidae

host	parasite	reference
	Protozoa	
Zosterops pallida capensis	*Leucocytozoon*	Wenyon (1939)
Zosterops palpebrosa palpebrosa	*Haemoproteus zosteropsi* Chakravarty & Kar	Chakravarty & Kar (1945)
	Isospora zosteropis Chakravarty & Kar [1]	Chakravarty & Kar (1947)
Zosterops japonica japonica	*Haemoproteus* sp.	Ogawa (1912)
	Leukocytozoon sp.	"
Zosterops japonica simplex	*Haemoproteus* sp.	Mathis & Leger (1910), Ogawa & Uegaki (1927)
	Proteosoma sp.	"
	"*Toxoplasma*"	Uegaki (1928)
Zosterops griseotincta rennelliana	*Haemoproteus johnstoni* M. Laird & E. Laird	Laird & Laird (1959)
	Atoxoplasma paddae (Aragão) [2]	"
Zosterops lateralis lateralis	*Atoxoplasma paddae* (Aragão)	Laird (1959)
Zosterops lateralis subsp. (*lateralis* or *familiaris*)	*Haemoproteus* sp.	Lawrence (1946), Cleland & Johnston (1910, 1912)
Zosterops lateralis griseonota	*Atoxoplasma paddae* (Aragão)	Laird (1959)
Zosterops flavifrons flavifrons	*Atoxoplasma paddae* (Aragão)	"
Zosterops flavifrons majuscula	*Atoxoplasma paddae* (Aragão)	"
Zosterops conspicillata saypani	*Haemoproteus* sp.	Marshall (1959)
Woodfordia superciliosa	*Trypanosoma paddae* Laveran & Mesnil	Laird & Laird (1959)
	Haemoproteus johnstoni M. Laird & E. Laird	"
	Atoxoplasma paddae (Aragão)	"
	Cestodes	
Zosterops lateralis subsp. (*lateralis* or *familiaris*)	*Zosteropicola clelandi* Johnston	Johnston (1912)
Zosterops lateralis griseonota	*Anonchotaenia aryncha* Fuhrmann	Fuhrmann (1918)
	Hymenolepis globocephala Fuhrmann	"
Zosterops lateralis melanops	*Hymenolepis globocephala* Fuhrmann	"

1) Also named *I. zosteropsae* on the same page.
2) Mackerras & Mackerras (1960) call this species *Lankesterella paddae* (Aragão).

Zosterops xanthochroa	*Anomotaenia caledonica* Fuhrmann	Fuhrman (1918)
Zosterops minuta	*Hymenolepis zosteropis* Fuhrmann	"
	Anomotaenia caledonica Fuhrmann	"
Chlorocharis emiliae moultoni	*Anonchotaenia aryncha* Fuhrmann [1])	Baylis (1928)
	Acanthocephali	
Zosterops lateralis griseonota	*Mediorhynchus zosteropis* (Porta)	Porta (1913)
	Nematoda	
Zosterops flavifrons majuscula	*microfilariae*	Laird & Laird (1959)
Zosterops lateralis lateralis	*Syngamus trachea*	Whitten & Salisbury (1951)
Zosterops conspicillata saypani	*microfilariae*	Marshall (1949)
	Acarida	
	Mesostigmata	
Zosterops senegalensis	*Boydaia zosteropis* Fain	Fain (1963)
	Ptilonyssus ruandae Fain	Fain (1956, 1957)
Zosterops lateralis subsp. (*lateralis* or *familiaris*)	*Ptilonyssus ruandae* Fain	Domrow (1964)
	Ixodides	
Zosterops montana steini	*Ixodes praematurus* Schulze	Schulze (1935)
Zosterops fuscicapilla fuscicapilla	*Ixodes cordifer* Neumann	"
	Sarcoptiformes	
Zosterops pallida pallida	*Anhemialges gracillimus* (Bonnet)	Gaun (1962)
	Ingrassiella rhitidoedema Gaud	Gaud (in litt.)
	Mouchetia dolichosikya Gaud	Gaud (1962)
	Proctophyllodes ceratophyllus Atyeo & Braasch	Atyeo (in litt.)
	Pterodectes n. sp.	Gaud (in litt.)
	Calcealges yunkeri Gaud	"
	Trouessartia megadisca Gaud	Gaud (1962)
Zosterops pallida capensis	*Strelkoviacarus* n. sp.	Gaud (in litt.)
	Proctophyllodes sp.	"
Zosterops "vaalensis"	*Proctophyllodes* sp.	"

1) This identification was made with reservations and is perhaps questionable.

Zosterops maderaspatana	*Anhemialges gracillimus* (Bonnet)	Bonnet (1924)
	Calcealges yunkeri (Gaud)	Gaud (in litt.)
Zosterops maderaspatana völtzkowi	*Anhemialges gracillimus* (Bonnet)	„
	Strelkoviacarus n. sp.	„
	Mouchetia dolichosikya Gaud	„
	Proctophyllodes ceratophyllus Atyeo & Braasch	„
	Calsealges yunkeri Gaud	„
	Trouessartia megadisca Gaud	„
Zosterops borbonica borbonica	*Anhemialges gracillimus* (Bonnet)	„
Zosterops palpebrosa auriventer	*Proctophyllodes* sp.	Ateyo (in litt.)
	Anhemialges sp.	„
	Mouchetia sp.	„
	Calcealges yunkeri Gaud	„
Zosterops japonica japonica	*Dermoglyphus elongatus* (Mégnin)	Alicata, Kartmann & Fisher (1948)
	Megninia sp.	„
	Pteronyssus sp.	„
	Trouessartia sp.	„
Zosterops japonica simplex	*Proctophyllodes* sp.	Atyeo (in litt.)
	Trouessartia sp.	„
	Anhemialges sp.	„
	Analges sp.	„
	Pteronyssus sp.	„
	Mouchetia sp.	„
	Calcealges yunkeri Gaud	„
	Calcealges sp.	„
Zosterops atricapilla atricapilla	*Anhemialges gracillimus* (Bonnet)	Bonnet (1924)
Zosterops griseotincta rennelliana	*Anhemialges gracillimus* (Bonnet)	Gaud (1962)
	Hemialges sp.	„
	Calcealges yunkeri Gaud	„
	Trouessartia megadisca Gaud	„
	Mouchetia viduata Gaud	„
Zosterops lateralis subsp.	*Anhemialges gracillimus* (Bonnet)	Bonnet (1924)
Zosterops albogularis	*Proctophyllodes ceratophyllus* Atyeo & Braasch	Atyeo & Braasch (1966)
Zosterops conspicillata conspicillata	*Proctophyllodes ceratophyllus* Atyeo & Braasch	„
Chlorocharis emiliae emiliae	*Anhemialges gracillimus* (Bonnet)	Bonnet (1924)

	Insecta	
	Mallophaga	
Zosterops japonica simplex	*Docophorus communis* Nitzsch [1])	Uchida (1920)
	Myrsidea rustica (Giebel)	Uchida (1926)
Woodfordia superciliosa	*Myrsidea* sp.	Clay (1957)
	Brüelia sp.	"
	Diptera	
Zosterops senegalensis cf. *stierlingi*	*Ornithoctona laticornis* (Macquart)	Mees (unpubl.)
Zosterops japonica simplex	*Ornithoica simplicis* Maa	Maa (1966)
Zosterops montana montana	*Ornithoica philippinensis* Ferris	"

1) According to Hopkins & Clay (1952), *Docophorus communis* Nitzsch belongs in the genus *Philopterus*, and is a synonym of *Philopterus citrinellae* (Schrank), described from *Emberiza citrinella.* It is unlikely that the material from *Z. japonica simplex* would really belong to be same species. The record of *Myrsidea rustica* appears equally doubtful.

of optimism. Not nearly enough is known of the Zosteropidae and other tropical passerine birds, to know if in this family such researches would be profitable, and it will certainly be a long time before an adequate picture of the parasites and their distribution is obtained. Obviously, parasites can be of no help to the solution of these problems until it is known how specific they are. On the other hand, progress can only be made if the available information is presented in a clear way, and that is the purpose of the following list.

Unfortunately, a few publications that may be important were not available to me; they are the papers by Inami (1923), Katahira (1929) and Hsieh (1959).

Comments on the chapter Zosteropidae in the "Check-List of Birds of the World"

Volume XII of the "Check-List of Birds of the World" with Mayr's list of the Indo-Australian Zosteropidae appeared when this paper had been typed, but had not yet gone to the printers. It would have been possible to incorporate my comments in the main text, and in a few cases I have done so. In view of the authoritative character of the Check-List it appeared desirable, however, to keep most comments together for easy consultation.

Though here I shall inevitably stress the differences, the most important and gratifying fact to be noted is the very close agreement between Mayr's list and mine; as close, perhaps, as any two workers dealing with the systematics of the same group may ever hope to get.

The most evident difference is in the sequence of species in the genus *Zosterops*, a matter that has been fully discussed in a preceding section. My recognition of *Megazosterops* as a separate genus is a consequence of the lesser confidence of my approach as compared with Mayr's.

On the species and their limits, and even in evaluation of subspecies we are in almost complete agreement. Mayr has preferred to treat as subspecies some forms in the *Z. atrifrons* and *Z. griseotincta* groups, which I have retained as species within those groups: a mere matter of nomenclatural judgment as our opinions on the affinities of the forms involved do not differ. In the same way, *Z. g. rennelliana*, considered a subspecies by me, is given specific rank by Mayr.

In *Z. palpebrosa*, Mayr has admitted one subspecies not recognised by me: *Z. p. amabilis*. Reasons why I have not resurrected *amabilis* have already been given (p. 242). In defining range and characters of *Z. p. siamensis*, Mayr has followed Deignan, whose views I have discussed on

p. 249. Deignan (1963) had introduced this revolutionary classification without any explanation, but Mayr (p. 295) justified it in a footnote: "The name *siamensis* was given to yellow-bellied birds, as found in lower Irawaddy Valley, Tenasserim, and adjacent Thailand. Other populations are polymorphic... while still others, particularly in the north and east, are white-bellied". As there is no published evidence of the occurrence of yellow-bellied *siamensis* in Thailand, or of the existence of polymorphic populations anywhere, these views must be based on unpublished information. In July 1962 I visited the U. S. National Museum, where one would expect Deignan's material, but found no specimens of *siamensis*. Inasmuch as observations in the field of mixed flocks, containing a high proportion of hybrids, might easily lead to the false assumption of dimorphism (cf. Mees, 1951, p. 204), I remain convinced that the view expressed by Deignan and Mayr is erroneous, and continue to use the name *siamensis* for yellow-bellied birds only.

In *Z. japonica,* Mayr has followed Mishima (1959) in recognising *Z. j. yesoensis,* which had been rejected by Vaurie (1958) and me (1957). In this connection it appears inconsistent that Mayr placed the names *iriomotensis* and *yonakuni* in the synonymy (though admittedly with a query), for these races were also re-defined and accepted by Mishima. Vaurie synonymized these names; lacking material, I had originally (1957) accepted them with misgivings, though now (p. 257) I prefer to follow Vaurie. As far as *yesoensis* is concerned, have I not been able to examine any recent material, but zoogeographical probability migitates against its validity, as all authors agree that *Z. japonica* has colonised Hokkaido in comparatively recent times and is still expanding its range in that island. On the other hand, as only Japanese authors have good material of the three forms under discussion, weight should be given to their opinion, and therefore I am hesitant to reject *yesoensis, iriomotensis* and *yonakuni* definitely until more material becomes available. For the moment, however, I consider that they can best be kept in the synonymy. Mayr has followed Vaurie (1958) in placing *ijimae* and *dageletica* in the synonymy of the nominate race instead of under *insularis* where they belong (cf. p. 257).

Z. everetti forbesi was accepted by me with reservations (1957, p. 149-151), partly on the advice of the late Mr. J. L. Peters who had the two known specimens under his care. Now Mayr has synonymised *forbesi* with *Z. e. basilanica,* and as Dr. Mayr is Director of the institute where the specimens are lodged, hence is in an excellent position to study them, I follow him, especially as he confirms suspicions I have always had.

In *Z. montana,* Mayr recognised the same subspecies as I did in 1957, but he adds in a footnote: "Mees, ... the latest reviser, synonymizes a large number of names for local populations under the nominate subspecies. Additional revisionary work is needed to determine whether or not this large-scale lumping is justified". Similar doubts had previously been expressed by Stresemann (1958). It appears to have escaped Mayr's attention that additional revisionary work has, in fact, been done on the species: Ripley & Rabor (1958), in their study of the Philippine races, have shown that I did not go too far, but on the contrary, not far enough in synonymising names (see further p. 271; also Ripley & Rabor, 1961). Though at present I still recognise *steini*, I expect that in future all grey-bellied populations will have to be united under the nominate race, leaving only the four yellow-bellied forms as other subspecies.

Mayr has synonymised *Z. atrifrons subatrifrons* with *Z. a. atrifrons*, as had previously been done by Finsch (1901). I have also mentioned (pt. II, p. 72) that I failed to find any difference, either in coloration or in measurements, between *subatrifrons* and the nominate race. The extant material of *subatrifrons* is, however, inadequate, and zoogeographically identity of *subatrifons* from Banggai and *atrifrons* from the northern peninsula of Celebes is difficult to explain, as Central Celebes has a different subspecies. Until more material from Banggai and the eastern peninsula of Celebes (an ornithological terra incognita) becomes available, I prefer not to reject *subatrifrons* definitely.

I need not discuss the identity of *Z. rendovae*, as this has been done adequately on a previous page.

Finally I take the opportunity to point out that in the section on African Zosteropidae (Moreau, 1967), two misprints occur. It should be *Z. senegalensis silvanus* Peters & Loveridge, not *Z. s. silvana*, as the senior author of the name has expressly stated that *silvanus* is: "a latin masculine substantive signifying a woodland deity; there is no reason, therefore, to alter the termination to a feminine one to agree with the gender of the generic name" (Peters, 1943, p. 90; also this revision pt. I, p. 20, footnote). The second case concerns *Z. maderaspatana anjuanensis* Newton, in the list misspelt *anjouanensis*. Moreau has listed the species of the African mainland alphabetically, and therefore has *Z. pallida* widely separated from *Z. virens* by the whole *Z. senegalensis* complex. *Z. pallida* and *Z. virens* have now been shown to be conspecific (Clancey, 1967). If Moreau had followed a geographical system of grouping, the two would have been placed next to each other, and a change in status would not have affected the sequence as it does now. It is not clear why in Moreau's classification *Z. pallida* is given a trinomial, as there are no subspecies. I note that Moreau has retained the spelling *Zosterops chloronothos* for a species from Mauritius, and has not emended it to *Z. chloronota;* in this he differs from older authors (for example Finsch, 1901, p. 38). If Moreau's point of view is correct, *Z. chloronothos* (Vieillot) does not preoccupy *Z. chloronotus* Gould and the subspecies at present known as *Z. lateralis gouldi* should be called *Z. lateralis chloronota* Gould.

LITERATURE CITED IN THE CONCLUDING CHAPTERS [1])

ALICATA, J. E., L. KARTMAN & H. I. FISHER, 1948. Wild birds as possible carriers of poultry parasites. Rep. Univ. Hawaii Agricult. Exp. Stat. **1946-1948**, p. 104-105.
AMADON, D., 1953. Avian systematics and evolution in the Gulf of Guinea. Bull. Am. Mus. Nat. Hist. **100**, p. 393-452.
——, 1959. The significance of sexual differences in size among birds. Proc. Am. Philos. Soc. **103**, p. 531-536.
ANDREWARTHA, H. G. & L. C. BIRCH, 1954. The Distribution and Abundance of Animals. Chicago.
ANON., 1920. Simaloer (Simeuloeë). Med. Encycl. Bur. **20**, 152 + xii p.
——, 1966a. Recovery round-up. Austr. Bird Bander **4**, p. 40-42.
——, 1966b. Recovery round-up. Austr. Bird Bander **4**, p. 80-82.
——, 1967. Recovery round-up. Austr. Bird Bander **5**, p. 64-66.
ATYEO, W. T. & N. L. BRAASCH, 1966. The feather mite genus Proctophyllodes (Sarcoptiformes: Proctophyllodidae). Bull. Univ. Nebraska State Mus. **5**, p. 1-354.

BARTELS JR., M., 1937. „Zosterops melanura melanura Hartl.", „Zosterops melanura gallio Sharpe" und „Zosterops melanura unica Hart.", drei verkannte Vertreter des Rassenkreises Zosterops palpebrosa. Orn. Monatsber. **45**, p. 85-86.
BAYLIS, H. A., 1928. Some further parasitic worms from Sarawak. Ann. Mag. Nat. Hist. (10) **1**, p. 606-615.
BERNDT, R. & P. DANCKER, 1960. Analyse der Wanderungen von Garrulus glandarius in Europa von 1947 bis 1957. Proc. XII Int. Orn. Congr. (Helsinki — **1958**), p. 97-109.
BERNDT, R. & M. HENSS, 1963. Die Blaumeise, Parus c. caeruleus L., als Invasionsvogel. Vogelwarte **22**, p. 93-100.
——, 1967. Die Kohlmeise, Parus major, als Invasionsvogel. Vogelwarte **24**, p. 17-37.
BIRCH, L. C., 1957. The meanings of competition. Am. Nat. **91**, p. 5-18.
BOCK, W. J., 1963. Review: morphological differentiation and adaptation in the Galápagos finches. Auk. **80**, p. 202-207.
BONNET, A., 1924. Révision des genres Megninia, Mesalges et genres voisins de la sous-famille des sarcoptides plumicoles. Bull. Soc. Zool. France **49**, p. 146-188, 190-218.
BOWMAN, R. I., 1961. Morphological differentiation and adaptation in the Galápagos finches. Univ. Calif. Publ. Zoöl. **58**, vii + 302 p.
BRIGGS, J. C., 1966. Zoogeography and evolution. Evolution **20**, p. 282-289.

CAIN, A. J., 1953. Geography, ecology and coexistence in relation to the biological definition of the species. Evolution **7**, p. 76-83.
CHAKRAVARTY, M. & A. B. KAR, 1945. Studies on Haemosporidia from Indian birds II. Proc. Ind. Ac. Sc. (B) **22**, p. 63-69.

1) Works marked with an asterisk (*) have not been available to me.

——, 1947. A study on the Coccidia of Indian birds. Proc. R. Soc. Edinburgh (B) **62**, p. 225-233.

Chasen, F. N., 1935. A handlist of Malaysian birds. Bull. Raffl. Mus. **11**, xx + 389 p.

Clancey, P. A., 1966. A catalogue of birds of the South African subregion, pt. V. Durban Mus. Nov. **7**, p. 545-633.

——, 1967. Taxonomy of the southern African Zosterops. Ibis **109**, p. 318-327.

Clay, T., 1957. Mallophaga (Insecta). Part I. Nat. Hist. Rennell Isl. **II**, p. 143-149.

Cleland, J. B. & T. H. Johnston, 1910. The Haematozoa of Australian birds, no. 1. Trans. R. Soc. S. Austr. **34**, p. 100-114.

——, 1912. The Haematozoa of Australian birds, no. II. Journ. R. Soc. N. S. W. **45** (for 1911), p. 415-444.

Coomans de Ruiter, L., 1951. Vogels van het dal van de Bodjo-rivier (Zuid-Celebes). Ardea **39**, p. 261-318.

Deignan, H. G., 1942. Nomenclature of certain Pycnonotidae. Auk **59**, p. 313-315.

——, 1960. Pycnonotidae (Oriental). In Mayr & Greenway (editors), Check-List of Birds of the World **IX**, p. 221-300.

——, 1963a. Checklist of the birds of Thailand. U.S. Nat. Mus. Bull. **226**, x + 263 p.

——, 1963b. Birds in the tropical Pacific. Proc. 10th Pacific Sc. Congr. (Honolulu — **1961**). Pacific Basin Biogeography, p. 263-269.

Delacour, J., 1943. A revision of the genera and species of the family Pycnonotidae. Zoologica **28**, p. 17-28.

——, 1947. Birds of Malaysia. New York.

Delacour, J. & E. Mayr, 1946. Birds of the Philippines. New York.

Dilger, W. C., 1956. Adaptive modifications and ecological isolating mechanisms in the thrush genera Catharus and Hylocichla. Wilson Bull. **68**, p. 171-199.

Domrow, R., 1964. Fourteen species of Ptilonyssus from Australian birds (Acarina, Laelapidae). Acarologia **6**, p. 595-623.

Fain, A., 1956. Note complémentaire sur les Rhinonyssidae au Ruanda-Urundi. Rev. Zool. Bot. Afr. **53**, p. 392-398.

——, 1957. Les Acariens des familles Epidermopteridae et Rhinonyssidae parasites des fosses nasales d'oiseaux au Ruanda-Urundi et au Congo belge. Ann. Kon. Mus. Belg.-Congo, (reeks in 8°) **60**, p. 1-176.

——, 1963. Chaetotaxie et classification des Speleognathinae (Acarina, Trombidiformes). Kon. Belg. Inst. Natuurw. Med. **39** (9), 80 p.

Finsch, O., 1901. Zosteropidae. Das Tierreich **15**, XIV + 55 p.

Formozov, A. N., 1960. La production de graines dans les forêts de conifères de la taiga de l'U.R.S.S. et l'envahissement de l'Europe occidentale par certaines espèces d'oiseaux. Proc. XII Int. Orn. Congr. (Helsinki-**1958**), p. 216-229.

Forster, J. B., 1964. Evolution of mammals on islands. Nature **202**, p. 234-235.

Fuhrmann, O., 1918. Cestodes d'oiseaux de la Nouvelle-Calédonie et des Iles Loyalty. Nova Caledonia, Zool. **II**, p. 399-449.

Gadow, H., 1883. On the suctorial apparatus of the Tenuirostres. Proc. Zool. Soc. London, p. 62-69, pl. XVI.

Gaud, J., 1962. Sarcoptiformes plumicoles (Analgesoidea) parasites d'oiseaux de l'île Rennell. Nat. Hist. Rennell Isl. **IV**, p. 31-50.

Gibson-Hill, C. A., 1947. Notes on the birds of Christmas Island. Bull. Raffl. Mus. **18**, p. 87-165.

——, 1950. Notes on the birds of the Cocos-Keeling Islands. Bull. Raffl. Mus. **22**, p. 212-270.

GISIN, H., 1964. Synthetische Theorie der Systematik. Z. zool. Syst. Evolut.-forsch. **2**, p. 1-17.

GRANT, P. R., 1965a. The adaptive significance of some size trends in island birds. Evolution **19**, p. 355-367.

——, 1965b. A systematic study of the terrestrial birds of the Tres Marías Islands, Mexico. Postilla **90**, 106 p.

——, 1966. Further information on the relative length of the tarsus in land birds. Postilla **98**, 13 p.

GROSS, P., 1963. Nesting of the White-eye. Notornis **10**, p. 181-182.

HAMILTON, T. H., 1961. The adaptive significances of intraspecific trends of variation in wing length and body size among bird species. Evolution **15**, p. 180-195.

——, 1962. Species relationships and adaptations for sympatry in the avian genus Vireo. Condor **64**, p. 40-68.

HARDIN, G., 1960. The competitive exclusion principle. Science **131**, p. 1292-1297.

HARRISSON, T. H., 1956. The Mountain Black-Eye (Chlorocharis), ecology and natural history. Sarawak Mus. Journ. **6**, (1955), p. 662-687.

HENNIG, W., 1950. Grundzüge einer Theorie der phylogenetischen Systematik. Berlin.

HINDWOOD, K. A., 1940. The birds of Lord Howe Island. Emu **40**, p. 1-86.

HOOIJER, D. A., 1950. The study of subspecific advance in the Quaternary. Evolution **4**, p. 360-361.

HOPKINS, G. H. E. & T. CLAY, 1952. A Check-List of the Genera & Species of Mallophaga. London.

*HSIEH, H. C., 1959. Fasciolopsiasis in Taiwan. Taiwan Igakkai Zasshi **58**, p. 623-629.

*INAMI, S., 1923. On a new species of Leucocytozoön that infests the nucleus of the host's cell and the development of the parasite. Taiwan Igakkai Zasshi, Taihoku (228).

JOHNSTON, T. H., 1912. New species of Cestodes from Australian birds. Mem. Queensl. Mus. **1**, p. 211-215.

JUNGE, G. C. A., 1936. Fauna Simalurensis — Aves. Temminckia **1**, p. 1-74.

*KATAHIRA, J., 1929. Beitrag zur Kenntnis über Vogelmalaria (Proteosoma praecox). Taiwan Igakkai Zasshi, Taihoku (292), (293), p. 647-674, 816-855, German summary p. 41-43.

KIKKAWA, J., 1963. A sexual difference in plumage of the Silvereye, Zosterops lateralis. Emu **63**, p. 32-34.

KINSKY, F. C., 1960. 10th annual report of the banding committee, Orn. Soc. N. Z., for the year ending 31st March **1960**, 42 p.

KIPP, F. A., 1942. Ueber Flügelbau und Wanderzug der Vögel. Biol. Zbl. **62**, p. 289-299.

——, 1948. Ueber die Eierzahl der Vögel. Biol. Zbl. **67**, p. 250-267.

——, 1959. Der Handflügel-Index als flugbiologisches Mass. Vogelwarte **20**, p. 77-86.

KIRIAKOFF, S. G., 1959. Phylogenetic systematics versus typology. Syst. Zool. **8**, p. 117-118.

——, 1966. Cladism and phylogeny. Syst. Zool. **16**, p. 91-93.

KLOMP, H., 1961. The concepts "similar ecology" and "competition" in animal ecology. Arch. Néerl. Zool. **14**, p. 90-102.

KLUIJVER, H. N., 1966. Regulation of a bird population. Ostrich, Suppl. **6**, p. 389-396.

KRAMER, G., 1960. Funktionsgerechte Allometrien. Proc. XII Int. Orn. Congr. (Helsinki-**1958**), p. 426-436.

KUNKEL, P., 1962. Bewegungsformen, Sozialverhalten, Balz und Nestbau des Gangesbrillenvogels (Zosterops palpebrosa Temm.). Zeitschr. f. Tierpsych. **19**, p. 559-576.

LACK, D., 1943-1944. The problem of partial migration. Brit. Birds **37**, p. 122-130, 143-150.
——, 1944. Ecological aspects of species formation in passerine birds. Ibis **86**, p. 260-286.
——, 1945. The Galapagos finches (Geospizinae), a study in variation. Occ. Pap. California Ac. Sc. **21**, p. 1-151.
——, 1947. Darwin's Finches. Cambridge.
——, 1954. The Natural Regulation of Animal Numbers. Oxford.
——, 1963. The significance of ecological isolation. In Jepsen, Mayr & Simpson (editors): Genetics, Paleontology and Evolution. Atheneum, New York, p. 299-308.
LACK, D. & R. E. MOREAU, 1965. Clutch-size in tropical passerine birds of forest and savanna. Ois. & Rev. Fr. d'Orn. **35**, No. Spéc., p. 76-89.
LAIRD, M., 1959. Atoxoplasma paddae (Aragão) from several South Pacific silvereyes (Zosteropidae) and a New Zealand rail. Journ. Parasitol. **45**, p. 47-52.
LAIRD, M. & E. LAIRD, 1959. Culicidae and Haematozoa from Bellona and Rennell. Nat. Hist. Rennell Isl. II, p. 213-234.
LAWRENCE, J., 1964. Some observations on the plasmodia and other blood parasites of Sparrows. Proc. Linn. Soc. N. S. W. **71**, p. 1-5.
LORENZ, K. Z., 1949. Ueber die Beziehungen zwischen Kopfform und Zirkelbewegung bei Sturniden und Ikteriden. In Mayr & Schüz (editors): Ornithologie als biologische Wissenschaft, p. 153-157.

MAA, T. C., 1966. Studies in Hippoboscidae. The genus Ornithoica Rondani. Pacific Insects Monogr. **10**, p. 10-124.
MCKEAN, J. L., 1965. Weights of the Silvereye at Canberra. Austr. Bird Bander **3**, p. 43-44.
MACKERRAS, M. J. & J. M. MACKERRAS, 1960. The Haematozoa of Australian birds. Austr. Journ. Zool. **8**, p. 226-260.
MACKWORTH-PREAD, C. W. & C. H. B. GRANT, 1963. Birds of the Southern Third of Africa **II**. London.
MARPLES, B. J., 1945. Zosterops lateralis at Dunedin, New Zealand. Emu **44**, p. 277-287.
MARSHALL, J. T., 1949. The endemic avifauna of Saipan, Tinian, Guam and Palau. Condor **51**, p. 200-221.
MATHIS, C. & M. LEGER, 1910. Sur les Haemoproteus de quelques oiseaux du Tonkin. Bull. Soc. Path. Exot. **3**, p. 704-708.
MAXWELL, W. G. H. & W. R. MAIKLEM, 1964. Lithofacies analysis, southern part of the Great Barrier Reef. Univ. Queensl. Pap. **5** (11), 21 p.
MAYR, E., 1942. Systematics and the Origin of Species. New York.
——, 1944a. The Birds of Timor and Sumba. Bull. Am. Mus. Nat. Hist. **83**, p. 139-194.
——, 1944b. Timor and the colonization of Australia by birds. Emu **44**, p. 113-130.
——, 1947. Ecological factors in speciation. Evolution **1**, p. 263-288.
——, 1963. Animal Species and Evolution. Cambridge, Mass.
——, 1965a. Relationships among Indo-Australian Zosteropidae (Aves). Breviora **228**, 6 p.
——, 1965b. Classification, identification and sequence of genera and species. Ois. & Rev. Fr. d'Orn. **35**, No. Spéc., p. 90-95.
——, 1965c. Avifauna: turnover on islands. Science **150**, p. 1587-1588.
——, 1965d. Numerical phenetics and taxonomic theory. Syst. Zool. **14**, p. 73-97.
——, 1967. Zosteropidae (Indo-Australian taxa). In Paynter (editor), Check-List of Birds of the World XII, p. 289-326.
MAYR, E. & C. VAURIE, 1948. Evolution in the family Dicruridae (birds). Evolution **2**, p. 238-265.

MEES, G. F., 1951. Het areaal van Zosterops palpebrosa buxtoni Nicholson op Java. Ardea **39**, p. 196-218.
——, 1953. An attempt at a natural classification of certain Zosteropidae of the Indo-Australian Archipelago. Zool. Med. **32**, p. 57-68.
——, 1954. The genus Zosterops in Borneo. Serawak Mus. Journ. **6**, p. 133-153.
——, 1956. Geographical and individual variation in Chlorocharis emiliae Sharpe. Sarawak Mus. Journ. **6**, (1955), p. 641-661.
——, 1962a. The subterranean freshwater fauna of Yardie Creek Station, North West Cape, Western Australia. Journ. R. Soc. W. Austr. **45**, p. 24-32.
——, 1962b. A preliminary revision of the Belonidae. Zool. Verh. **54**, 96 p.
——, 1964a. Further revisional notes on the Belonidae Zool. Med. **39**, p. 311-326.
——, 1964b. Notes on two small collections of birds from New Guinea. Zool. Verh. **66**, 37 p.
——, 1964c. Geographical variation and distribution of some birds from Western Australia. Journ. R. Soc. W. Austr. **47**, p. 91-96.
——, 1965. Revision of Nectarinia sericea (Lesson). Ardea **53**, p. 38-56.
——, 1966. A new subspecies of Anthreptes malacensis (Scopoli) from the Soela Islands (Aves, Nectariniidae). Zool. Med. **41**, p. 255-257.

MEISE, W., 1929. Die Vögel von Djampea und benachbarten Inseln nach einer Sammlung Baron Plessens. Journ. f. Orn. **77**, p. 431-480.
——, 1938. Ueber parallele geographische Variation in der Vogelwelt Ostasiens. IXe Congrès Orn. Int. (Rouen-**1938**), p. 233-248.

MILLER, A. H., 1931. Systematic revision and natural history of the American shrikes (Lanius). Univ. California Publ. Zool. **38**, p. 11-242.
——, 1941, Speciation in the avian genus Junco. Univ. Calif. Publ. Zoöl. **44**, p. 173-434. p. 173-434.
——, 1956. Ecologic factors that accelerate formation of races and species of terrestrial vertebrates. Evolution **10**, p. 262-277.
——, 1966. Animal evolution on islands. In R. I. Bowman (editor): The Galápagos. Proceedings of the symposia of the Galápagos international scientific project. Berkeley and Los Angeles, p. 10-17.
MISHIMA, T., 1959. Subspecific evaluation of white-eyes of Yaeyama islands, Ryukyus and Hokkaido (Japanese with English summary). Tori **15**, p. 127-133.
MITCHELL, P. C., 1911. On longevity and relative viability in mammals and birds; with a note on the theory of longevity. Proc. Zool. Soc. London, p. 425-549.

MOREAU, R. E., 1944. Clutch size: a comparative study, with special reference to African birds. Ibis **86**, p. 286-347.
——, 1957. Variation in the western Zosteropidae (Aves). Bull. Brit. Mus. (Nat. Hist.), Zool. **4**, p. 309-433.
——, 1961. Taxonomic realism. Proc. Zool. Soc. London **137**, p. 623-626.
——, 1966. The Bird Faunas of Africa and its Islands. New York, London.
——, 1967. Zosteropidae (African and Indian Ocean taxa). In Paynter (editor), Check-List of Birds of the World **XII**, p. 326-337.
MOTTRAM, J. C., 1915. The distribution of secondary sexual characters amongst birds, with relation to their liability to the attack of enemies. Proc. Zool. Soc. London, p. 663-678.

MURPHY, R. C., 1929. Birds collected during the Whitney South Sea Expedition. IX. Zosteropidae from the Solomon Islands. Am. Mus. Nov. **365**, 11 p.
——, 1938. The need of insular exploration as illustrated by birds. Science **88**, p. 533-539.
MURPHY, R. C. & G. M. MATHEWS, 1929. Birds collected during the Whitney South Sea expedition. VII. Am. Mus. Nov. **356**, 14 p.

NEWTON, I., 1967. The adaptive radiation and feeding ecology of some British finches. Ibis **109**, p. 33-98.
NICE, M. M., 1937. (See Nice, 1964).
——, 1953. The question of ten-day incubation periods. Wilson Bull. **65**, p. 81-93.
——, 1964. Studies in the life history of the Song Sparrow I. New York. (Reprint as a book of paper first published in 1937).
NORTH, A. J., 1904. Ornithological notes. Rec. Austr. Mus. **5**, p. 337-338.
——, 1906. Description of a new species and genus of honey-eater from Rennell Island, Solomon group. Vict. Nat. **23**, p. 104-105.

OBERHOLSER, H. C., 1917. The birds of the Anamba Islands. U.S. Nat. Mus. Bull. **98**, v + 75 p.
OČKO, 1965. Aufzucht von Brillenvögeln (Zosterops palpebrosa) in der Zimmervoliere. AZ-Nachr., p. 38-42.
OGAWA, M., 1912. Notizen über die blutparasitischen Protozoen bei japanischen Vögeln. Arch. f. Protistenk. **24**, p. 119-126.
OGAWA, M. & J. UEGAKI, 1927. Beobachtungen über die Blutprotozoen bei Tieren. Archiv. f. Protistenk. **57** (1), p. 14-30.
OORDT, G. J. VAN, 1950. Is de Pestvogel (Bombycilla garrulus) een echte trekvogel? Ardea **37**, p. 179-181.

PERDECK, A. C., 1957. The isolating value of specific song patterns in two sibling species of grasshoppers (Chorthippus brunneus Thunb. and C. biguttulus L.). Leiden.
PETERS, J. L., 1943. First supplement to the list of types of birds now in the Museum of Comparative Zoölogy. Bull. Mus. Comp. Zoöl. **92**, p. 51-104.
PORTA, A., 1913. Acantocefali della nuova Caledonia e delle isole Loyalty. Nova Caledonia, Zool. **I**, p. 165-170.

RABOR, D. S., 1959. The impact of deforestation on birds of Cebu, Philippines, with new records for that island. Auk. **76**, p. 37-43.
——, 1962. The impact of deforestation on the birds of Cebu, Philippines, with new records for that island. Bull. C.I.P.O. **8**, p. 79-85.
RAND, A. L., 1952. Secondary sexual characters and ecological competition. Fieldiana, Zool. **34**, p. 65-70.
RAND, A. L. & D. S. RABOR, 1960. Birds of the Philippine islands: Siquijor, Mount Malindang, Bohol, and Samar. Fieldiana, Zool. **35**, p. 223-441.
RENSCH, B., 1930. Eine biologische Reise nach den Kleinen Sunda-Inseln. Berlin.
——, 1933. Zoologische Systematik und Artbildungsproblem. Zool. Anz. Suppl. **6**, p. 19-83.
——, 1936. Studien über klimatische Parallelität der Merkmalsausprägung bei Vögeln und Säugern. Arch. f. Naturgesch. N. F. **5**, p. 317-363.
——, 1938. Einwirkung des Klimas bei der Ausprägung von Vogelrassen, mit besonderer Berücksichtigung der Flügelform und der Eizahl. Proc. VIII Int. Orn. Congr. (Oxford-**1934**), p. 285-311.
——, 1939.Typen der Artbildung. Biol. Rev. **14**, p. 180-222.
——, 1950. Die Abhängigkeit der relativen Sexualdifferenz von der Körpergrösse. Bonn. zool. Beitr. **1**, p. 58-69.
RIDGWAY, R., 1895. On birds collected by Doctor W. L. Abbott in the Seychelles, Amirantes, Gloriosa, Assumption, Aldabra, and adjacent islands, with notes on habits, etc., by the collector. Proc. U.S. Nat. Mus. **18**, p. 509-546.
RIDPATH, M. G. & R. E. MOREAU, 1966. The birds of Tasmania: ecology and evolution. Ibis **108**, p. 348-393.

RIPLEY, S. D. & D. S. RABOR, 1958. Notes on a collection of birds from Mindoro Island, Philippines. Peabody Mus. Bull. **13**, iv + 83 p.

——, 1961. The avifauna of Mount Katanglad. Postilla **50**, 20 pp.

ROBERTSON, C. J. R., 1964. 14th annual report of the New Zealand bird banding scheme for the year ending 31st March *1964*, 32 p.

SALOMONSEN, F., 1953. Miscellaneous notes on Philippine birds. Vidensk. Medd. Dansk naturh. Foren. **115**, p. 205-281.

SCHÖNWETTER, M., 1966. Handbuch der Oologie. Berlin. Lief. **11**.

SCHOUTEDEN, H., 1966. La faune ornithologique du Rwanda. Kon. Mus. Midden-Afr. Zool. Document. **10**, vii + 130 p.

SCHULZE, P., 1935. Zur vergleichenden Anatomie der Zecken. Zeitschr. Morph. Oek. Tiere **30**, p. 1-40.

SCHUMACHER, D., 1964. Ages of some captive wild birds. Condor **66**, p. 309.

SELANDER, R. K., 1966. Sexual dimorphism and differential niche utilization in birds. Condor **68**, p. 113-151.

SELANDER, R. K. & D. R. GILLER, 1963. Species limits in the woodpecker genus Centurus (Aves). Bull. Am. Mus. Nat. Hist. **124**, p. 213-274.

SHARLAND, M. S. R., 1929. Land birds of Lord Howe Island. Emu **29**, p. 5-11.

SKEAD, C. J. & G. A. RANGER, 1958. A contribution to the biology of the Cape province white-eyes (Zosterops). Ibis **100**, p. 319-333.

SNOW, D., 1954. Trends in geographical variation in Palaearctic members of the genus Parus. Evolution **8**, p. 19-28.

——, 1955. Geographical variation of the Coal Tit, Parus ater L. Ardea **43**, p. 195-226.

STEGMANN, B. K., 1961. The rudiment of the distal primary in the bird wing (in Russ.). Trudi Inst. Zool Leningrad **29**, p. 227-256.

——, 1962. Die verkümmerte distale Handschwinge des Vogelflügels. Journ. f. Orn. **103**, p. 50-85.

STOLL, N. R. & AL., 1961. Code International de Nomenclature Zoologique/International Code of Zoological Nomenclature. London.

STRESEMANN, E., 1931. Die Zosteropiden der indo-australischen Region. Mitt. Zool. Mus. Berlin **17**, p. 201-238.

——, 1939. Zosterops siamensis Blyth — eine gelbbäuchige Rasse von Zosterops palpebrosa. Journ. f. Orn. **87**, p. 156-164.

——, 1958. [Review of Mees, A systematic review of the Indo-Australian Zosteropidae]. Journ. f. Orn. **99**, p. 118-119.

——, 1963. Variations in the number of primaries. Condor **65**, p. 449-459.

SVÄRDSON, G., 1957. The "invasion" type of bird migration. Brit. Birds **50**, p. 314-343.

TAKA-TSUKASA, N. & Y. YAMASHINA, 1931. On two new birds from the Caroline Islands. Dobuts. Zasshi **43**, p. 599-600.

THOMPSON, M. C., 1966. Birds from North Borneo. Univ. Kansas Publ., Mus. Nat. Hist. **17**, p. 377-433.

TIMOFÉEFF-RESSOVSKY, N. W., 1943. Diskussion zum Vortrag Stresemann. Journ. f. Orn. **91**, p. 326-327.

TURBOTT, E. G., 1961. The interaction of native and introduced birds in New Zealand. Proc. N. Z. Ecol. Soc. **8**, p. 62-66.

TYNE, J. VAN & A. J. BERGER, 1959. Fundamentals of Ornithology. New York.

UCHIDA, S., 1920. On a second collection of Mallophaga from Formosan birds. Annot. Zool. Jap. **9**, p. 635-652.

——, 1926. Studies on Amblycerous Mallophaga of Japan. Journ. Coll. Agricult. Imp. Univ. Tokyo **9**, p. 1-56.
UEGAKI, J., 1928. Über den Hämoproteus von Zosterops palpebrosa peguensis aus Formosa. Fukuoka-Ikwadaigaku-Zasshi (Fukuoka Acta Medica) **21**, p. 160-182, German abstr. p. 8.
ULFSTRAND, S., 1963. Ecological aspects of irruptive bird migration in northwestern Europe. Proc. XIII Int. Orn. Congr. (Ithaca-**1962**), p. 780-794.

VAURIE, C., 1949. A revision of the bird family Dicruridae. Bull. Am. Mus. Nat. Hist. **93**, p. 199-342.
——, 1958. Systematic notes on Palearctic birds. No. 32. Oriolidae, Dicruridae, Bombycillidae, Pycnonotidae, Nectariniidae, and Zosteropidae. Am. Mus. Nov. **1869**, 28 p.
——, 1962. Family Dicruridae. In: Mayr & Greenway, Check-List of Birds of the World **XV**, p. 137-157.
VESEY-FITZGERALD, D., 1940. The birds of the Seychelles. — I. The endemic birds. Ibis (14) **4**, p. 480-489.
VOOUS, K. H., 1948. Notes on a collection of Javanese birds. Limosa **21**, p. 85-100.
——, 1955. Origin of the avifauna of Aruba, Curaçao, and Bonaire. Acta XI Congr. Int. Orn. (Basel-**1954**), p. 410-414.
——, 1957. The birds of Aruba, Curaçao, and Bonaire. Stud. fauna Curaçao a. o. Caribb. isl. **29**, p. 1-260.

WATSON, G. E., R. L. ZUSI & R. E. STORER, 1963. Preliminary field guide to the birds of the Indian Ocean. Washington, D.C.
WENYON, C. M., 1939. Blood parasites. In Hamerton, Review of mortality rates and report on the deaths occurring in the Society's gardens during the year 1938. Proc. Zool. Soc. London **109** B, p. 326.
WHITE, C. M. N., 1965. A revised Check-List of African Non-Passerine Birds. Lusaka.
WHITTEN, L. K. & R. M. SALISBURY, 1951. A note on the occurrence of the gapeworm (Syngamus trachea) in New Zealand. Austr. Vet. Journ. **27**, p. 291-292.
WILLIAMS, G. R., 1953. The dispersal from New Zealand and Australia of some introduced European passerines. Ibis **95**, p. 676-692.
——, 1962. Extinction and the land- and freshwater-inhabiting birds of New Zealand. Notornis **10**, p. 15-32.

YAPP, W. B., 1951. Ecological speciation in the genus Phylloscopus. Proc. X Int. Orn. Congr. (Uppsala-**1950**), p. 173-175.

REGISTER OF BOTANICAL NAMES

REGISTER OF BIRD NAMES OTHER THAN INDO-AUSTRALIAN ZOSTEROPIDAE

INDEX

As it appeared useful to have a complete list of all specific and subspecific names given to the Zosteropidae, the names available for African members of the family have been included, but no attempt has been made to judge the validity of any of the names given to African birds, as this would be outside my competence. The list includes all forms described up to March 1969, and I fancy that there are no omissions.