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

by

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INTRODUCTION

Hardly any group of birds is of a greater interest to the zoogeographer and to the student of evolution and speciation than the family of the Zosteropidae. It was with the fact in mind that no conclusions as regards these fields of investigation could be drawn without the reliable base of a good classification that Stresemann (1931) [1]) undertook a revision of the Indo-Australian members of the family.

Stresemann's revision is a pioneer work that will long remain the base for any further work in the group. Since 1931, however, 45 further names have been given in the Indo-Australian group of the Zosteropidae, adding two valid species and about 25 valid races to the number already known. Though several partial revisions have greatly elucidated some obscure points in our knowledge in recent years (Mack, 1932; Mayr, 1933; Bartels Jr., 1937; Stresemann, 1939; Mayr, 1944), no comprehensive paper has appeared since 1931.

Moreover, Stresemann's was only a first attempt at classification, being barely more than a check-list of species and races. Now the time seems ripe for giving a full account of every described form, including its life-history, and with particular reference to the great gaps still existing in our knowledge of even the commonest forms.

Originally I intended to revise the family as a whole, but at an early stage of the investigations it appeared that Mr. Moreau was reviewing the African group of species. As a consequence, the present work is confined to the non-African members of the family, hence, it covers the same geographic area as Stresemann's paper.

It is remarkable that, whereas Moreau (1957) started his investigations with the intention of giving a systematic review of the African Zosteropidae, and produced a paper mainly concerned with the external causes of variation, my own work was the other way round. I began with a primarily zoogeographical interest and found that, even with the several recent papers referred to above at hand, it was necessary to give a systematic review before

1) The literature referred to in the introductory chapters is listed on p. 18.

it might be possible to approach the more modern problems which are so richly presented by the members of the group. The divergence between Moreau and myself is largely caused by the fact that Moreau dealt with a continental fauna, whereas the majority of the Indo-Australian species are insular in their distribution. Nevertheless, I was confronted with some of the same problems, and on the subject of relative dimensions a preliminary note was recently published (Mees, 1956).

In the present paper slightly over one-fourth of the valid forms are treated. There were various reasons for already publishing part of the work. The first is that, as the greater part of the work had to be carried out in spare time, progress was, and is, very slow so that it will probably take several more years before the whole may be completed; the second is that, because of high costs of printing, voluminous papers are not readily accepted for publication, which made it advisable to spread the publication over several years. It is my intention to complete the purely systematic revision in two or three more parts, and to add a concluding paper in which several interesting problems in the fields of zoogeography, speciation, and variation will be discussed.

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FAMILY ZOSTEROPIDAE

The Zosteropidae constitute a natural family of the Passeres, of uncertain relationships, though generally they are placed in the neighbourhood of the

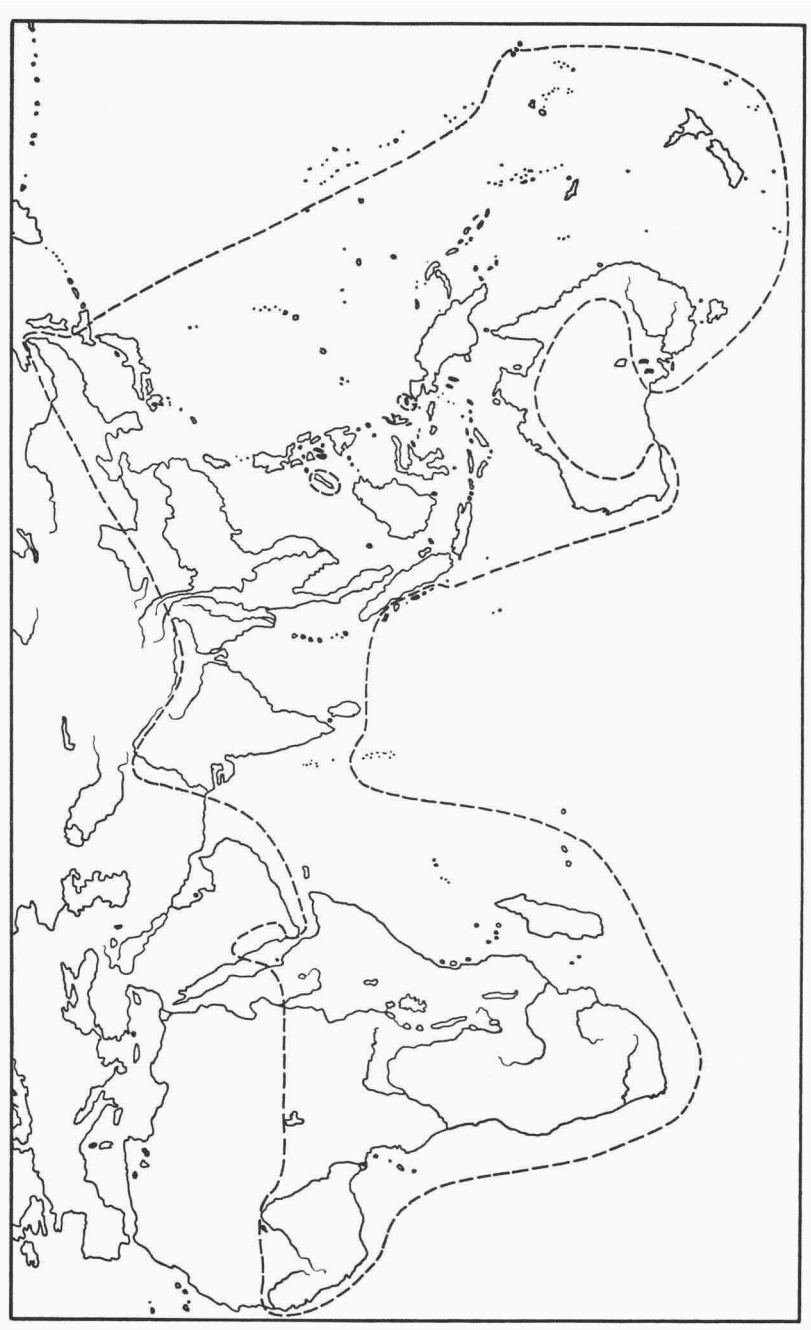

Fig. 1. The distribution of the Zosteropidae. Note the absence of the family from the West Sumatra Islands, Palawan, and the Western Papuan Islands. The distribution in Africa has only been roughly indicated.

Dicaeidae and the Nectariniidae because of their somewhat similar way of living.

The family is characterized by the strongly reduced 1st (outer) primary, by a brush tongue, and by the white circumorbital ring, which, however, is absent in a few forms.

They form an almost purely tropical group, whose range (fig. 1) extends over the whole of Africa south of the Sahara (though apparently scarce in, or absent from, the Congo basin and parts of arid South West Africa), from Senegal and the islands in the Gulf of Guinea in the West; Madagascar, the smaller islands between Madagascar, Africa, and India, Socotra, western Arabia; South and East Asia from Afghanistan, southern Thibet, and Ussuria (at least to 50° N.) to Japan where one species is found as far north as central Hokkaido; the Malay Archipelago; New Guinea, Australia, Tasmania, New Zealand, and all Pacific islands to Samoa in the East, Macquarie in the South. One species has been introduced in the Hawaiian Islands where it seems to be flourishing and, from the point or points of introduction, apparently unaided by man, has spread to other islands of the group.

The number of genera as recognised here is 12, the number of species about 85, unequally divided over the large genus *Zosterops* with sixty to seventy species, about fifty of which occur in the Indo-Australian region and will be dealt with in this and following papers, and 22 in other genera, the majority of these monotypic, and the largest containing but six species.

Of these genera, one is confined to Africa (*Speirops*, with two or three species in Cameroon and on the islands Fernando Poo, São Tomé, and Principe in the Gulf of Guinea) [1]). One genus, *Zosterops*, has geographical limits that are equal to those of the family, and hence include the ranges of all the other genera; seven genera have a more or less limited distribution on islands of the Indian Archipelago; one genus (*Woodfordia*) is confined to the Pacific islands of Rennell and Santa Cruz; two genera (*Rukia* and *Megazosterops*) are confined to Micronesia.

HISTORY OF NOMENCLATURE

As far as its relation to modern science is concerned, the history of the Zosteropidae apparently begins in 1760, when Brisson described and figured three species under the names *Ficedula Borbonica* (p. 510), *Ficedula Mada-*

1) According to Stresemann (in Wolff-Metternich & Stresemann, 1956) the species *brunnea*, generally placed in *Speirops*, does not belong to that genus; an opinion that is not shared by Moreau (1957). The species is very rare in collections and I have not seen it.

gascariensis minor (p. 498), and *Certhia Madagascariensis olivacea* (p. 625). Subsequently, in binary nomenclature, two of these species received from Linnaeus (1766) the names *Motacilla maderaspatana* and *Certhia olivacea*.

During the following 60 years a fair number of additional species were described by various authors, they were divided among several well-known passerine genera: *Muscicapa flavifrons* Gmelin, *Sylvia lateralis* Latham, *Dicaeum chloronothos* Vieillot, *Dicaeum flavum* Horsfield, *Sylvia javanica* Horsfield, *Sylvia palpebrosa* Temminck, and others.

In 1826 Vigors & Horsfield created for two of the species a separate genus, *Zosterops*, and with this procedure the recognition of the Zosteropidae as a distinct systematic unit begins.

The systematic place of the genus had by no means been settled at the time; whereas its authors first believed it to be very close to *Sylvia*, Horsfield (1854) later placed it between *Myzornis* and *Iora* of his subfamily Brachypodinae, family Merulidae — which would place it somewhere with the Pycnonotidae, the Irenidae, and the Timaliidae of modern classification.

Reichenbach (1852) used a classification that, in the light of modern knowledge, seems even more curious, by placing the genus in his family Meropinae. It must be admitted, however, that in this group he arranged a very heterogeneous assemblage of small passeres in addition to such genera as *Merops* and *Coracias*.

About the same time, Bonaparte (1854) erected a subfamily for *Zosterops* and related genera, which he placed with the Phyllornithidae.

In this classification he was followed by Sharpe (1884), though as late as 1889 Oates still stowed away *Zosterops* in his subfamily Sibiinae, family Crateropodidae. The *Sibia*'s are now placed in the family of the Timaliidae.

In 1891 at last, Sharpe proposed to raise the Zosteropidae to family level, in which he was followed by the great majority of later authors. Though his conclusion was probably right, it is interesting to point out that the argument on which he based the family was entirely wrong; it reads as follows: "An examination of the tongue of *Zosterops* shows that it resembles that of a Tit and has no similarity to the "brush" tongue of a Honey-sucker. For the present, therefore, I am inclined to keep the White-eyes as a separate family...".

Though it is not necessary to finally settle the question here, I note that I have examined tongues of a number of *Zosterops*-species, and that all these proved to be brush tongues. Sharpe probably referred to the tongue of *Z. lateralis* as described by Gadow; I have not yet been able to examine the tongue of that species, but Mathews (1923), discussing the same topic, wrote that: "Australian ornithologists have long been familiar with the fact that

their *Zosterops* had brush tongues, several correspondents having sent me specimens...". Anyhow, the shape of the tongue has very little, if any, phylogenetic significance as I hope to prove in a later contribution.

As regards more recent attempts at classification, Fürbringer (1888) reduced all Passeres to one family, and, because of the absence of trustworthy anatomical characters, did not contribute much to classification within this giant family.

Stresemann (1934) merely mentions the group, which he places in the sequence Nectariniidae, Hyliidae, Chalcopariidae, Meliphagidae, Dicaeidae, Zosteropidae, Vireonidae, Prunellidae; whereas Wetmore (1951) gives the sequence Meliphagidae, Nectariniidae, Dicaeidae, Zosteropidae, Vireonidae, Coerebidae. Neither of these authors discusses the affinities of the group, they obviously follow the common practice of the last sixty years.

Mayr & Amadon (1951) place the family in a similar position, giving the following discussion: "The relationships of the Zosteropidae remain to be discovered. Since some of them are somewhat specialized for feeding on nectar, they may continue to be left in the vicinity of the Meliphagidae and Dicaeidae. The nine-primaried wing indicates a considerable degree of specialization".

Reichenow (1914) and Berlioz (1950), like Sharpe (1891), include in the family characters a tongue, which must certainly be considered atypical for the group; Berlioz describes it as follows: "Langue rappelant celle des Nectariniidés, protractile et bifide, mais ni lasciniée, ni pénicillée".

Hachisuka (1930) deemed it necessary to create a separate subfamily for the monotypic genus and species *Hypocryptadius cinnamomeus*, the Hypocryptadiinae, but I do not see the advantage of subdividing a small and compact group as the Zosteropidae, and as I am not aware that anybody has ever followed Hachisuka, no subdivisions above the generic level are recognised in this review.

A LIST OF THE INDO-AUSTRALIAN ZOSTEROPIDAE

For various reasons, but particularly as the publication of the further parts of this revision will be somewhat delayed, it was considered desirable to add a check-list of the recognizable forms of Zosteropidae occurring in the Indo-Australian region.

Ornithologists acquainted with the Zosteropidae will miss in the present list several names familiar to them. As far as the species numbered 1 to 11 are concerned, these names will be found in this paper, listed as synonyms under the forms to which they are considered to belong. As regards synonyms of forms not yet treated here, I succinctly indicate below, to the syno-

nymy of which forms I have brought these names. A full discussion of all these names will be given in the following parts of this revision.

Species 12, *tudjuensis* and *majauensis* are synonyms of *chloris*; *griseiventris, bassetti,* and *lettiensis* are synonyms of *albiventris*; *intercalata* is a synonym of *citrinella* (cf. Mayr, 1944); the name *australasiae* is indeterminate, and should not replace *citrinella*; *sumbavensis* and *kalaotuae* are synonyms of *intermedia*; *zachlora* is a synonym of *solombensis* (cf. Mees, 1954).

Species 18, *sharpei* is a synonym of *atrifrons* (cf. Mees, 1953); *tenuifrons* is a synonym of *chrysolaema*; *pallidogularis* is a synonym of *delicatula.*

Species 26, *shaw-mayeri* must be considered a synonym of *wahgiensis.*

Species 28, *aignani* is a synonym of *griseotincta*; *ottomeyeri* is a synonym of *eichhorni.*

Species 35, *ugiensis* is a synonym of *rendovae* (cf. Mees, 1955).

The polytypic species 38, 43, and 49, and several monotypic species from the Pacific area, have not yet been critically reviewed, so that a few superfluous names may still be listed, which in future may be found to be synonyms. As regards *Zosterops lateralis,* I have, following Mack (1932) and other recent revisers of the Australian members of this species, listed all the birds from Southeastern Australia and Tasmania under one name (*Z. lateralis lateralis*), though according to Keast (in litt., 29-II-1956) several races can be distinguished in this area. My own investigations tend to confirm that at least two valid races are involved, but as Mr. Keast is revising the species, and as his results will probably be published soon, I prefer not to give an opinion on the question at present.

Genus *Zosterops* Vigors & Horsfield

Species 1. *Zosterops ceylonensis* Holdsworth

Species 2. *Zosterops palpebrosa* (Temminck)

1. *Zosterops palpebrosa nilgiriensis* Ticehurst
2. *Zosterops palpebrosa egregia* Madarász
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 iriomotensis* Kuroda
7. *Zosterops japonica yonakuni* Kuroda
8. *Zosterops japonica daitoensis* Kuroda
9. *Zosterops japonica simplex* Swinhoe
10. *Zosterops japonica hainana* Hartert
11. *Zosterops japonica batanis* McGregor
12. *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
4. *Zosterops everetti boholensis* McGregor
5. *Zosterops everetti siquijorensis* Bourns & Worcester
6. *Zosterops everetti mandibularis* Stresemann
7. *Zosterops everetti babelo* Meyer & Wiglesworth
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 pectoralis* Mayr

5. *Zosterops montana whiteheadi* Hartert
6. *Zosterops montana seranensis* Stresemann
7. *Zosterops montana obstinata* Hartert
8. *Zosterops montana ternatana* Stresemann

Species 10. *Zosterops natalis* Lister

Species 11. *Zosterops flava* (Horsfield)

Species 12. *Zosterops chloris* Bonaparte

1. *Zosterops chloris chloris* Bonaparte
2. *Zosterops chloris albiventris* Reichenbach
3. *Zosterops chloris harterti* Stresemann
4. *Zosterops chloris citrinella* Bonaparte
5. *Zosterops chloris flavissima* Hartert
6. *Zosterops chloris mentoris* Meise
7. *Zosterops chloris intermedia* Wallace
8. *Zosterops chloris periplecta* Hartert
9. *Zosterops chloris solombensis* Oberholser
10. *Zosterops chloris maxi* Finsch

Species 13. *Zosterops grayi* Wallace

Species 14. *Zosterops (grayi) uropygialis* Salvadori

Species 15. *Zosterops consobrinorum* Meyer

Species 16. *Zosterops anomala* Meyer & Wiglesworth

Species 17. *Zosterops wallacei* Finsch

Species 18. *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
10. *Zosterops atrifrons gregaria* Mayr
11. *Zosterops atrifrons delicatula* Sharpe

Species 19. *Zosterops atriceps* G. R. Gray

1. *Zosterops atriceps atriceps* G. R. Gray
2. *Zosterops atriceps fuscifrons* Salvadori
3. *Zosterops atriceps dekaani* van Bemmel

Species 20. *Zosterops mysorensis* Meyer

Species 21. *Zosterops meeki* Hartert

Species 22. *Zosterops hypoxantha* Salvadori
- 1. *Zosterops hypoxantha hypoxantha* Salvadori
- 2. *Zosterops hypoxantha ultima* Mayr
- 3. *Zosterops hypoxantha admiralitatis* Rothschild & Hartert

Species 23. *Zosterops fuscicapilla* Salvadori
- 1. *Zosterops fuscicapilla fuscicapilla* Salvadori
- 2. *Zosterops fuscicapilla crookshanki* Mayr & Rand

Species 24. *Zosterops buruensis* Salvadori

Species 25. *Zosterops kühni* Hartert

Species 26. *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 27. *Zosterops lutea* Gould
- 1. *Zosterops lutea lutea* Gould
- 2. *Zosterops lutea hecla* Mathews
- 3. *Zosterops lutea balstoni* Ogilvie-Grant

Species 28. *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 29. *Zosterops vellalavella* Hartert

Species 30. *Zosterops luteirostris* Hartert

Species 31. *Zosterops splendida* Hartert

Species 32. *Zosterops kulambangrae* Rothschild & Hartert
- 1. *Zosterops kulambangrae kulambangrae* Rothschild & Hartert
- 2. *Zosterops kulambangrae paradoxa* Mees
- 3. *Zosterops kulambangrae tetiparia* Murphy

Species 33 *Zosterops metcalfii* Tristram
1. *Zosterops metcalfii exigua* Murphy
2. *Zosterops metcalfii metcalfii* Tristram
3. *Zosterops metcalfii floridana* Rothschild & Hartert

Species 34. *Zosterops murphyi* Hartert

Species 35. *Zosterops rendovae* Tristram
1. *Zosterops rendovae rendovae* Tristram
2. *Zosterops rendovae oblita* Hartert
3. *Zosterops rendovae hamlini* Murphy

Species 36. *Zosterops stresemanni* Mayr

Species 37. *Zosterops sanctae-crucis* Tristram

Species 38. *Zosterops lateralis* (Latham)
1. *Zosterops lateralis gouldi* Bonaparte
2. *Zosterops lateralis lateralis* (Latham)
3. *Zosterops lateralis ramsayi* Masters
4. *Zosterops lateralis tephropleura* Gould
5. *Zosterops lateralis griseonota* G. R. Gray
6. *Zosterops lateralis melanops* G. R. Gray
7. *Zosterops lateralis nigrescens* F. Sarasin
8. *Zosterops lateralis macmillani* Mayr
9. *Zosterops lateralis vatensis* Tristram
10. *Zosterops lateralis valuensis* Murphy & Mathews
11. *Zosterops lateralis flaviceps* Peale

Species 39. *Zosterops strenua* Gould

Species 40. *Zosterops tenuirostris* Gould

Species 41. *Zosterops albogularis* Gould

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

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

Species 44. *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 45. *Zosterops xanthochroa* G. R. Gray

Species 46. *Zosterops minuta* E. L. Layard & E. L. C. Layard

Species 47. *Zosterops samoensis* Murphy & Mathews

Species 48. *Zosterops cinerea* (Kittlitz)

1. *Zosterops cinerea cinerea* (Kittlitz)
2. *Zosterops cinerea ponapensis* Finsch
3. *Zosterops cinerea finschii* (Hartlaub)

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 takatsukasai* Momiyama
7. *Zosterops conspicillata owstoni* 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)

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 *Madanga* Rothschild & Hartert

Species 1. *Madanga ruficollis* Rothschild & Hartert

Genus *Heleia* Hartlaub

Species 1. *Heleia mülleri* Hartlaub

Species 2. *Heleia crassirostris* (Hartert)

1. *Heleia crassirostris crassirostris* (Hartert)
2. *Heleia crassirostris junior* (Rensch)

Genus *Tephrozosterops* Stresemann

Species 1. *Tephrozosterops stalkeri* (Ogilvie-Grant)

Genus *Hypocryptadius* Hartert

Species 1. *Hypocryptadius cinnamomeus* Hartert

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 *Megazosterops* Stresemann

Species 1. *Megazosterops palauensis* (Reichenow)

Genus *Rukia* Momiyama

Species 1. *Rukia oleaginea* (Hartlaub & Finsch)

Species 2. *Rukia ruki* (Hartert)

Species 3. *Rukia longirostra* (Taka-Tsukasa & Yamashina)

GENERAL REMARKS

In the following pages, of every polytypic species is given a general description, in which those characters are listed that are common to all its races; further the range of the species, the geographical variation, a discussion of its affinities, and other particulars that are relevant for an understanding of the species as a whole are to be found.

As regards monotypic species and valid races of polytypic species, the sequence of treatment is as described below.

Name and synonyms. Under every form the following particulars are given: in bold type the valid name; a reference to its original description, with mention of the type locality, and an enumeration of those proposed names that, in my opinion, are synonyms, with their type localities. As far as names proposed as new are concerned, the author's name follows the scientific name without interposition of a comma. Nomina nuda are also placed in this section. When the original description was not available, I have marked the reference with an asterisk (*).

Bibliography. The true synonyms are followed by an enumeration of the references. The sequence of the different names and combinations is that of their date of first appearance in literature. References to misprints and lapsus (contrary to nomina nuda) should also be sought here.

Primarily because of the fact that the libraries in the Netherlands could not supply all the necessary literature, this bibliography is far from complete. This deficiency is especially great as far as literature from India, Japan, and Australia is concerned, and could only partly be made up by too short visits to the libraries of the British Museum (Natural History) in London, and the Laboratory of the Marine Biological Association of the United Kingdom in Plymouth.

Notwithstanding these deficiencies, the references given suffice to enable anybody interested in a certain form, soon to find his way into the most important literature, even if, as in some races of *Zosterops palpebrosa*, *Z. japonica*, and *Z. lateralis*, the literature is almost overwhelmingly large.

Like in the preceding sector, those references which I have not been able to check in the original, have their author's name preceded by an asterisk (*).

Characters. A short definition of the diagnostic characters is given, with a general impression of the size, for which the following standard has been accepted (measurements in mm in brackets): very small means an average wing length of less than 53, small (53-55), fairly small (55-57), average-sized (57-59), fairly large (59-61), large (61-65), very large (over 65).

There follows a description, which is usually kept fairly short, while of such characters as are generally found throughout the group — such as the whitish inner edges of the primaries and secondaries — mention is altogether omitted.

A satisfactory description of fine shades of colour is very difficult; I have made use of Ridgway's "Color & Color Nomenclature" wherever this was possible, but the usefulness of this work is limited. The names of colours

that have been directly compared with Ridgway's standards, are written with initial capitals in the text.

The colours of the unfeathered parts are described if known; generally I have preferred to directly copy these from the labels of specimens examined; then the name of the collector or the person who is responsible for the notes follows without addition of a year. If the records are taken from publications, the quotation may be as follows: (Hartert, 1910, ex Meek), which means that my record is taken from a publication by Hartert, and that this author gave the colours of the unfeathered parts on the authority of Meek.

When sufficient material was available to make such a division, measurements are given for males and for females separately; moreover it is intended to present, in the concluding part of this revision, a list with full data and individual measurements of all specimens examined. Unless otherwise stated, measurements are given in millimeters.

If structural peculiarities ask for a special discussion, this is also given here, it may include remarks on the softness of the plumage, and on the

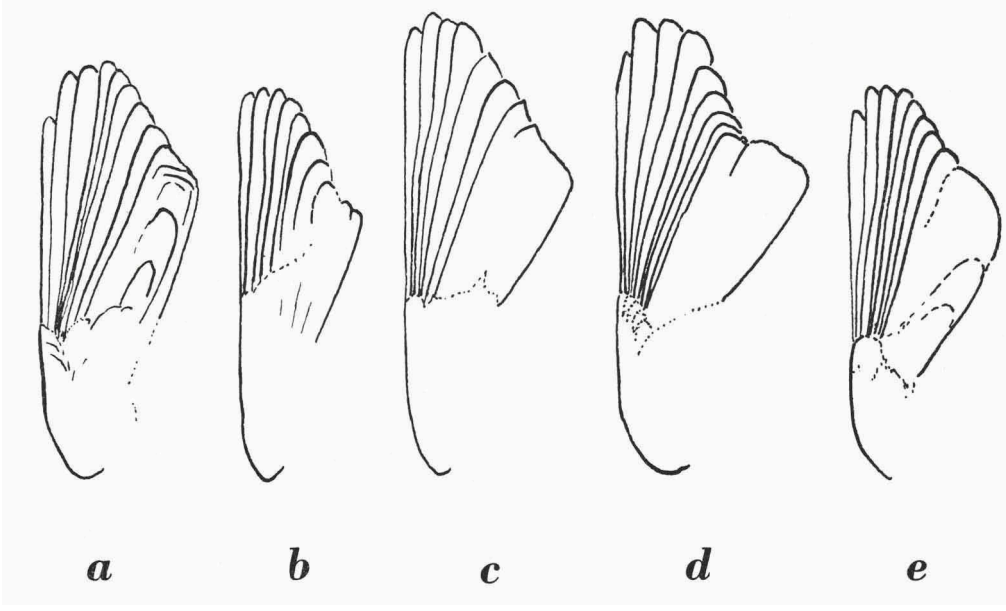

Fig. 2. Wings of some species of *Zosterops,* showing differences in wing-formula; a, *Z. ceylonensis* (BM nr. 1940.12.3.322); b, *Z. palpebrosa auriventer* (type, BM nr. 86.12.1.1724, wing-formula aberrant); c, *Z. erythropleura* (USNM nr. 335143); d, *Z. japonica insularis* (MCZ nr. 156573); e, *Z. everetti wetmorei* (BM nr. 1910.12.27.330). Natural size.

wing-formula. As regards the wing-formula, particular attention has been paid to the relative length of the 2nd (first developed) primary. Certainly the wing-formula is of some systematic and of much biological interest (fig. 2).

Distribution. Apart from the geographical distribution, the altitudinal range and, briefly, the relative abundance of the form under discussion within its range are given here. More elaborate particulars on altitudinal range, abundance, and habitat will be found in the section on habits.

First collector. Often, especially where long-established and well-known species are concerned, it is impossible to ascertain who was the first collector. The first collector, of course, means the collector who was the first to make available specimens to Western science.

Figure. No comment is necessary.

Type. In this section are mentioned the institution or the institutions where the type or cotypes are preserved, as also their registered numbers (if any). If the type is known to be lost, this is also recorded.

As the majority of the forms here discussed have been described in comparatively recent times, this section has not been difficult to compile. In a few instances, however, it proved necessary to choose a lectotype out of heterogeneous material in order to restrict the type locality, or to avoid confusion. When they proved necessary, discussions about the type locality are also given under this heading.

Moult. The investigation remained confined to the main moult, of primaries and rectrices, though minor moult of body feathers has been recorded whenever it was accidentally found. This section has been added only as a first attempt to define the season in which the main moult usually takes place, on the base of the specimens actually examined. Only in a few instances relevant particulars from existing literature have been added.

Nidification. The Zosteropidae, as far as is known, are to a remarkable extent uniform as regards structure of their nests and coloration of their eggs. Without known exception, the nests are well-built cup-shaped structures, generally suspended in the fork of a twig. The eggs are generally unspotted pale blue or pale greenish blue; in a number of forms they may be either pale blue or pure white. I am not aware of the existence of a form that exclusively lays white eggs.

As regards the share each sex takes in nest-building and in incubation, very little is known, and the same pertains to incubation-period and fledging-period. Such evidence as is available indicates that the duration of the incubation-period and of the fledging-period may widely differ in different species (cf. under *Zosterops palpebrosa egregia* and *Z. natalis*).

Habits, etc. Under this heading, general notes on behaviour, food, habitat, abundance, etc., will be found, and also short references to voice.

Voice. Only in those few cases where something is known about the bird's voice, this section is added; stray remarks about the voice of forms of which the vocabulary has never been adequately described, have not been taken from their context, but appear in the previous section under habits.

Discussion. Notes on systematic position, geographical variation, discussion of synonyms, hypotheses on affinities, zoogeography, and any other systematic problem, are given under this heading. With a few exceptions, synonyms that are generally recognised as such in current literature, have not been discussed again

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Genus **Zosterops** Vigors & Horsfield

Zosterops Vigors & Horsfield, Trans. Linn. Soc. London 15, 1826, p. 234 — based on *Motacilla maderaspatana* Linnaeus and *Zosterops dorsalis* Vigors & Horsfield; type by subsequent selection by Lesson (Manuel d'Orn. I, 1828, p. 286), *Motacilla maderaspatana* Linnaeus [1]).

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Malacirops Bonaparte, Compt. Rend. Ac. Sc. 38, 1854, p. 264 — type by monotypy, "*Z. borbonica* Brisson" = *Motacilla borbonica* Gmelin.

Cyclopterops Bonaparte, Compt. Rend. Ac. Sc. 38, 1854, p. 264 — type by monotypy, *Dicacum chloronothos* Vieillot.

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Zosteropisylvia Heuglin, Journ. f. Orn. 15, 1867, p. 295 — type by monotypy, *Zosteropisylvia icterovirens* Heuglin (ex. von Württemberg, MS).

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Generic characters. Because of its wide distribution, the abundance of its species, and their remarkable similarity in widely separated regions, the assumption that the genus *Zosterops* is the most "primitive" in the sense of harbouring species that are closest to the ancestral forms of the family, seems more than an unfounded hypothesis. The other genera, all with but a limited

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1) Mathews (1923) and others claim that *Zosterops dorsalis* Vigors & Horsfield is the type of the genus "by monotypy", but this is incorrect and Lesson's designation must stand.

number of species and with often a very restricted geographical range, can safely be assumed to be solely more or less modified offshoots from a stock of *Zosterops*-like ancestors.

It seems best to give first a general description of the ordinary type of *Zosterops*, and to have this followed by descriptions of the more aberrant types. The following is the most widely distributed type of *Zosterops*, with what I prefer to call the basic pattern, to avoid expressions like primitive or ancestral, because nothing can be known about the history of the genus, whereas basic only indicates that I make it the base for further comparison and description.

A rather small bird (wing 55 to 60 mm in length) with the upper parts greenish or somewhat yellowish green, generally between Warbler Green und Pyrite Yellow, with or without a distinctly more yellowish rump, forehead and supra loral patches; lores blackish or greyish, less commonly pale dusky, yellow, or whitish, the black usually continued to half-way under the eye-ring; a white eye-ring, generally interrupted in front by a blackish spot that may be seen as a continuation of the loral line; primaries, secondaries, and rectrices brownish black, primaries and secondaries always broadly bordered with the same colour as the mantle, rectrices usually more or less broadly — but fairly often narrowly and sometimes not at all — bordered with this colour.

Under parts either all yellow, or throat and under tail coverts yellow, with often a more or less distinct longitudinal yellow streak between throat and crissum over the centre of the under parts, and the remainder of the under parts grey or pale grey, with often a more or less distinct brownish (buff) suffusion on the flanks.

The great majority of the species, both African and Indo-Australian, is covered by this description, but deviations from this description may occur as listed below.

Reduction of the white eye-ring occurs in a number of forms; the eye-ring may be either wide (excessively so in the African species *Z. eurycricota* Fischer & Reichenow and *Z. silvanus* Peters & Loveridge [1]), not in species of the Indo-Australian region), narrow, or vestigial. Even when it is greatly reduced, traces of the eye-ring can usually be detected on the eye-lids. The size of the eye-ring is a useful character for distinguishing races, but not for defining higher systematic units, as it may be of greatly different development in closely related forms.

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1) As the name *silvanus* by its co-author has expressly been stated to be a masculine substantive, there is no reason to alter the termination to a feminine one to agree with the gender of the generic name, as has been done by Moreau (1957); cf. Peters (1943).

A different colour of the eye-ring occurs, as far as I am aware, in one species only; in *Zosterops wallacei*, a well-marked endemic species of the Lesser Soenda Islands, the eye-ring is yellow.

A different colour of the back occurs in a number of races of *Zosterops lateralis*, and in some species related to it, where the back is partly grey instead of green like the remainder of the upper parts.

Loss of yellow on the under surface. On this point Stresemann (1931) has already commented: "Man gewinnt den Eindruck ... dass es 3 Farbbezirke für das Lipochrom der Unterseite gibt: 1. Kinn und Kehle; 2. Brust und Bauch; 3. Unterschwanzdecken. Lipochromausfall auf der Unterseite geschieht stets in folgender Reihenfolge: 2 — 1 — 3; es kommt also nicht vor, dass die Unterschwanzdecken weiss sind, wenn nicht auch die ganze übrige Unterseite weiss ist".

A black forehead, like the other variations described here, has evidently developed independently in a number of groups, and forms may present it whereas their closest relatives have ordinary yellowish or greenish foreheads.

The most aberrant forms still included in the genus are found on some small islands. *Zosterops cinerea*, confined in three races to Micronesia, is entirely greyish brown, and moreover lacks the eye-ring. *Z. borbonica* from Réunion and Mauritius is somewhat similar, with greyish or brownish upper parts. *Z. modesta* from Mahé, Seychelles, falls also in this group, though its mantle still has a definite greenish hue, and a white eye-ring of moderate width is present.

Very large-sized species, far larger than the majority of the widely distributed species, are found as endemics on a number of small islands, where conditions seem to favour such growth. Especially *Z. lateralis* has given birth to a number of such species (*Z. strenua, Z. tenuirostris, Z. albogularis, Z. inornata*), of which, especially in the cases of *Z. strenua* and *Z. inornata*, the most remarkable feature is that, notwithstanding their gigantic size, they have hardly differentiated from *Z. lateralis* as regards coloration and general appearance.

Distribution. Coincides with that of the family. Within its range, the genus is absent, for no apparent reason, from a few islands. In this connection, the West-Sumatran Islands (with the exception of Engano) may be mentioned; apparently conditions are unfavourable for colonizing these islands from Sumatra. The genus is also absent from some of the larger western Papuan Islands (Misoöl, Salawatti, Batanta, Waigeoe).

A much more curious gap in the known distribution is the island of Palawan. The absence of the genus (and of the family) from Palawan is, in fact, so remarkable that it would not at all surprise me if in the moun-

tains of this island — where no exhaustive ornithological collecting has ever been carried out — a species still remains to be discovered.

As Mayr (1945) has already pointed out, white-eyes are particularly good colonizers because of their gregarious habits. This explains their wide distribution in the Pacific area.

Species 1. **Zosterops ceylonensis** Holdsworth

Zosterops ceylonensis Holdsworth, Proc. Zool. Soc. London, 1872 (November), p. 459, pl. 20 fig. 2 — Ceylon: Nuwara Eliya and on the upper hills, restricted to Nuwara Eliya by Hartert's (1928) selection of a lectotype from that locality.

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Zosterops zeylanica; Moreau, Bull. Brit. Mus. Nat. Hist. Zool. 4, 1957, p. 401 (Ceylon; lapsus).

Characters. A fairly small and dull species, dark above, without brighter forehead, greenish yellow throat, breast, and under tail coverts, whitish belly.

Upper parts. Mantle, including forehead, supra loral region, upper tail coverts and rump, generally between Warbler Green and Dark Citrine; lores and streak under the eye dark dusky grey, not black; on the ear coverts also some dusky; eye-ring of average width, white, rather widely interrupted in front by a dark grey spot which is continuous with the dark grey lores; primaries, secondaries, and rectrices blackish brown, broadly margined with the colour of the upper parts.

Under parts. Throat and whole breast Strontian Yellow, fairly pure in the centre, becoming increasingly suffused with the colour of the mantle (greenish) towards the margins; under tail coverts rather purer yellow, without admixture of green; remainder of under parts greyish white, darkest on the flanks; a trace of a yellow streak over the centre of the belly is usually present.

Unfeathered parts. Irides light brown, bill dark leaden, feet lavender (Holdsworth); iris pale brownish yellow, bill blackish, white base beneath, or dark horn, base under lighter, legs and feet plumbeous or dusky leaden, a bluish tint on the legs, or legs and feet dusky bluish (Legge); iris brown, bill blackish above, bluish grey below, feet grey (A. L. Butler); iris light brown, bill upper mandible black, lower greyish; legs dark greyish flesh (Ripley).

Measurements. Wing 10 ♂, 55-59½ (56.55); 5 ♀, 55-57 (55.40); 18 specimens, 55-59½ (56.31); tail 10 ♂, 38-41½ (39.40); 5 ♀, 38-40½ (39.00); 18 specimens, 38-41½ (39.28); tarsus 17 specimens, 16½-19 (17.56); entire culmen 17 specimens, 13½-15¼ (14.33); exposed culmen 17 specimens 11-12¼ (11.72); culmen from anterior point of nostril 17 specimens, 7¾-9 (8.43).

As regards coloration this species differs from *Zosterops palpebrosa egregia,* the only other white-eye from Ceylon, in being much duller and greener, both above and below, and in the yellow of the under surface extending over the whole breast, not only over the upper breast.

Structurally it differs from *Z. palpebrosa* by its longer beak, tarsus, and tail, and by its different wing-formula, the 2nd primary being relatively shorter. The 2nd primary in this species comes in length between the 8th and the 10th primary (fig. 2a). The tail is long, in 18 specimens the average tail: wing index is 69.76 %, much higher than in all races of *palpebrosa* except *Z. palpebrosa nilgiriensis.*

Distribution. Hills and mountains of Ceylon, with a lower limit, according to various authors, of somewhere between 1500 and 3000 ft. Stuart Baker (1921, 1922) allows it to go down as low as 1000 ft., Wait (1914) calls it common at elevations over 2000 ft., and in a later publication (Wait,

1922) states that it is confined to the hills down to about 3600 ft.; Whistler, on the other hand, mentions it from all elevations down to about 3000 ft., occurring locally even down to 1500 ft. In the higher parts of Ceylon it is reported by several authors to be the most common bird, and its upper limit is evidently formed by the mountain tops.

The reported occurrence of this species in the Nilghiries, Southern India, is erroneous, and is evidently based on confusion with *Z. palpebrosa nilgiriensis*, a race that shares with *Z. ceylonensis* certain characters absent in other races of *Z. palpebrosa*.

First collector. Unknown to me. The species was recorded by Kelaart as early as 1852, but I have seen no material collected before 1868 (by Holdsworth). It is likely that the specimen from Ceylon mentioned under the name *Zosterops* sp. by Lichtenstein (1854) belonged to the present species, but it is no longer possible to check this, as all the mounted specimens of *Zosterops* in the Berlin Museum were destroyed during a bomber attack in February 1945 (Stresemann, in litt., 6-XI-1956).

Figures. Holdsworth (1872), plate 20 fig. 2 (coloured, natural size, by J. Smit); Legge (1880), plate opposite p. 577, lower figure (coloured, natural size, by J. G. Keulemans); Deraniyagala (1949), plate 79 fig. 9 (text-figure of doubtful value); Henry (1955), plate 8 fig. 5 (coloured, but reproduced on too small a scale to be of much value).

Type. No type was designated in the original description, which was evidently based on several specimens. Hartert (1928) claims the type to be in the Tring Museum, but I am not quite sure if he intended to make his specimen a lectotype, or just wanted to draw attention to the fact that one of Holdsworth's original specimens was present in this collection. Probably, however, the specimen has become a lectotype by Hartert's action, and to put an end to any doubt that still may exist, I designate the same specimen as lectotype. It is now AMNH nr. 699930 (type examined).

I have seen one other cotype, BM nr. 88.7.1.767.

Moult. Whistler (1944) records that specimens collected on 2 and 16 August and on 7 October are undergoing the complete post-nuptial moult, which specimens collected from 25 November to 1 December had evidently recently finished.

My own specimens show moult as follows: January (3), one moulting primaries, two others not in moult; April (1), not in moult; May (1), moult in primaries and moult on forehead; June (6), no moult; September (1), moult in primaries, the 2nd primary on both sides being very short, the 3rd about half its normal length and with its base in a sheath; October

(1) not in moult, this specimen appears to be a juvenile; November (2), no moult; December (1), no moult.

Nidification. The earlier authors (Legge, 1880; Lewis, 1898) mentioned a breeding season from about March until May; Nehrkorn (1910) records eggs without date, whereas Ogilvie-Grant (1912) mentions a clutch from 12 August. The latter record is of interest as it constitutes the first contradiction of the generalisation that the species breeds from March to May, a period extended, unfortunately without supporting evidence, to "January to July" by Nock (1914). Phillips (1936) observes that it nests chiefly from March to May, but that nests have also been found in July and October. Apart from a number of statements about the breeding season being in the first part of the year, the majority of these being without doubt copied from Legge (1880), the only dated clutches in literature would seem to be the one recorded by Ogilvie-Grant, and one mentioned by Stuart Baker, taken on 7 March. It seems from the not very precise evidence available that there may be a main breeding season in the first half of the year (though exact data are much wanted), but that, like so many tropical birds, the species may be found breeding throughout the year. The eggs are described as pale bluish-green, and the clutch size is stated to be normally three (Legge, 1880; Stuart Baker, 1926; Phillips, 1936). Measurements are given by Legge and Stuart Baker (l. c.).

Habits, etc. All authors agree that this species is numerous in the higher parts of Ceylon, it occurs both in, and at the edges of, forests, and in low isolated bushes, patna-jungle, etc., where it often gathers in flocks of hundreds. The birds are extremely active and energetic, and surprise by their confidence in man, properties they share with most other species of the genus (cf. Holdsworth, 1872; Legge, 1874; Legge, 1880; Lewis, 1898; Stuart Baker, 1926; Henry 1955).

Legge (1880) reports this species as a prey of the owl *Glaucidium radiatum castanonotum* (Blyth), and also writes that *Lanius cristatus lucionensis* L. is known to impale the species after the manner of the European shrikes.

Henry (1955) states that the species feeds largely on small caterpillars, the tea tortrix *Homona coffearia* (Nietn.) being a special favourite.

Voice. There is a pleasant agreement between various authors about what the common call-note of the species sounds like; they all describe it as a sparrow-like chirp or "cheep" (Legge, 1874; Stuart Baker, 1926; Henry, 1955; Ripley, note on label of specimen USNM nr. 377457).

Stuart Baker (1926) writes that this loud chirp is quite different from the high "pip pip" or musical twittering call of *Z. palpebrosa egregia*;

whereas according to Henry (1955) the chirp is very like that of *egregia*, but differs in being stronger and deeper in tone.

Only Henry (1955) seems to have heard song, which he describes as a jingling song, suggestive of shaking a bunch of keys repeatedly, eight or nine times. He heard this song only in the morning, before sunrise.

Discussion. It has been suggested (Ripley, 1949) that this species owes its origin to double colonisation of Ceylon by *Zosterops palpebrosa* (or, rather, by the direct ancestors of *Z. palpebrosa*). Whereas it will be difficult to disprove or to prove such a statement, it must be noted that the species differs from *Z. palpebrosa* in such an array of characters — as noted in the description, not only in coloration, but also in proportions and structure, and in voice —that I cannot consider the two species particularly closely related. Whether it is more closely related in time to *Z. palpebrosa* than to some other species may be doubted, and, anyhow, morphology must, of necessity, be our guide in judging relationship. Morphologically *Z. ceylonensis* is undoubtedly rather closer to several other species than to *Z. palpebrosa*.

Nevertheless it is interesting to note that *Z. ceylonensis* is much closer to *Z. palpebrosa nilgiriensis* than to other forms of *Z. palpebrosa*. It shares with this form, and not, or only partially, with some other races of *Z. palpebrosa*, the relatively long tail, the fairly large wing, the long bill, upper parts that are greener than in *Z. p. egregia*, and it also has a similar vertical distribution, *nigiriensis* being confined to the hills. Hence, *Z. p. nilgiriensis* may with some justice be considered a link between *Z. palpebrosa* and *Z. ceylonensis*.

Species 2. **Zosterops palpebrosa** (Temminck)

Characters. A small species, thoroughly agreeing with the general *Zosterops*-type as described in the introduction.

Upper parts, in the various races, varying from slightly more yellowish than Warbler Green to almost pure Pyrite Yellow; rump generally more yellowish, conspicuously so in the greener forms; forehead and supra loral region always more or less distinctly yellow (see however, remarks under *Z. palpebrosa auriventer*); loral line black extending to half way under the eye-ring; white eye-ring of average width, interrupted in front by a blackish spot, a continuation of the loral line; primaries, secondaries, and rectrices blackish brown, the primaries and secondaries always edged with the same colour as the mantle, rectrices similarly edged in the western races, but not or hardly edged with green in the southeastern group of races, which, moreover, tend to have the primaries and rectrices darker, more blackish.

Under parts. Chin and throat, upper breast, and under tail coverts

Strontian Yellow, inclining to Lemon Chrome, with or without a more or less pronounced mesial longitudinal streak of the same colour over the abdomen; in three forms the whole under surface is yellow, in the other forms the remainder of the under parts is pale greyish white, sometimes rather dark grey, which seems to be due to the inner parts of the feathers being darker grey than the tips, so that abraded or badly prepared skins show darker than fine fresh and well-made skins; in the southeastern races, moreover, the flanks seem to be rather darker grey than in the western races.

Unfeathered parts. The species has a brown or yellowish brown iris, though in a few individuals it has been reported as grey (perhaps mistakenly?); the bill is black, with the base of the mandible plumbeous; the legs generally are slate or plumbeous.

Measurements are shown in table I.

TABLE I

Zosterops palpebrosa

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
nilgiriensis	22	53-58	34-41½	55.52	37.91	68.14 %
egregia (Ceylon)	25	51-57	32-37½	53.88	34.56	64.14 %
egregia (Laccadives)	4	55-57	36½-40	55.75	38.00	68.16 %
egregia (Central India)	22	52-57	33½-38	54.68	35.89	65.63 %
egregia (North-West India)	13	55-57½	35½-39	56.27	37.27	66.23 %
salimalii	9	52-56	32-37	54.11	34.67	64.06 %
palpebrosa (Nepal)	47	51½-57	32½-37	53.85	34.70	64.44 %
palpebrosa (Burma, Assam, Bengal, and Sikkim)	29	51-56	32-36½	53.17	34.34	64.59 %
palpebrosa (China)	12	52-58	33½-37	54.42	35.33	64.93 %
palpebrosa (Siam)	14	52-55	32½-36½	53.35	34.32	64.38 %
palpebrosa (Indo-China)	27	50-54½	32½-38	52.65	35.15	66.74 %
nicobarica (Andamans)	12	52-56	33½-36	54.54	35.00	64.17 %
nicobarica (Nicobars)	5	52-55	32-35	53.00	33.50	63.21 %
siamensis	25	51-54½	31½-35	52.08	33.31	63.98 %
williamsoni	22	50-56	30-35½	52.93	33.14	62.60 %
auriventer	27	49-56	27-34	52.65	31.17	59.20 %
buxtoni	114 (11) [1]	48-53½	29-32½	50.63	30.68	60.21 %
melanura	59 (9) [2]	50-55	28-35	52.45	32.28	61.29 %
unica	4	51-54	29½-31	52.25	30.75	58.13 %

1) Wing-measurements of 114 specimens, other measurements and tail : wing index of 11 specimens only.

2) Wing-measurements of 59 specimens, other measurements and tail : wing index of 9 specimens only.

Structure. In all races, the 2nd primary is in length between the 6th and the 8th. The tail indices for the various races are shown in the table.

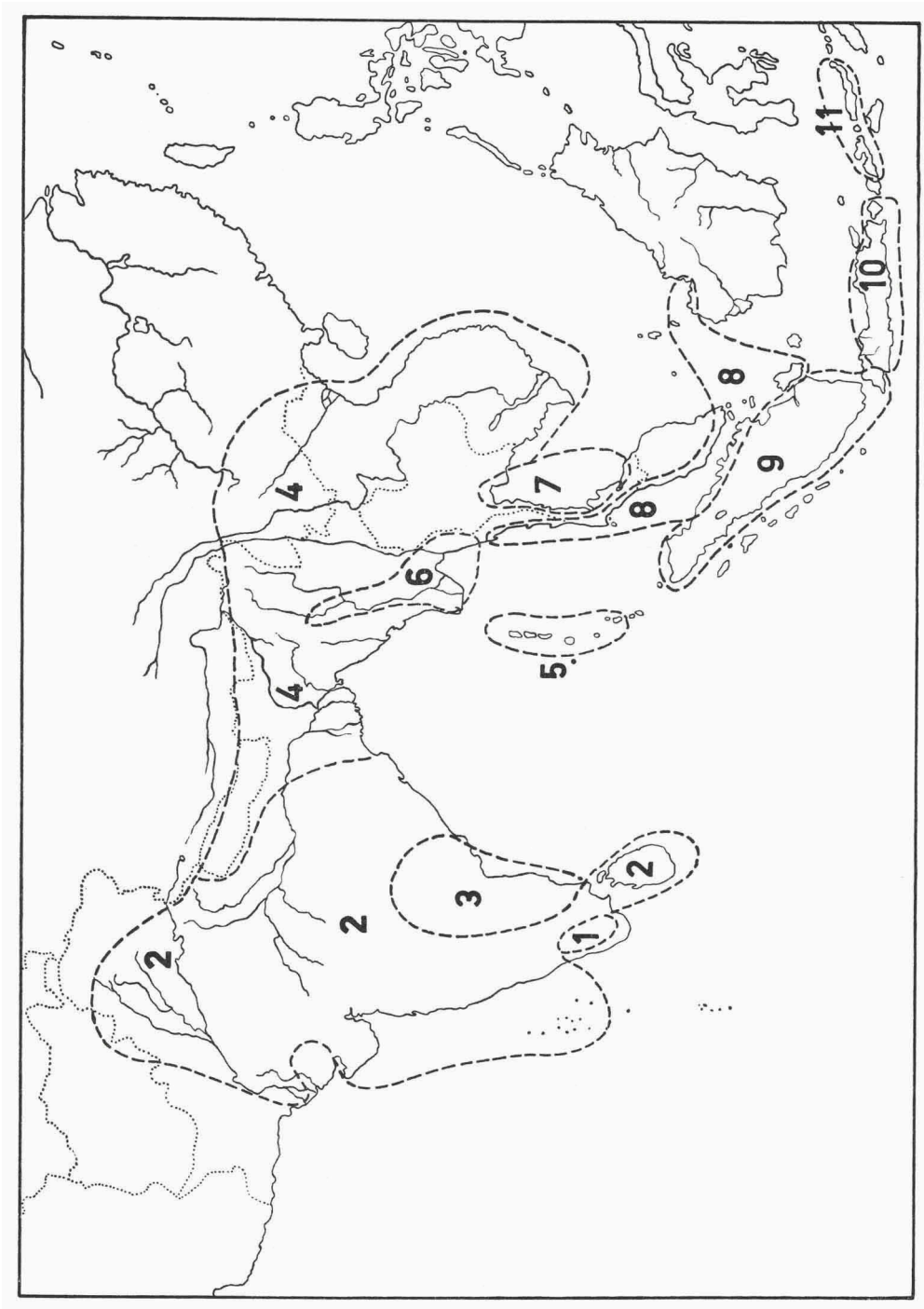

Fig. 3. The distribution of *Zosterops palpebrosa* and races; 1, *nilgiriensis*; 2, *egregia*; 3, *salimalii*; 4, *palpebrosa*; 5, *nicobarica*; 6, *siamensis*; 7, *williamsoni*; 8, *auriventer*; 9, *buxtoni*; 10, *melanura*; 11, *unica*.

Distribution (fig. 3). Eastern Afghanistan (Djalalabad, only locality known), all Indian Empire — except the arid western part and probably northern Kashmir — including the Laccadives, Ceylon, the Andamans and the Nicobars; Yunnan; Szechuan; the whole of Siam and Indo-China; Malaya, Sumatra, islands between Sumatra and Borneo, and Western Borneo; Java, Bali, Soembawa, and Flores.

Ecology. Varies with the different races; probably the majority of forms inhabit hilly country from about 200 to 2000 m altitude, but some races seem addicted to true lowlands and mangroves. These ecological differences will be dealt with in the discussion of the various races.

Geographical variation. In the description of the species, those characters that can vary according to race, have already been briefly mentioned.

Because of some theoretical considerations about the appearance of a yellow belly in some races and not in others (Murphy, 1929; Stresemann, 1931; Mees, 1951), it is interesting to note the presence of a yellow belly in two (not three as suggested by Stresemann, 1939, for the occurrence of a yellow-bellied race in Borneo cannot be accepted, cf. Mees, 1954) different and widely separated parts of the range of the species; in southern Burma, where *siamensis* occurs, and in Java, Bali, Soembawa and Flores, where the very similar races *melanura* and *unica* occupy a probably contiguous range (the species has not yet been found in Lombok, but as in the also fairly well-explored island of Bali it was not discovered until 1938, I feel confident that it will eventually be found in Lombok also).

The genetical background of the change of a grey to a yellow belly probably being more complicated than suggested by Murphy (1929) and Stresemann (1931), at least in the species here discussed, it is important to point out that the yellow bellies of *siamensis* on the one hand, and of *melanura* and *unica* on the other hand seem to have arisen independently, for in all characters, besides the yellow belly which the two groups share to the exclusion of the other races, each of the yellow-bellied races is closer to its grey-bellied neighbour than to the other yellow-bellied race. The characters that in this connection are particularly significant include the greenish edges of the tail-feathers. These are present in the nominate race, and also in *siamensis,* the range of the latter being surrounded by that of the nominate race. In colour and dimensions *siamensis* also agrees perfectly with the adjacent populations of *palpebrosa.* The race *williamsoni,* inhabiting the eastern coast of the Malay Peninsula, has the greenish edges present, but faint; *auriventer* lacks them, or has in a few instances but the faintest traces. The forms inhabiting the Soenda Islands, *buxtoni, melanura,* and *unica,* share an entirely brownish black tail, and are greener on the upper

parts. The evidence supplied by general coloration, therefore, leads to the conclusion that no geographically difficult explainable shifts have taken place in the past, but that the races, as we now know them, must have originated in about the regions where they live at present.

More particulars about the shift from a grey to a yellow belly will be given in the discussion of the species *Z. montana.*

Related species. Probably because of the fact that it belongs to the great group of species of the general *Zosterops*-type, *Z. palpebrosa* has been associated with more species than perhaps any other member of its genus.

Until quite recently the forms of *Z. montana* were considered to belong to *palpebrosa,* whereas the forms of *palpebrosa,* co-occurring with them were placed in the separate species *Z. auriventer* and *Z. melanura* (the group of races of *palpebrosa* without greenish edges to the rectrices, *Z. auriventer* in this sense not to be confused with *Z. aureiventer* auct. = *Z. everetti tahanensis* in this revision). As soon as it was realized that the forms mentioned were properly placed with *palpebrosa,* this classification of course became untenable, for there is a large area of overlap between *montana* and *palpebrosa.* Though *Z. palpebrosa* and *Z. montana* have quite different altitudinal ranges, they do meet; in the collection of the Leiden Museum there are specimens of both *Z. palpebrosa melanura* and *Z. montana montana,* collected at Bratan, Bali, 1200 m, by V. von Plessen.

The union between *Z. palpebrosa* and *Z. japonica* lasted even longer, and even now the latter is named *Z. palpebrosa japonica* in perhaps the majority of publications. However, *Z. p. palpebrosa* and *Z. japonica simplex* were found side by side in the breeding season in Yunnan (Rothschild, 1926, p. 318), and the evidence that has accumulated since then seems sufficiently convincing to keep *Z. japonica* and its races distinct from *Z. palpebrosa.* See, however, the discussion of *Z. japonica hainana.*

The endemic white-eye from Engano, *Z. salvadorii,* has been associated with *Z. palpebrosa,* with some doubt as late as 1947 by Delacour, but not on good grounds as I intend to explain under that species.

Since Stresemann's (1931) revision, the Philippine group of forms here united under the name of *Z. everetti* has been united with *Z. palpebrosa,* but in my opinion incorrectly, as I have recently tried to show (Mees, 1954). The same arguments as used for removing *Z. everetti* from the *Z. palpebrosa* relationship pertain to an even stronger degree to *Z. nigrorum* and its races, a species of which Delacour & Mayr (1946) thought that it might belong to *Z. palpebrosa.*

The affinity suggested by Stresemann (1939) between *Z. palpebrosa* and *Z. citrinella* is also, at most, extremely doubtful, as Mayr (1944) has shown.

For further particulars on the relations of the species briefly mentioned here, I refer to the discussions of these species.

In all the cases discussed above, forms were concerned which, at one time or another, were believed to be conspecific with *Z. palpebrosa.* Quite a different problem is of course whether or not they are related as species to this species. A firm morphological base being entirely absent, suggestions in this field can hardly be more than guesswork. I am not able to judge at present if the very close morphological similarity between such forms as *Z. palpebrosa nilgiriensis* and *Z. (chloris) citrinella, Z. montana, Z. japonica meyeni,* etc. rests on genetical affinity, but the wide geographical gaps between some of the similar-looking species would suggest that this needs not necessarily be the case.

Discussion. A visit to the British Museum (Natural History), where I could examine very large series, has enabled me to get some insight into the geographical variation of the present species on the Asiatic continent.

It seems appropriate to begin this discussion with a historical review.

That some variation exists was realized long ago; that the birds from Bengal and Burma are slightly greener than those from Western India was observed by Blanford (1872) and Hume (1876), who identified the greener birds with Swinhoe's *Zosterops simplex,* thus initiating a confusion between *palpebrosa* and *simplex* that even now has not entirely ended. The green form from the Nilghiris was also recognised as distinct at a comparatively early date (Blanford, 1869).

Apart from the races *auriventer* and *siamensis,* which are well differentiated and need not be considered here, Salvadori (1889) was the first to describe, besides the nominate race, a form from the Asiatic continent (Karenni, Karen ind.), *Z. mesoxantha,* which was diagnosed as follows: "Zosterops *Z. palpebrosae* (Temm.) simillima, sed pectore et abdomine in medio flavis distinguenda" and further: "Tutti questi esemplari hanno la fascia giallognola lungo il mezzo del petto e dell' addome, e perciò mi sembra che debbano essere riferiti ad una specie distinta dalla *Z. palpebrosa,* la quale manca di quella fascia; il colore grigio dei fianchi in alcuni è più cupo che non in altri, ma è sempre piu chiaro che non nella *Z. auriventer,* Hume et Davis., nella quale inoltre la fascia gialla sulle parti inferiori è molto più larga".

Madarász (1911) separated the birds from Ceylon from the typical race, diagnosing them as being: "Above light yellowish green (much paler and more yellowish than that of *Z. palpebrosa* Temm.) shading into pure yellow on the front...".

La Touche (1921) described the form of *Z. palpebrosa* from Yunnan

(type locality Mengtsz) as *Z. palpebrosa joannae,* diagnosing it as follows: "Near *Z. aureiventer* Hume, but the yellow stripe down the centre of the under parts joins the yellow throat and is often only slight in extent in some males and is absent altogether in females. The upper parts are a golden green and the flanks are a darkish pink-grey. The white ring round the eye is narrower and the tail longer". Curiously La Touche altogether omits comparison with *williamsoni, mesoxantha,* and the nominate race; the type localities of the first two of these races are much closer to Mengtsz than is the type locality of *auriventer.* Of some of the differences given (the narrower eye-ring, and the sexual difference as regards presence or absence of the yellow abdominal streak) I cannot make much; the other characters are exactly those in which *auriventer* differs not only from *joannae,* but also from *mesoxantha* and from the nominate race.

To decide how many races can be recognised, it is of course important to know the type locality of the species, which in the original description was given as Bengal. The first author to consider this point is Stuart Baker (1922), who thought that: "The type is a dark bird with a wing of 54 mm. and a bill of 11 mm., and evidently belongs to the southern, not the northern form. In 1824 Orissa formed a part of Bengal as did Chota Nagpore, and it is evident that the bird came from one of these places, and I therefore designate Orissa as the restricted type-locality". Following this, Stuart Baker proceeds to describe two new races. The first of these is *Zosterops palpebrosa elwesi,* stated to differ from the nominate race by being "Very much brighter above, and more yellow and less olive-green; also paler below". The type locality was given as Sikkim, and according to Stuart Baker, its distribution embraced the W. Central Provinces, Rajputana, N. W. India and the Himalayas to W. Assam, N. Shan States, and Kauri, Cachen Hills.

The second new race is *Zosterops palpebrosa cacharensis,* type locality Gunjong, N. Cachar, distributed over Assam, south of the Brahmaputra, Manipur, Lushai, Chittagong, Chin Hills. It is stated to resemble "... typical *palpebrosa* closely, but is smaller and almost invariably has a distinct yellow streak down the centre of the abdomen. In this respect it closely resembles the pale southern form of *auriventer,* but it has the long greenish-black tail of *palpebrosa*".

Summarizing Stuart Baker's views, it seems that he distinguished three forms: the nominate race, large and greenish, inhabiting "Bengal, Orissa, E. Central Provinces and southern India, including all the hilly country from Mysore southwards, east and west"; *elwesi* from Northwestern India, etc., including Sikkim, smaller and yellower; and *cacharensis,* greenish as the

nominate race, but smaller and with a yellow streak down the abdomen. No mention is made of *mesoxantha,* which he apparently overlooked.

Robinson & Kloss (1923) were the first authors to comment on Stuart Baker's paper; as they confine themselves to Malaysia, their views need nor concern us here, apart from the fact that they bring the name *mesoxantha* (misspelt *mesozantha* by these authors) in discussion, which name they believe to be referable to *Z. tahanensis.*

Ticehurst (1927) discusses the Indian races, strongly disagreeing with Stuart Baker: "Mr. Baker has separated the bird from Sikkim as *elwesi* as brighter and more yellow above, paler below, and *smaller* than the Bengal bird. It is true that there is a brighter yellow form than *palpebrosa* in India, but it certainly does not come from Sikkim, and, moreover, it is larger, not smaller, than the Bengal bird. Sikkim birds I cannot differentiate in any way from Bengal ones, and *elwesi* therefore becomes a synonym of *palpebrosa*". He proceeds to name this larger more yellow form; as range for his new race *occidentis* (not *occidentalis,* a lapsus that gained a certain foothold in systematic publications) he gives: "N. W. Himalayas (Vale of Nepal westwards to Kashmir), N. W. F. P., Punjab, Sind (Karachi), W. United Provinces, Central Provinces east to Raipur, Rajputana and Bombay Presidency south to Kanara; two from Mysore also appear to be this race".

He also describes *Z. p. nilgiriensis* as follows: "In the Nilgiris and Palani Hills occurs a *Zosterops* which certainly cannot be united with *occidentis,* and it is too large, both in wing and bill, to unite with the typical bird, though it is of the same darker greener type".

He has also something to say on the type locality of the species: "*Zosterops palpebrosa* of Temminck ... was founded on a bird received from Dussumier from Bengal, and it is highly probable, as Dussumier was a French Mercantile Marine captain, that he got it at Chandernagore, near Calcutta. Temminck's plate depicts, so far as one can tell from a plate, the darker type of *palpebrosa,* and this type certainly inhabits Bengal".

Stuart Baker (1930, 1934) sticks to his original views as regards the validity of his races *elwesi* and *cacharensis,* and maintains as type locality for the nominate race Orissa, further restricting it to Cuttack, and places Ticehurst's *nilgiriensis* in the synonymy of this form. He does, however, recognise *occidentis* as an additional form. He also recognises *mesoxantha,* of which he makes *tahanensis* a synonym.

Stresemann (1931), in his revision, evidently follows Ticehurst; he recognises both *occidentis* and *nilgiriensis* and rejects the two names proposed by Stuart Baker, which he places in the synonymy of the nominate race, to which he also brings *joannae.* For the typical race he gives the distribution:

"Yünnan, Nord-Siam, Franz. Indochina, S. Shan Staaten, Assam, Sikkim, Bengalen...; ferner gehören hierher anscheinend auch die Vögel von Arakan, Nord- und Südost Pegu und des äussersten Nordens von Tenasserim".

In 1935, Whistler describes an additional race from the southern Ghats. As apparently hardly any earlier collected material from this part of India was present in collections, this race, fortunately, does not affect the main trend of the picture.

Greenway (1940), dealing with the birds from northern Siam only, restores *Z. p. joannae* to validity, which is argumented as follows: "Since writing his last paper on Zosterops (Journ. f. Orn., 87, 1939, pp. 156-164), Stresemann, having seen topotypes of *Zosterops palpebrosa joannae* and many specimens collected by Deignan in Siam, has changed his mind. He writes on August 25, 1939 to James Peters: "*Palpebrosa* from Mengtz, called *joannae* by La Touche, is very near to *mesoxantha* Salvadori, but has the flanks a slightly darker grey and the upperside more greenish, less yellowish. The name *joannàe* may stand, therefore, but the racial characters are very feebly pronounced".

Stresemann does not make it clear whether or not he now considers *mesoxantha* to be separable from *palpebrosa*, with which he synonymized it...".

Deignan (1943, 1945) goes even further in splitting, he recognises within Siam both *mesoxantha* ("Our bird is neither *palpebrosa* (Bengal), which has the underparts vinaceous-ashy and the mesial streak of exceptional occurrence, nor is it *auriventer*..."), and *joannae*.

Very recently additional races from India and Afghanistan have been described by Koelz (1939, 1950). These will be dealt with in the discussion of the synonymy of the races to which they belong.

Ripley (1950) closes the row of disagreeing authors with an attack on Ticehurst, his remarks being of sufficient importance to be quoted in full:

"A large series of males and females from Nepal have wing measurements of 51-56. Ticehurst (1927) redescribed the northern Indian White-eye in an extraordinarily offhand way. Earlier Baker (1922) had revised some of the Oriental *Zosteropidae*, restricting the type locality of *Zosterops palpebrosa palpebrosa* to Orissa. He then separated the northern and western Indian population as *elwesi* on the basis of brighter yellower upper part, paler under parts, and smaller size. His type locality was given as Sikkim. Ticehurst (op. cit.) revised this range to exclude Sikkim, and renamed the population, noting that it is larger not smaller than typical *palpebrosa*, but otherwise is paler and more yellow as Baker had pointed out.

Fortunately all these birds appear similar above and below, there being a certain amount of individual variation in the shade of greenish-yellow or

yellowish-green, particularly on the upper parts. I would, therefore, include them all with *palpebrosa*, thus agreeing with Stresemann (1939). It is perhaps inappropriate to comment on the above nomenclatorial whirligig, but I can hardly refrain from dubbing Ticehurst's act irresponsible. It is quite clear from Baker's paper what he was trying to get at, and it is also fairly apparent from the material when Nepal specimens are included, as they should have been by Ticehurst, that Sikkim birds fit in with those from farther west.

As for measurements, they show little difference between the two populations. For *p. palpebrosa* we have: wing ♂♂ and ♀♀ 49-57 mm. (Baker's, Ticehurst's and mine), and for "*elwesi*" (including "*occidentalis*") [lapsus for *occidentis*!] ♂♂ and ♀♀ 49-59 mm. (Baker's, Ticehurst's and mine)".

My own investigation of the problem leads to the following results: the yellowest birds, moreover with smaller bills than in any other subspecies, occur in southeastern India (Ghats); they are even more yellow than specimens from N. W. India and Ceylon. They usually have a feeble yellow streak over the centre of the abdomen, which is generally (but not always) absent in birds from N. W. India and Ceylon. The name *salimalii* is available for these populations.

As regards the yellow upper parts of *salimalii*, it must be stated that all the specimens available of this race are extremely well prepared skins; this is certainly the cause of their being whiter underneath than the majority of specimens from other localities, and may have to do something with their general brightness and yellowness too. Nevertheless, on the base of the material now available, it seems justified to recognise them as a distinct race. Though Whistler & Kinnear (1934) give as wing length up to 57.5 mm, I find them not larger than 56 mm, average 54.11 mm.

In the Nilgiri and Palani Hills there is a form, well characterized by its large bill, fairly large measurements, and green upper parts. There is no doubt about the validity of *nilgiriensis*, of which *palniensis* is of course a synonym.

The remainder of India, with the exception of the range of the nominate race discussed below, is inhabited by a rather yellow form, which is somewhat variable in dimensions, but is generally rather large; unlike previous authors I am quite unable to differentiate birds from North-Western India from those inhabiting Ceylon, though the former run somewhat larger in dimensions. After comparison of very large series, I am convinced that all the birds from India and Ceylon, with the exception of *salimalii*, *nilgiriensis*, and the nominate race, should be united under one name, *egregia*. Ticehurst's

occidentis is a synonym not of *palpebrosa* (as proposed by Ripley) but of this form.

Remains the nominate race. As stated above, the type of the species does show traces of a yellow streak on the belly, which is absent in birds west from Bengal; therefore I agree with Ticehurst's restriction of its type locality to Chandernagore, Bengal, rather than with Stuart Baker's earlier restriction to Orissa. Though Stuart Baker may be right in his claim that Orissa formed part of Bengal in 1824, Temminck clearly stated that his bird came from Bengal, and it seems not at all desirable to restrict its locality of provenance to a place now outside that country; moreover, as both Stuart Baker and Ticehurst correctly noted, the type is of the more greenish appearance known to inhabit Bengal, whereas I am not sure what kind of birds inhabit Cuttack, Orissa, whence I have not seen material, and where I am not even convinced that the species occurs. For the time being I see no reason for accepting any restriction of the type locality at all, as Bengal seems to be inhabited by a more or less uniform population, though the yellow streak present in the eastern Bengal birds becomes increasingly feeble towards the west. If a restriction is necessary, and if it can be proven that in Cuttack white-eyes occur that are similar to the type-specimen, for reasons of priority Stuart Baker's restriction should be accepted, but before this is certain, I prefer to keep it Bengal.

On the average the birds from Bengal and Burma are greener than those from western India and Ceylon. As regards Ripley's view quoted above, I must admit that in my opinion Ticehurst was right in sinking *elwesi* in the synonymy of the nominate race, because not only the Sikkim birds, but also all the specimens I have seen from Nepal, belong to this slightly greener race, and are fairly small. The fact that Ticehurst incorrectly included Nepal into the range of his *occidentis* — though contrary to Stuart Baker's previous effort he did choose as type locality an area inhabited by more yellow-backed specimens — has evidently caused this divergence of opinion between Ripley and myself as concerns the identity of *occidentis*. On the other hand I agree with Ripley, and also with Stresemann (1931), that the yellow streak over the abdomen should not be used as a subspecies criterion in this case.

As Greenway (1940) and Deignan (1943, 1945) have stated, birds from Yunnan and Indo-China average slightly greener again than those from Burma and Nepal; therefore these authors are inclined to uphold *joannae*. Though the difference noted really exists, it is so slight that in my opinion it is not advisable to maintain *joannae*; there is also much overlap, the greenest birds from Burma are definitely greener than the yellowest specimens from Indo-China. Deignan (1943) claims the occurrence of both races

(*mesoxantha* and *joannae*) in Siam, but it is quite impossible to assign them with certainty because there is an overlap of probably over 50 %.

The only difference between *palpebrosa* and *mesoxantha* is the yellow streak down the under parts in the latter. As this streak, though feeble, is also present in the type of *palpebrosa*, and as its occurrence in the various populations is somewhat irregular, *mesoxantha* enters the synonymy of the nominate race. In contradistinction to former authors, who have much speculated about the identity of *mesoxantha*, I have been able, through the kindness of Dr. Capra, to directly compare two cotypes, including Salvadori's cotype a, with the holotype of *Z. palpebrosa*. Whereas *mesoxantha* has a stronger yellow streak, which may have something to do with its type locality being very close to the boundary of the range of the entirely yellow-bellied *siamensis*, it perfectly agrees with the type of *palpebrosa* in all other respects.

The race *williamsoni*, which I have kept out of discussion as it is without doubt valid, occurs in Central Siam (Meklong, Bangkok); I know not if, and where, its range is in contact with that of the nominate race. Some authors, beginning with Rothschild (1926), have quite erroneously synonymized *joannae* with *williamsoni*. The specimens I have seen from Indo-China all belong to the nominate form.

Though the differences as noted above between *salimalii*, *egregia*, and *palpebrosa*, may be sufficient to separate the great majority of specimens, there is even between specimens from extreme localities some overlap; it is possible to find Ceylon birds that are as green above as the yellowest of the specimens from Indo-China, and as regards Central India, many specimens can with as much justice be placed with *salimalii* as with *egregia*. Though for the moment I prefer to keep the three forms distinct, I shall be the first to follow anybody who has the courage to unite them under one name, and this is actually what Dr. Junge suggested to me (oral communication), whereas Mr. Moreau, who together with me examined series in the British Museum, would also agree with this further simplification (oral communication).

1. **Zosterops palpebrosa nilgiriensis** Ticehurst

Zosterops palpebrosa nilgiriensis Ticehurst, Bull. B. O. C. 47, 1927, p. 89 — Coonoor, Nilgiri Hills.

Zosterops palpebrosa palniensis Koelz, Proc. Biol. Soc. Washington 52, 1939, p. 76 — Kodaikanal, Palni Hills.

Zosterops Maderaspatensis; Jerdon, Madras Journ. 11, 1840, p. 7 (summit of Neilgherries, abundant).

Zosterops palpebrosus; (pt.) Jerdon Birds India II, 1863, p. 265-266 (Neilgherries); (pt.) Blanford, J. As. Soc. Bengal 38, 1869, p. 170 (Nilgiri); Morgan, Ibis (3) 5, 1875, p. 322 (Neilgherries).

Zosterops palpebrosa; Fairbank, Stray Feathers 5, 1877, p. 407 (Palani Hills: Lower Hills and Kodal grove at the top, where it is plenty); Anonymus, Stray Feathers 10, 1887, p. 478 (Pulnay Hills: Kukal); (pt.) Tristram, Cat. Coll. Birds, 1889, p. 211 (Nilghiris); Davidson, J. Bombay N. H. Soc. 11, 1898, p. 657 (above Ghats, nests at Sirsi); Bourdillon, J. Bombay N. H. Soc. 15, 1903, p. 261 (Travancore); Dewar, J. Bombay N. H. Soc. 16, 1904, p. 153 (Coonoor); (pt.) Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 3 (Nilghiri Hills: Ootacamund, Coonoor); Dewar, Birds Ind. Hills, 1915, p. 190, 236 (Nilgiris, Palni Hills); Kinloch, J. Bombay N. H. Soc. 27, 1921, p. 940 (Nelliampathy Hills, northern boundary of the Western Ghats in their southern division: very common); H. R. Baker, J. Bombay N. H. Soc. 28, 1922, p. 436 (near Ootacamund); Betts, J. Bombay N. H. Soc. 33, 1929, p. 547 (Coorg: a common resident); Berlioz, Ois. & Rev. Fr. d'Orn. N. S. 10, 1940, p. 312 ff. (Nilghiris: commun); Wynter-Blyth, J. Bombay N. H. Soc. 48, 1949, p. 250 (Nilgiri: Bangi, Tappal, common); Betts, J. Bombay N. H. Soc. 50, 1951, p. 227 (Coorg).

Zosterops ceylonensis; Davison, Ibis (5) 6, 1888, p. 146 (Travancore: Chimpani Hills).

Zosterops Ceylonensis; Hatchwell, J. Bombay N. H. Soc. 15, 1904, p. 726 (Coonoor).

Zosterops palpebrosa palpebrosa; (pt.) Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 85 (S. India); (pt.) Stuart Baker, Ibis (11) 4, 1922, p. 143-144 (all the hilly country from Mysore southwards); (pt.) Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 358; Bates, J. Bombay N. H. Soc. 31, 1926, p. 300 (Nilgiri); (pt.) Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 280; (pt.) Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 188.

Zosterops palpebrosa nilgiriensis; Ticehurst, J. Bombay N. H. Soc. 32, 1927, p. 355; Snouckaert, Alauda (2) 3, 1931, p. 16; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 209; Whistler & Kinnear, J. Bombay N. H. Soc. 37, 1934, p. 282; Salim Ali & Whistler, J. Bombay N. H. Soc. 38, 1936, p. 771 (Marāiūr 3500 ft., Sānthanpāra 3500 ft., Pādagiri 3000 ft., Mūnnār 5000 ft., Peermade 3200 ft., Camp Derāmalāi 3000 ft., Panthalam Hills, Balamore Estate 2000-4000 ft., Ashāmbu Hills, nowhere below 1500 ft., highest 7000 ft.); Nichols, J. Bombay N. H. Soc. 39, 1937, p. 824 (Kodaikanal); Koelz, Proc. Biol. Soc. Washington 52, 1939, p. 77; Nichols, J. Bombay N. H. Soc. 44, 1944, p. 406 (Madura District: abundant on the upper hills, common on the lower hills from 1200 ft. to the tops of all the hills); Whistler, Pop. Handb. Ind. Birds, 4th ed., 1949, p. 264; Salim Ali, Birds Travancore and Cochin, 1953, p. 182-183, pl. 14 fig. 3.

Zosterops palpebrosa nilghiriensis; Primrose, J. Bombay N. H. Soc. 40, 1938, p. 504 (Munnar).

Zosterops palpebrosa palniensis; Whistler, J. Bombay N. H. Soc. 43, 1942, p. 36 (strongly doubts validity); Koelz, J. Bombay N. H. Soc. 47, 1947, p. 138 (Kodaikanal).

Zosterops palpebrosa nilgirensis; Koelz, J. Bombay N. H. Soc. 47, 1947, p. 138 (Ootacamund, Kunjapani).

Subspecific characters. The largest race; differs from the other races in Peninsular India (*egregia* and *salimalii*) in being greener above; differs from these races as well as from the nominate race by its larger bill; conspicuously differs from all other races of the species by its relatively much longer tail.

Unfeathered parts. Iris light brown, feet slate colour (Gosse); iris light brown; bill black, base of lower mandible grey or white; legs dark grey (Ripley); iris white [!], bill black, legs greyish black (Ripley).

Measurements. Wing 8 ♂♂, 55-58 (56.88); 7♀, 53-56 (54.57); 22 specimens, 53-58 (55.52); tail 8 ♂, 34-40½ (37.94); 7 ♀, 36-39 (37.36); 22 specimens, 34-41½ (37.91); tarsus 21 specimens, 15-17 (16.07); entire culmen 20 specimens, 12½-14 (13.13); exposed culmen 20 specimens, 9½-11 (10.10); culmen from anterior point of nostril 20 specimens, 7-8 (7.36).

Structurally this subspecies stands apart by its relatively very long tail, the average index of 22 specimens being 68.14 %; the wing formula (7>2) agrees with that of the other races.

Distribution. Nilghiri and Palani Hills, southern India. The vertical range is from about 1500 or even 1000 ft. (Bourdillon, 1903; Salim Ali & Whistler, 1936; Nichols, 1944; etc.) up to the tops of all the hills, at least 7500 ft. (Salim Ali & Whistler, 1936). Within its range this race is evidently common.

First collector. Unknown to me; this race was recorded as early as 1840 by Jerdon. The oldest specimen present in the BM dates from 1872.

Figure. Salim Ali (1953), plate 14 fig. 3 (coloured, but not good, throat brownish instead of yellow).

Type. BM nr. 86.12.1.1690 (type examined).

Moult. Specimens collected in January (1), March (5), July (1), and November (1) are not in moult. Another specimen from July is moulting primaries, the 3rd on both sides being unfullgrown; one specimen from October is moulting primaries, the 3rd on both sides being very short.

The data are qu'te insufficient but it seems likely, also because of what is known of the breeding season, that the main moult takes place from August to October.

Nidification. The main breeding season seems to be from March to May (Bourdillon, 1903; Betts, 1951); Dewar (1904) found several nests near Coonoor in May 1904, and Terry found a nest at Kukala in the Palani Hills in May (Salim Ali & Whistler, 1936). Ogilvie-Grant (1912) records nests from Ootacamund, 11 and 14 March, from Coonoor on 15 and 17 March and 15 April. The measurements as given by Ogilvie-Grant show a good deal of variation, doubtless caused by the fact that he united several races under the name *palpebrosa*. As it is likely that this race, in agreement with its generally larger size, has larger eggs than the other forms of the species, remeasuring of the available eggs is desirable.

According to Betts (1951) breeding is sometimes resumed after the monsoon, but unfortunately no evidence is given.

The nest, as described by various authors, seems typical (Jerdon, 1863; Morgan, 1875), but that it is not always suspended in the fork of a branch

is shown by Bourdillon (1903), who found a nest in the side of a cutting in the road.

The eggs are very pale blue in colour, and a clutch consists of two, rarely three, eggs (Jerdon, 1863; Morgan, 1875; Betts, 1951).

Habits, etc. An abundant species in the higher parts of the Nilghiris, where it is found in woods and in gardens.

Voice. When moving about in small flocks, a continual feeble twitter is kept up, just like the other races (Jerdon, 1863). The song is described as a brief, weak trill (Nichols, 1937).

Discussion. The distinctness of the Nilghiri race was noted as long ago as 1869 by Blanford, who wrote: "Rare in the Central Provinces, I only came across 3 or 4 specimens. The Nilgiri race is a little larger and appears to be a little darker in colour. I only have one specimen to compare... In a specimen from Manthúm the beak is 0.35 [inch]... The bill appears a little variable. The black lores appear rather more developed in the Nilgiri bird. I doubt whether it is wise to propose a distinctive name upon such slight differences, as intermediates may be found". Many subsequent authors have noted the same differences, hence it is surprising that the race was named as late as 1927, on the strength of the characters already enumerated by Blanford.

Whistler (1942) has already expressed strong doubt about the validity of the alleged race *palniensis* on geographical grounds, the Palani Hills being only a spur of the Travancore Hills, where *nilgiriensis* occurs. I have examined two specimens from Kodaikanal, the type locality of *palniensis*, and find them to be identical with topotypical specimens of *nilgiriensis*, hence I fully agree with Whistler's conclusion that this name is doubtless a synonym of *nilgiriensis*.

2. **Zosterops palpebrosa egregia** Madarász

Zosterops egregia Madarász, Ann. Mus. Nat. Hung. 9, 1911, p. 422, pl. 16 fig. 1 — Ceylon (= Kandy).

Zosterops palpebrosa occidentis Ticehurst, Bull. B. O. C. 47, 1927, p. 89 — Simla.

Zosterops palpebrosa remota Koelz, Proc. Zool. Soc. Washington 52, 1939, p. 76 — Jalalabad, Afghanistan (= Djelalabad on Dutch and German maps).

Zosterops palpebrosa amabilis Koelz, Am. Mus. Nov. 1452, 1950, p. 9 — Sasan, Junagarh, Kathiawar, India.

Zosterops annulosus; (pt.) Blyth, J. As. Soc. Bengal 14, 1845, p. 563 (Ceylon).

Zosterops palpebrosus; Hutton, J. As. Soc. Bengal 17, 1849, p. 690-691 (Mussooree); Blyth, Cat. Birds Mus. As. Soc., 1849, p. 220; Leith Adams, Proc. Zool. Soc. London 26, 1858, p. 496 (W. Himalayas); Leith Adams, Proc. Zool. Soc. London 27, 1859, p. 183 (Cashmere and Ladakh); Tennent, Sketches Nat. Hist. Ceylon, 1861, p. 266 (Ceylon); (pt.) Jerdon, Birds India II, 1863, p. 265-267 (India and Ceylon); von Pelzeln, Journ. f. Orn. 16, 1868, p. 29 (Pangi, Serahan, Markanda Mai, Kotegurh im Winter); Beavan, Ibis N. S. 4, 1868, p. 82 (Maunbhoom in the hilly country above

Chalta; Simla); Tytler, Ibis N. S. 4, 1868, p. 197 (Simla to Mussoorie: not uncommon at low elevations and in the valleys); von Pelzeln, Ibis N. S. 4, 1868, p. 311 (translation of paper in Journ. f. Orn. 16); King, J. As. Soc. Bengal 37, 1868, p. 215 (Goona District, C. I., on the Agra and Bombay mail road 200 miles south of Agra); Brooks, Ibis N. S. 5, 1869, p. 57 (Nynee Tal and Almorah, nidification); Hume, J. As. Soc. Bengal 39, 1870, p. 114 (Saugor, C. P.: anything but rare, nidification); Blanford, J. As. Soc. Bengal 41, 1872, p. 158 (Godâvari); Holdsworth, Proc. Zool. Soc. London 1872, p. 458, pl. 20 fig. 1 (Ceylon); Adam, Stray Feathers 1, 1873, p. 384 (Samthur Lake, 25° 58′ N, 75° 5′ E); Hayes Lloyd, Ibis (3) 3, 1873, p. 399 (Kattiawar); Legge, Ibis (3) 4, 1874, p. 22 (Ceylon); Blanford, Ibis (3) 4, 1874, p. 91; Brooks, Stray Feathers 3, 1875, p. 252 (Dhúnda, between Mussoori and Gangaotri); Legge, Ibis (3) 5, 1875, p. 275 (S. E. Ceylon); Butler, Stray Feathers 3, 1875, p. 491 (Mt. Abo, Sambhur); Butler, Stray Feathers 4, 1876, p. 37 (Aboo, the Gir, etc. (Kattiawar) and Koochawan (Jodhpoor)); Fairbanks, Stray Feathers 4, 1876, p. 260 (Khandala, Mahabaleshwar, and Belgaum, along the Sahyadri Mountains; and near Ahmednagar in the Dekhan: common everywhere); Hume, Stray Feathers 4, 1876, p. 463 (Laccadives: occurs in every inhabited island that we touched at); Murray, Stray Feathers 10, 1882, p. 328 (Layaree Gardens, Sind); Murray, Vert. Zool. Sind, 1884, p. 174; Marshall, Ibis (5) 2, 1884, p. 418 (Chamba, N. W. Him.: breeds in my garden); Jesse, Ibis (7) 2, 1896, p. 194, 198 (Lucknow).

Zosterops palpebrosa; (pt.) Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 92-93, pl. 462 fig. 3300-1; Kelaart, Prodr. Faun. Zeylan., 1852, p. 102, 121 (Ceylon); (pt.) G. R. Gray, Hand-List Birds 1, 1869, p. 162 (India, Ceylon); (pt.) A. E. Brehm & Finsch, Gefangene Vögel I, 2, 1876, p. 285 (Ceylon); Hume, Stray Feathers 4, 1876, p. 424, 437 (Pigeon Island and Kiltan, Laccadives: really indigenous); (pt.) Giebel, Thes. Orn. III, 1877, p. 777 (Ceylon); Davidson & Wenden, Stray Feathers 7, 1878, p. 84 (Satara District, S. E. of Bombay); Butler, Cat. Birds Sind, Cutch, etc., 1879, p. 42 (Mt. Aboo and the Gir and Girnar region of Kathiáwár: common, permanent resident); Vidal, Stray Feathers 9, 1880, p. 69 (South Konkan, N. of Goa: scarce); Legge, Birds Ceylon, 1880, p. 582-584 (Ceylon); Butler, Cat. Birds S. Port. Bombay Pres., 1880, p. 57 (not uncommon, permanent resident); Butler, Stray Feathers 9, 1881, p. 413 (Deccan and S. Mahratta Country: not common, as a rule, throughout the region); Reid, Stray Feathers 10, 1881, p. 49 (Lucknow: very common); Davidson, Stray Feathers 10, 1882, p. 311 (W. Khandesh); Swinhoe & Barnes, Ibis (5) 3, 1885, p. 127 (Mhow and Neemuch, C. I.); (pt.) Russ, Handb. Vogelliebh. I, 1887, p. 314 (Zeylon); (pt.) Hume & Oates, Nests Eggs Ind. Birds, 2nd ed. I, 1889, p. 145 (...breeds in Ceylon in June, July, and August); (pt.) Oates, Fauna Brit. Ind., Birds I, 1889, p. 214 (India, Ceylon); (pt.) Tristram, Cat. Coll. Birds, 1889, p. 211 (Ceylon, Cawnpore, Umballa); Barnes, J. Bombay N. H. Soc. 5, 1890, p. 97 (Western India; ...extremely rare in Sind, but...more or less commonly throughout the rest of the Presidency...in Poona...very common; many particulars); Murray, Avifauna Island Ceylon, 1890, p. 136 (Ceylon); Butler, J. Bombay N. H. Soc. 10, 1896, p. 308 (Cocoa-watte Estate, Lunugala, Prov. Uva, Ceylon: very common, breeds in early part of the year); Madarász, Termés. Füz. 20, 1897, p. 357 (Kandy); Betham, J. Bombay N. H. Soc. 11, 1897, p. 317 (Camp Baroda: breeding); Davidson, Ibis (7) 4, 1898, p. 12 (Kashmir: Garhi in Jhelum Valley); Lewis, Ibis (7) 4, 1898, p. 542 (Ceylon); (pt.) Finsch, Tierreich 15, 1901, p. 17 (India, Ceylon, Lakkadiven); Inglis, J. Bombay N. H. Soc. 13, 1901, p. 623 (Madhubani Subdivision, Darbhanga district, Tirhut, C. I.: particulars); Betham, J. Bombay N. H. Soc. 13, 1901, p. 688 (Poona, particulars); (pt.) Dubois, Syn. Av. I, 1902, p. 707; Rattray, J. Bombay N. H. Soc. 16, 1905, p. 423 (Murree Hills and Gullies, Punjab: common, particulars); Ward, J. Bombay N. H. Soc. 17, 1906, p. 111 (numerous in Poonch and Jammu; less so in Kashmir Proper, breeds in April in Kashmir); Ryan, Spolia Zeyl. 5, 1907, p. 14 (Dimbula, Ceylon

4000-5000 ft.); Magrath, J. Bombay N. H. Soc. 18, 1908, p. 287 (Thandiani, Hazara District, N. W. F. P.); C. H. T. Whitehead, Ibis (9) 3, 1909, p. 110 (Kachai, Kohat, N. W. F. P.); Magrath, J. Bombay N. H. Soc. 19, 1909, p. 145 (Murree Hills, particulars on nidification); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 4; Osmaston, J. Bombay N. H. Soc. 19, 1909, p. 753 (Naini Tal: feeding of liquid to young); C. H. T. Whitehead, J. Bombay N. H. Soc. 20, 1910, p. 182 (Kachai, Samana, not observed in the Kurram Valley, a cold weather visitor to the district); Perreau, J. Bombay N. H. Soc. 19, 1910, p. 983-984 (Bakloh, Punjab); Manders, Proc. Zool. Soc. London, 1911, p. 716 (Ceylon); Moss King, J. Bombay N. H. Soc. 21, 1911, p. 90 (Saugor and Damoh Districts, C. P., nests in May and June, particulars); C. H. T. Whitehead, J. Bombay N. H. Soc. 21, 1911, p. 164 (Sehore, C. I., abundant); Mason & Lefroy, Mem. Dept. Agricult. India, Ent. 3, 1912, p. 19, 58 (Pusa, stomach contents); Cave, Spolia Zeyl. 8, 1912, p. 96 (Colombo); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 3 (Kotgarh, Almora, Lucknow, Allahabad, Jhansi, Saugor, Raipur, (C. P.), Lunugala (Ceylon)); D'Abreu, J. Bombay N. H. Soc. 21, 1912, p. 1164 (Balaghat District, C. P.); Osmaston, J. Bombay N. H. Soc. 22, 1913, p. 533 (Gorakhpur in the extreme north-east of U. P.: common); Nock, Spolia Zeyl. 9, 1914, p. 274 (Ceylon, common on Albion Estate, never seen at Hakgala in Nuwara Eliya); Wait, Spolia Zeyl. 10, 1914, p. 9 (Ceylon: common all over the country); Lewis, Spolia Zeyl. 10, 1915, p. 162 (Ceylon, Siyambala-anduwa, Vedda Country); Whistler, Ibis (10) 4, 1916, p. 44 (Jhelum District); Currie, J. Bombay N. H. Soc. 24, 1916, p. 562 (Lahore: fairly common, breeds in April and May); Whistler, J. Bombay N. H. Soc. 24, 1916, p. 583 (Dalhousia, Chamba State: common in the foot-hills above the tonga-road in May); Whistler, J. Bombay N. H. Soc. 24, 1916, p. 691 (Gujranwala District, Punjab: only met with in the district during my visit in December 1913); Betham, J. Bombay N. H. Soc. 24, 1916, p. 833 (Ferozepore, particulars); Whistler, J. Bombay N. H. Soc. 25, 1918, p. 668 (Ambala District, Punjab: met with commonly from the end of October until the end of March at Ambala, Rupar Mubariqpur, Chandighar, and the low hill jungles about Kalka); Jones, J. Bombay N. H. Soc. 26, 1919, p. 604 (Simla Hills: common summer visitor, breeds April to June); Whistler, J. Bombay N. H. Soc. 27, 1920, p. 96 (Simla); Hingston, J. Bombay N. H. Soc. 27, 1921, p. 557 (Dharmsala, Dhauladhar Range, Kangra Valley: a summer visitor to the range, very abundant, particulars); Jones, J. Bombay N. H. Soc. 27, 1921, p. 795 (Campbellpur, Attock District, W. Punjab); (pt.) Fletcher & Inglis, Agricult. Journ. India 16, 1921, p. 595-597, plate; Fairbank, Birds Mahableshwar, 1921, p. 35, fig. (Mahableshwar and plains of the Deccan: common); Osmaston, J. Bombay N. H. Soc. 28, 1922, p. 454 (Pachmarhi, 3500 ft., 22½° N, 78½° E: very common and resident, breeds chiefly in July); Osmaston, J. Bombay N. H. Soc. 28, 1922, p. 546 (Dehra Dun); Gill, J. Bombay N. H. Soc. 29, 1923, p. 107 (U. P.: nidification); Holmer, Bird Study in India, 1926, p. 131 (Punjab); Betham, J. Bombay N. H. Soc. 34, 1930, p. 573 (Poona); Briggs, J. Bombay N. H. Soc. 34, 1931, p. 1076 (Ranikhet: very common); Briggs, J. Bombay N. H. Soc. 35, 1931, p. 393 (Mhow, C. I.; Peshawar); Doyle, J. Bombay N. H. Soc. 36, 1933, p. 504-505 (Poona, nidification); Berlioz, Ois. & Rev. Fr. d'Orn. N. S. 9, 1939, p. 390 (Naini Tal); Hewetson, J. Bombay N. H. Soc. 41, 1939, p. 295, 307 (Betul, C. P.: abundant); Wright, J. Bombay N. H. Soc. 43, 1942, p. 437 (Berar: common resident in Melghat); Frome, J. Bombay N. H. Soc. 45, 1945, p. 424 (Simla foothills between Delhi and Simla: common); Waite, J. Bombay N. H. Soc. 45, 1945, p. 539 (Gaura and Nachar, N. W. Himalayas above Simla); From, J. Bombay N. H. Soc. 47, 1947, p. 287 (Delhi, resident, particulars); Dharmakumarsinhji, J. Bombay N. H. Soc. 48, 1948, p. 189 (Gir and Girnar in Kathiawar: not common); Wright, J. Bombay N. H. Soc. 48, 1949, p. 572A (Dehra Dun, all year round); Jamal Ara, J. Bombay N. H. Soc. 50, 1951, p. 408 (Ranchi); Jamal Ara, J. Bombay N. H. Soc. 51, 1953, p. 843

(Dorand, Ranchi, Bihar State: all year); Hutson, Birds about Delhi, 1954, p. 89 (particulars).

Zosterops; Green, J. Bombay, N. H. Soc. 17, 1907, p. 835 (Ceylon).

Zosterops palbebrosa; Dewar, Birds Ind. Hills, 1915, p. 47 (Western Himalayas).

Zosterops palpebrosa egregia; Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 85 (Ceylon); Stuart Baker, Ibis (11) 4, 1922, p. 144 (Ceylon); Wait, Manual Birds Ceylon, 1925, p. 161 (Ceylon, up to about 4000 ft.); Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 361 (Ceylon and the Laccadives); Ticehurst, Bull. B. O. C. 47, 1927, p. 90 (Ceylon); Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 281; Snouckaert, Alauda (2) 3, 1931, p. 16; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210; Henry, Spolia Zeyl. 18, 1933, p. 147 (Ceylon: Hallinna Estate and Madola near Opanake); Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 191 (nidification); Henry, Spolia Zeyl. 20, 1937, p. 272 (not in Yale Game Sanctuary, S. P., Ceylon); Betts, J. Bombay N. H. Soc. 40, 1938, p. 384 (Laccadive Isl.: numerous at Kadmat and Kaltan, rare on barren Chetlat, not seen on Amini); Whistler, Spolia Zeyl. 23, 1944, p. 197 (Kalawewa 400 ft., Kumbalgamuwa 3000 ft., Nilgada 1000 ft., breeds from June to August, locally up to 5000 ft.); Ripley, Evolution 3, 1949, p. 157 (Ceylon); Phillips, Rev. Checkl. Birds Ceylon, 1953, p. 104 (Ceylon); Wynne, North W. Nat. N. S. 2, 1954, p. 625; Henry, Guide Birds Ceylon, 1955, p. 107 (Ceylon).

Zosterops palpebrosa elwesi; (pt.) Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 85 (E. Central Provinces, N. W. and N. India, Himalayas to N. Assam); (pt.) Stuart Baker, Ibis (11) 4, 1922, p. 144 (W. Central Provinces, Rajputana, N. W. India); (pt.) Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 360; Basil-Edwards, J. Bombay N. H. Soc. 31, 1926, p. 273 (Delhi); Whistler, J. Bombay N. H. Soc. 31, 1926, p. 473 (Punjab, Kangra D.: Kulu and Saraj, probably summer visitor, breeds); Whistler, Ibis (12) 2, 1926, p. 739 (Kangra District, Punjab: common); Osmaston, J. Bombay N. H. Soc. 32, 1927, p. 137 (Kashmir: Srinagar; Pir Panjal in Jammu and Punch); Hudson, J. Bombay N. H. Soc. 34, 1930, p. 825 (Naini Tal, from March till October); Billimoria, J. Sind N. H. Soc. 2, (1), 1934, p. 11-14 (Jacobabad).

Zosterops palpebrosa palpebrosa; Wait, Spolia Zeyl, 12, 1922, p. 181 (Ceylon, particulars); Brown, J. Bombay N. H. Soc. 29, 1923, p. 840 (Ceylon, fuss about snake *Dipsadomorphus*).

Zosterops palpebrosa occidentalis; Briggs & Osmaston, J. Bombay N. H. Soc. 32, 1928, p. 755 (Peshawar District on Kabul River: fairly common in winter); Snouckaert, Alauda (2) 3, 1931, p. 16; Kuroda, Birds Isl. Java I, 1933, p. 122.

Zosterops palpebrosa occidentis; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 281; Whistler, Ibis (12) 6, 1930, p. 119 (Rawal Pindi District, N. W. India: Murree Hills, Changla Gali, Thandiani, breeds commonly in the Murree Hills from about 6500′ downwards); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 209; Ticehurst, J. Bombay N. H. Soc. 32, 1927, p. 354; Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 190 (nidification); Whistler & Kinnear, J. Bombay N. H. Soc. 37, 1934, p. 281 (Anantagiri 3000 ft., Sankrametta 3000-4000 ft., particulars); d'Abreu, J. Bombay N. H. Soc. 38, 1935, p. 103 (Nagpru, C. P.: resident); R. S. P. Bates, J. Bombay N. H. Soc. 38, 1936, p. 535(Kishengana Valley, Kashmir, from Domel to Kheran); Salim Ali & Abdulali, J. Bombay N. H. Soc. 40, 1938, p. 158 (Bombay City, Salsette: common on mainland across harbour, particulars); Whistler, J. Bombay N. H. Soc. 40, 1938, p. 225 (Jodhpur State: Jawar, Jaswantpura); Salim Ali & Whistler, J. Bombay N. H. Soc. 41, 1939, p. 106 (C. I.: Bhopal: Jaithari; Gwalior: Ruthiai, Sanchi, Gwalior, Satanwara, Shivpuri, Chanderi, Sandarpur; Dhar: Mandu; common in gardens and wooded country); Salim Ali, J. Bombay N. H. Soc. 42, 1941, p. 732 (Bahawalpur, Punjab: Harunabad, Bhung, Chachran; uncommon, settling in irrigated areas); Salim Ali & Whistler, J. Bombay N. H. Soc. 43, 1943, p. 589 (Mysore: Namadachiluma 3000 ft., Agumbe 2500 ft., Biligirirangan Hills 4000 ft., Edbuthi 4000 ft., Anaribetta 4000

ft., Bellaji, Bandipur, Sakluhpur, Bababudan Hills (Kemmangundi 4500 ft.), Jagar Valley 2500 ft., Jog, and intermixed with *nilgiriensis*: Biligirirangans); Abdulali, J. Bombay N. H. Soc. 45, 1945, p. 340 (Vizagapatam District: common at Anantgiri and Lamasinghi); Waite, J. Bombay N. H. Soc. 48, 1948, p. 106 (Punjab Salt Range, particulars); Whistler, Pop. Handb. Ind. Birds, 4th ed., 1949, p. 264, pl. 13 fig. 1; Biswas, Rec. Ind. Mus. 45, 1949, p. 256 (Dungardur in Rajputana); Bates & Lowther, Breeding Birds Kashmir, 1952, p. 203 (Kashmir); Dharmakumarsinhji, Birds Saurasthra, 1954, p. 377; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Salim Ali, J. Bombay N. H. Soc. 52, 1955, p. 789 (Gujarat: Ajwa, Dabka, Vaghjipur, Desa, Dediapada, Mahal, Malegam, Mheskatri, Waghai; Saurasthra: Dalkhania; not recorded from Kutch).

Zosterops palpebrosa egrgia; Phillips, Spolia Zeyl. 19, 1936, p. 345 (Mousakande Group, Gammaduwa, Central Province, Ceylon: nests chiefly during April).

Zosterops palpebrosa egregcria; Koelz, Am. Mus. Nov. 1452, 1950, p. 10.

Zosterops palpebrosa amabalis; Dharmakumarsinhji, Birds Saurasthra, 1954, p. 377, pl. 23 fig. 8 (Saurasthra).

Zosterops palpebrosa egregaria; Dharmakumarsinhji, Birds Saurasthra, 1954, p. 377.

Zosterops palpebrosa amabilis; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Very near to the nominate race, but differs in series in averaging slightly more yellowish above; the yellow mesial streak over the abdomen is in this race of rather exceptional occurrence.

Differs from *nilgiriensis* in being yellower above, and in its slightly smaller bill, as also in its relatively somewhat shorter tail. Differs from *salimalii* in its on the average slightly larger bill, and by usually (though not always) lacking a yellow streak over the centre of the under parts, which is present in all specimens of *salimalii* that I had the opportunity of examining.

Unfeathered parts. Ceylon: iris brownish grey, bill blackish, legs and feet slaty blue (Feruundo); eye dark brown, bill blackish (Vanderzil); iris brown; bill black, base of lower mandible pearl grey; feet grey (Ripley); iris brown, bill black, base of lower bluish; feet bluish (P. W. Lowe); see also the notes by Legge (1880).

Central India: iris brown; bill dusky plumbeous; legs and feet lavender grey (Butler: Belgaum).

N. W. India: iris yellowish brown; bill black, lighter at base of lower mandible; feet greybrown (Whistler: Ferozepore); iris yellow brown, bill black, feet plumbeous grey (Whistler: Jhelum); iris light hazel; bill black, lower mandible grey at base; legs greyish brown (Ward: Naini Tal).

Measurements. Ceylon: wing 12 ♂, 51-56 (53.75); 9 ♀, 51-56 (53.89); 25 specimens, 51-57 (53.88); tail 12 ♂, 32-36 (34.67); 9 ♀, 32-35½ (33.94); 25 specimens, 32-37½ (34.56); tarsus 24 specimens, 14¼-16 (15.13); entire culmen 23 specimens, 11-13 (11.89); exposed culmen 23 specimens, 8-10 (9.45); culmen from anterior point of nostril 23 specimens, 6-7½ (6.68).

Laccadives: 4 males, wing 55-57 (55.75), tail 36½-40 (38.00), tarsus 15¼-16¾ (15.88), entire culmen 11½-13½ (12.75), exposed culmen 8-10 (9.06), culmen from anterior point of nostril 6-7 (6.63).

Central India: wing 14 ♂, 52-57 (54.96); 6 ♀, 53-56 (54.08); 22 specimens, 52-57 (54.68); tail 14 ♂, 33½-38 (36.00); 6 ♀, 34-37 (35.67); 22 specimens, 33½-38 (35.89); tarsus 22 specimens, 14-16½ (15.25); entire culmen 22 specimens, 11-12 (11.64); exposed culmen 22 specimens, 8-9½ (8.72); culmen from anterior point of nostril, 5¾-7 (6.27).

N. W. India: wing 8 ♂, 55-57 (56.31); 4 ♀, 55-57½ (56.50); 13 specimens, 55-57½ (56.27); tail 8 ♂, 36-39 (37.75); 4 ♀, 35½-38 (36.63); 13 specimens, 35½-39 (37.27); tarsus 12 specimens, 14¼-16 (15.42); entire culmen 12 specimens, 11½-13½ (12.28); exposed culmen 12 specimens, 8¾-9¾ (9.21); culmen from anterior point of nostril 12 specimens, 6-7½ (6.67).

Distribution. Ceylon, the Laccadives, and all India with the exception of the ranges of the nominate race, of *salimalii,* and of *nilgiriensis.* It is absent from some of the arid parts of western India, though following irrigation; but it does occur in eastern Afghanistan (Djelalabad). Its boundary to the north is apparently somewhere in northern Kashmir — it has not been recorded from Thibet or Pamir, though it has been taken, and is apparently common, quite close to the Thibet frontier. In the South, specimens from Mysore can be ascribed to this race; the ranges of the respective races in this area need working out. A specimen from Vizagapatam on the eastern coast clearly belongs to the present race.

The vertical range is very great, the race occurs in Ceylon and on the Laccadives at sea-level, as probably in Kathiawar, near Bombay, and elsewhere; and ascends in the Himalayas to over 7000 ft., although I have not examined material from over 5000 ft., which brings the northern populations in line with those from Ceylon, where it is reported to occur locally up to 5000 ft. (Whistler, 1944; Phillips, 1953), or even 6000 ft. (Henry, 1955).

Over the greater part of its range the race is common.

First collector. Not traced.

Figures. Madarász (1911), plate 16 fig. 1 (coloured); Holdsworth (1872), plate 20 fig. 1 (coloured, natural size, by J. Smit); Fletcher & Inglis (1921), plate opposite p. 595 (coloured, fair); Henry (1955), plate 8 (coloured, but reduced to $^1/_3$ natural size, hence not of much use).

Type. At least three cotypes, collected by Madarász near Kandy (Madarász, 1897) are or were in the Hungarian National Museum. A few weeks prior to the recent troubles in Hungaria I have written to the director of this institute, but no answer has reached me. If the press information concerning this museum is correct, it must be feared that the types are destroyed [1]).

1) It is practically certain now that the types are destroyed (cf. Anonymus, Nature 179, 1957, p. 939-940, and Journ. f. Orn. 98, 1957, p. 226).

Moult. Ceylon: specimens collected in January (1), February (3), May (1), July (1), September (1), November (1), and December (2) are not in moult. One specimen from January is moulting primaries and rectrices; out of two specimens from June, one is moulting primaries, no tail moult, the other is moulting rectrices, no wing moult; one specimen from August is moulting primaries, no tail moult; one specimen from September is moulting primaries and rectrices; out of two specimens from October, one has nearly completed its moult, the 2nd primary on both sides being slightly too short, and with its base in a sheath, the remainder of its plumage being very fresh, whereas the other is moulting both primaries and rectrices.

Central India: specimens collected in January (4), February (2), March (3), April (2), June (1), August (1), September (2), October (1), November (2), and December (3) are not in moult.

North-Western India: specimen collected in February (1), April (2), May (1), June (2), July (1), November (2), and December (3) are not in moult. One specimen from October (type of *occidentis*) is moulting secondaries.

The evidence is not at all conclusive, but perhaps the main moult takes place about August-October.

Nidification. This is one of the very few forms of white-eye of which something like a complete nesting history is known; it was contributed by Doyle (1933), the gist of his story being summarized here: On 16 July 1932 he saw a pair of White-Eyes very busily prospecting in his verandah at Poona; the 20th the nest was complete, and the 21st the first egg was laid. The hen did not sit close on that day or the next and easily took fright. On the 23rd the second egg was laid, with which the clutch was completed; and the parent birds sat very close from this date. Both eggs hatched on 2 August; the young were fed and sheltered by both parents, and left the nest in the morning of the 12th, taking up their position in a tree nearby, not moving further afield until the 13th.

This note, of which the author modestly wrote that he sent it to the editors in case they might think it of sufficient interest to merit publication, actually gives several important particulars that are not available elsewhere. The careful mentioning of dates of egg laying and hatching, make it evident that the incubation took about ten days or perhaps slightly longer than that.

Recently Nice (1953) has severely critizised a number of published records of ten day incubation periods for species of the genus *Zosterops,* and it is indeed very unfortunate that aviculturists have not more often contributed exact results of their findings when breeding members of the genus; nevertheless the references to ten day incubation periods are more plentiful in

literature than Nice surmised, and she has apparently not consulted Doyle's paper; as regards an other species, T. W. Taylor's (1934) record of "ten days" for *Zosterops lateralis* in New Zealand has been omitted from discussion. In the latter case one might of course be inclined to think that aviculturists and ornithologists in New Zealand were somewhat prejudiced for a ten day incubation period because of the works of Buller (1888) and Oliver (1930); nevertheless, I wonder if Nice is justified in a priori assuming the longest possible time deducible from the data given by Page (1911) and Perreau (1911) to be the correct one. I fully agree that the ten day incubation periods for *Z. lateralis* are all somewhat doubtful, but it is interesting to note that Page, Perreau, and Doyle for *Zosterops palpebrosa* all give ten days. It may be that the small tropical species *Z. palpebrosa* has a slightly shorter incubation period than the large southern *Z. lateralis* has in a much cooler climate.

If, assuming of course that Doyle's observations are correct, we suppose that the bird started incubation as early as midnight on the 23rd, and count this day for the full 24 hours, this means that if the eggs hatched the 2nd August late in the night (which is not true, as Doyle observed the young for some time when in a tree near by), the incubation may have lasted as long as 264 hours, but much more likely it was somewhere between 240 and 264 hours — even if we assume, as is perhaps justified, that the last egg was not laid on the 23rd July, but already on the 22nd late in the night, and incubation started at once. Admittedly the evidence is still somewhat flimsy, but nevertheless I am inclined to believe that the incubation in this case took about 10½ days, and that it is justified to give as incubation period for *Z. palpebrosa egregia* 10-11 days.

It is to be hoped that aviculturists in future will carefully note the exact hours of laying and of hatching, if possible with every egg marked, and subsequently publish their results in a magazine with a wide distribution. The contribution of aviculturists to science has hitherto been much smaller than it might have been.

Another important particular given by Doyle (1933) is the fact that both sexes take about equal parts in incubation and sheltering of the young. Unfortunately he does not precisely state whether or not both sexes participated in nest-building.

The fledging period of ten days as given by Doyle, agrees with the experience of others (Taylor, 1934) — Taylor actually thinks that his birds left the nest too early as a consequence of repeated controls, and maybe he is right, but it is, as with the incubation period, uncertain that *Z. lateralis* develops completely like *Z. palpebrosa*. That, actually, there is a great deal

of variation in period of incubation and fledging period in the genus, is shown by the work of Gibson-Hill (1950), who found in *Zosterops natalis* an incubation period of not less than 15 or 16 days and a fledging period of 17 days.

Doyle is by no means the first author to contribute to the life history of this form; remarkable is the early work of Hutton (1849) at Mussooree — his description has been much quoted, among others in the standard work of Hume & Oates (1889). Other authors who have written on nidification of the race are: Brooks (1869), Hume (1870), Legge (1880), Davidson (1886), Barnes (1890), Betham (1901), Inglis (1901), Rattray (1905), Ward (1906), Moss King (1911), Wait (1922), Gill (1923), Stuart Baker (1934), Phillips (1936), From (1947), and Waite (1948).

A combination of the published evidence shows that the breeding season extends from January till October, though generally not after September, and that, according to locality, there is a peak from about April to June. The clutch size varies from 2 to 4; two eggs was considered the normal clutch by Oates and Blanford, but Moss King (1911) in the environments of Saugor found never two, but either four or three, whereas Davidson (1886) also mentioned four, and Inglis (1901) found generally three, once two, and once four eggs at Tirhut. Rattray (1905) once found a nest with five eggs near Changlagali, but this is probably exceptional.

Of course, large clutches are no proof that large numbers of young are raised; Betham (1901, 1916) has considered this problem, but his whole theory seems built on one single case, where two young out of a brood of four died, apparently as a result of negligence from the side of their parents, and therefore loses much of its interest, being based on an incidental observation.

One brood only every season is reported (Barnes, 1890), though one wonders how this could be ascertained.

Measurements of eggs from North West India and from Ceylon are given by Stuart Baker (1934).

Habits, etc. In habits this form does not differ from the other Indian races; as regards its vertical distribution it is interesting to note that apparently it does not avoid true lowlands — also that in Ceylon it is found up to about the same altitude as in other parts of its range, so that one must be careful with concluding that its vertical distribution in Ceylon may be limited by competition with *Z. ceylonensis*. Even though in the Himalayas Stoliczka (1868) found it ranging up to 12000 ft. in summer, this elevation is so much above what has been recorded by others that I consider its occurrence there exceptional; normally it probably does not ascend higher

than to about 7000 ft., apparently coming down to the plains during the winter.

These vertical seasonal movements, occurring in this species as in a number of other Himalayan birds, are very interesting and deserve to be studied more fully than hitherto has been done. At least, as far as *Z. palpebrosa* is concerned, I have not found anything but scattered notes on the subject (Hutton, 1849; Stoliczka, 1868; A. E. Jones, 1919; Hingston, 1921). Whistler (1918) found it in Ambala District, Punjab, especially in winter, commonly from the end of October until the end of March.

Literature on food is very much scattered; here too, it seems that Hutton (1949) was the first to contribute exact evidence; he saw the birds feeding upon the small black berries of a species of *Rhamnus*. d'Abreu (cf. Fletcher & Inglis, 1921) found berries of *Zizyphus oenoplia* in a stomach. Further vegetable matter includes small buds and seeds, ripe mangoes and guavas and other ripe fruit. Mason & Lefroy (1912) identified insect-remains from a number of stomachs of birds shot at Pusa, among them, besides some unidentified insects, *Camponotus compressus* (Fabr.), *Tanymecus hispidus* Marshall, *T. indicus* Faust, *Phydole malinsi* Forel, *Polyrhachis simplex* Mayr.

On the habit of visiting flowers and sucking nectar, which undoubtedly occurs in this form like in other races, very little, if anything, seems to have been published.

Osmaston (1909) made an interesting observation at Naini Tal, where he saw a parent bird feeding a young in the nest with liquid. Perhaps his interpretation, that liquid was given to make it easier for the young bird to swallow a large insect, is not the correct one; the bird might as well have been feeding nectar to its young.

As regards natural enemies of this form, Green's (1907) suspicion that bats of the genus *Megaderma* might catch and eat it is worth mentioning. Osmaston (1922) saw a specimen as a prey of the drongo *Dicrurus macrocercus macrocercus* Vieill.

Though this form is generally stated to be purely arboreal, Doyle (1933) found that it was not strictly so, as he saw his couple on more than one occasion fly down to the gravel path in his garden.

The reason why I have made mention of so many more or less casual observations is that it seemed worth while to show how little is known of even this common form; many of the more interesting observations are badly in need of confirmation, other habits of these birds have probably remained altogether unnoticed, and any serious observer in India should be able to materially contribute to the knowledge of this familiar bird. These remarks of course pertain equally well to the other Indian races of the species.

Voice. According to Salim Ali & Abdulali (1938) the male has a pretty, rather feeble, tinkling song reminiscent of the Nilgiri Verditer Flycatcher's, *Muscicapa albicaudata* Jerdon, which is uttered from some exposed branch. Mention of song was also made by Lister (1954).

Discussion. Within its large range this race is not uniform, though it seems not justified to recognise races on the base of these slight and gradual differences. A comparison of average measurements (table I) shows that the birds from the northwestern Himalayas average not only decidedly larger than those from Central India and Ceylon, but also have a slightly greater tail index. The 4 specimens from the Laccadives are remarkable for their very long tails, agreeing with *nilgiriensis* in this respect. It is difficult, however, on the base of 4 specimens, to decide if this difference is real; if larger series would confirm it, it might be justified to separate the Laccadives population as a distinct race.

There has been some speculation in the past about the similarity of Laccadive birds to those from Ceylon, but as specimens from western India (Bombay Presidency) agree with those from Ceylon, it is not necessary to fall back on ingenious zoogeographical theories: the coastal area of India opposite the Laccadives is inhabited by birds that are indistinguishable from *egregia*.

Moreau (1957) thought that the subspecies *egregia* and *occidentis* are very like each other, and that the Laccadives birds are actually intermediate in plumage. This was presumably written before we together examined large series originating from all parts of continental Asia in the British Museum, and Moreau (oral communication) agreed with me that *occidentis* is indistinguishable from *egregia*. This conclusion evidently takes away any possibility of the Laccadives birds being intermediate.

Koelz (1950) described an allegedly new race (*amabilis*) from Kathiawar, justifying this separation with the remark: "This is an isolated population of arid Kathiawar". The same claim had been made, nearly eighty years earlier, by Hayes Lloyd (1873), only to be promptly contradicted by that great authority on Indian birds, Blanford (1874).

The diagnosis given by Koelz is not in the least convincing, it reads: "Similar to *Z. p. egregeria* [!] but with bright yellow forehead and brighter throat. Differs from *Z. p. occidentis* by its citrine, not olive green, upper parts and by the whiter flanks and abdomen".

From the USNM I received a number of specimens from Baroda and Kathiawar, identified by Deignan as *amabilis* (besides I have seen many specimens from Baroda and the surrounding parts of India in the BM). This small series is quite homogeneous, and shows uniformly more yellowish above

than the Ceylon specimens (topotypical *egregia*) belonging to the USNM, which I had also out here on loan. These specimens were collected in 1907 and in 1944. Curiously the RMNH series of *egregia* from Ceylon, of which the majority has been collected in 1922, is quite as uniform more yellowish on the mantle than the series of "*amabilis*", so that the two series of *egregia* from Ceylon are more distinct from each other than either of them is from the series of "*amabilis*". I can not explain this, but it shows once again how careful one must be in basing subspecific names on slight differences in shade noticed in small series.

As regards the alleged races *occidentis* and *remota*, I have already stated on a previous page that I can see no difference in coloration between birds from the northwestern Himalayas and those from Ceylon; the existence of a separate race in Afghanistan is altogether unlikely as Whistler (1945) has already pointed out. I have compared specimens from the North West Frontier Provinces, and they are absolutely identical with the type and topotypical material of "*occidentis*". As regards Koelz's material from Afghanistan, I examined a few specimens from the AMNH. One of these is very dull (AMNH nr. A), perhaps it has been preserved in some liquid, at any rate its colour is not normal; the other specimens agree with "*occidentis*".

For completeness' sake I quote here the diagnosis of *remota*, which is as flimsy as we are accustomed from its author: "Similar to a series of *occidentis* from Punjab in collection of the University of Michigan, but is greener above and somewhat darker below".

Birds from N. W. India always lack the yellow streak over the under parts; in specimens from Central India it is sometimes present, though generally absent; one of the specimens from the Laccadives has a distinct streak; in Ceylon specimens it is generally absent, but may sometimes be found.

3. **Zosterops palpebrosa salimalii** Whistler

Zostcrops palpebrosa salimalii Whistler, J. Bombay N. H. Soc. 36, 1933 (15 Dec.), p. 811 — Farahabad 2688 ft., S. E. Hyderabad.

Zosterops palpebrosus; (pt.) Blanford, J. As. Soc. Bengal 40, 1871, p. 274 (Hyderabad).

Zosterops palpebrosa; (pt.) Finn, List Birds Ind. Mus., 1901, p. 76 (Shevaroy Hills).

Zosterops palpebrosa salimalii; Salim Ali & Whistler, J. Bombay N. H. Soc. 36, 1933 (15 Dec.), p. 915; Whistler & Kinnear, J. Bombay N. H. Soc. 37, 1934, p. 281 (Shevaroy Hills, Chitteri Range, Saschachalam Hills, Nallamallai Range 2000 ft.); Whistler, Pop. Handb. Ind. Birds, 4th ed., 1949, p. 264; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Distinguished by the very yellow upper parts, which are pure Pyrite Yellow, even more yellow than in *egregia*; bill finer than in

any other race; perhaps a slightly smaller amount of black under the eye than in the other races of India. The rectrices are broadly edged with Pyrite Yellow, and in nearly all specimens an — admittedly rather weak — yellow streak over the under parts is present; in *egregia* this streak is generally absent.

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

Measurements. Wing 3 ♂, 53½-55 (54.50); 5 ♀, 52-54½ (53.50); 9 specimens, 52-56 (54.11); tail 3 ♂, 34½-37 (35.83); 5 ♀, 32-34½ (33.70); 9 specimens, 32-37 (34.67); tarsus 10 specimens, 14-15¾ (15.03); entire culmen 9 specimens, 11-12¼ (11.42); exposed culmen 9 specimens 8-9 (8.56); culmen from anterior point of nostril 9 specimens, 6-6½ (6.33).

Distribution. South Eastern India, where recorded as follows: Nallamallai Range (S. Kurnool) 2000 ft., Shevaroy Hills (Madras) 3500-4800 ft., Saschachalam Hills (S. Cuddapah) 2000 ft., Mananur (Hyderabad) c. 2060 ft., Farahabad (Hyderabad) c. 2688 ft. (material from all these localities examined); also mentioned from the Chitteri Hills (Whistler & Kinnear, 1934), whence I have not seen material. Within its range it is apparently quite as common as the other Indian forms (Salim Ali & Whistler, 1933).

First collector. Unknown to me; apparently the oldest specimen I have seen is an undated and unsexed specimen from the Shevaroys, collected by W. Daly (Zool. Surv. Ind. nr. 18042), and there is, or was, a series of seven from the same locality and collector in the Indian Museum (cf. Finn, 1901).

Not figured.

Type. BM nr. 1934.10.13.1 (type examined).

Moult. Out of nine specimens examined, collected in the months May (2), September (1), October (3), November (3), two of the October specimens (the third is marked as juvenile), and one November specimen are heavily moulting primaries. The two other specimens taken in November are in fresh plumage and have apparently completed their moult. Evidently the main moult takes place in the autumn about October.

Nidification. Apparently not recorded.

Habits, etc. Not recorded.

Discussion. In the diagnosis, Whistler (1933) noted the following points of difference from neighbouring races: "The upper parts are a very clear yellowgreen, yellower even than in *occidentis*, the bill is very small and fine, and the lower parts have very little of the dark wash noticeable in the other races. This form approaches the Ceylon form *Z. p. egregia*, but can be separated from it in being neither quite such a rich golden yellow above, nor so deep a yellow on the throat, and by the finer and shorter bill". As already

noted elsewhere, I cannot see any constant difference between *occidentis* and *egregia*; and *salimalii* seems to me slightly more yellowish, not less yellow, than *egregia*, as already stated under the heading subspecific characters. The small bill seems a character that does hold in a majority of specimens. Specimens here placed with *occidentis*, from Central India, and even from Rajputana are somewhat intermediate between *occidentis* and this race; a specimen from Mt. Aboo (BM nr. 86.12.1.1610) has a small bill and a yellow streak over the belly and would, were not its locality so far away, doubtless have to be placed with *salimalii*.

For a fuller discussion of the affinities of this form, see under the general discussion of the species.

4. **Zosterops palpebrosa palpebrosa** (Temminck)

Sylvia palpebrosa Temminck, Recueil d'Oiseaux 293, fig. 3, 1824 — Bengale.

Zosterops mesoxantha Salvadori, Ann. Mus. Civ. Genova 27, 1889, p. 396 — Carin Indipend., Villag. d. Tahò 1000-1400 m.

Zosterops aureiventer joannae La Touche, Bull. B. O. C. 42, 1921 (29 Nov.), p. 31 — Mengtz, S. E. Yunnan 4000 ft.

Zosterops palpebrosa elwesi Stuart Baker, J. Bombay N. H. Soc. 28, 1921 (Dec.), p. 85 — nomen nudum.

Zosterops palpebrosa cacharensis Stuart Baker, J. Bombay N. H. Soc. 28, 1921 (Dec.), p. 85 — nomen nudum.

Zosterops palpebrosa elwesi Stuart Baker, Ibis (11) 4, 1922 (1 Jan.), p. 144 — Sikkim.

Zosterops palpebrosa cacharensis Stuart Baker, Ibis (11)4, 1922 (1 Jan.), p. 144 — Gunjong, N. Cachar.

Zosterops palpebrosa vicina Riley, Proc. Biol. Soc. Washington 42, 1929, p. 162 — summit of Doi Sutep, Siam.

sylvia palpebrosa; Lesson, Manuel d'Orn. I, 1828, p. 295.

Zosterops Maderaspatanus; Horsfield, Proc. Zool. Soc. London 7, 1839, p. 161 (Assam); (pt.) Blyth, J. As. Soc. Bengal 12, 1843, p. 985 (Nêpal).

Zosterops palpebrosus; Lesson, Rev. Zool. Soc. Cuvier, 1840, p. 135; (pt.) Horsfield, Cat. Birds East-India Comp. I, 1854, p. 263 (Assam, Nepal); Wood, Ill. Nat. Hist. Birds, 1862, p. 311, fig.; (pt.) Jerdon, Birds India II, 1863, p. 265 (Assam, Arrakan); Godwin-Austen, J. As. Soc. Bengal 39, 1870, p. 109 (Khasi Hill Ranges); Ball, Stray Feathers 2, 1874, p. 314 (Chota Nagpur: Manbhum, Satpura Hills); (pt.) Blyth, Cat. Mamm. Birds Burma, J. As. Soc. Bengal II extra-nr., 1875, p. 110 (Arakan); Ball, Stray Feathers 7, 1878, p. 220 (Bengal: Manbhum; Sambalpur north of Mahanadi, Godaveri Valley, Raipur); (pt.) Mason & Theobald, Burma I, 1882, p. 377 (Arakan, Pegu); Chalmers Mitchell, Proc. Zool. Soc. London, 1911, p. 473 (longevity); Mackintosh, Birds Darjeeling, 1915, p. 147 (Darjeeling, seldom higher than 3000 to 4000 ft.).

Zosterops annulosus; (pt.) Blyth, J. As. Soc. Bengal 14, 1845, p. 563 (Himalaya).

Zosterops madraspatana; G. R. Gray, Cat. Mamm. Birds Hodgson, 1846, p. 73 (Nepal); Lichtenstein, Nomencl. Av. Mus. Berol., 1854, p. 33 (Nepal).

Zosterops palpebrosa; G. R. Gray, Gen. Birds I, 1848, Mniotiltinae, p. 198; Bonaparte, Consp. Gen. Av. I, 1850, p. 398; van der Hoeven, Handb. Dierkunde II, 2nd ed., 1855, p. 765; (pt.) G. R. Gray, Hand-List Birds 1, 1869, p. 162 (India); Hume, Stray Feathers 3, 1875, p. 143 (Upper Pegu, near Thayetmyo); (pt.) A. E. Brehm & Finsch,

Gefangene Vögel I, 2, 1876, p. 285 (von dem unteren Himalayagürtel bis Assam, Arrakan...); Marshall, Birds' Nesting in India, 1877, p. 57 (breeding season); (pt.) Giebel, Thes. Orn. III, 1877, p. 777 (India); J. Anderson, Anat. Zool. Res. Yunnan I, Text, 1878, p. 631 (Momien); Hume, Stray Feathers 7, 1878, p. 403 (Sikkim); Scully, Stray Feathers 8, 1879, p. 322 (valley of Nepal); Hume, Stray Feathers 9, 1881, p. 505 (North-east Cachar); Oates, Stray Feathers 10, 1882, p. 227 (Pegu: Kyeikpadein; this species?); Oates, Birds British Burma I, 1883, p. 342; Reichenow, Vögel Zool. Garten II, 1884, p. 360 (Indien); (pt.) Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 165 (Nepal, Darjiling, Assam, Momien); (pt.) Russ, Handb. Vogelliebh. I, 1887, p. 314 (Indien); Hume, Stray Feathers 11, 1888, p. 253 (distribution); Oates, Fauna Brit. Ind., Birds I, 1889, p. 214; (pt.) Hume & Oates, Nests Eggs Ind. Birds, 2nd ed. I, 1889, p. 140-145 (nidification); (pt.) Tristram, Cat. Coll. Birds, 1889, p. 211 (Darjeeling); Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 288 (du Bengale et du Bhoutan); Stuart Baker, J. Bombay N. H. Soc. 8, 1893, p. 206 (this race?); Inglis, J. Bombay N. H. Soc. 10, 1896, p. 459 (Hylakandy District, Cachar: very common in the tea gardens); Walton, J. As. Soc. Bengal 69, 1900, p. 158 (Almora district near Nepal boundary); (pt.) Finsch, Tierreich 15, 1901, p. 17; (pt.) Finn, List Birds Ind. Mus., 1901, p. 76 (Nepal: Bajali, Thankot, Nepal Valley, Katmandu, Darjeeling Terai); Dalgliesh, Zoologist (4) 6, 1902, p. 202 (Darbhanga District, Tirhoot, Bengal: very common); Dubois, Syn. Av. I, 1902, p. 707; Stuart Baker, J. Bombay N. H. Soc. 17, 1907, p. 789 (Shillong, Khasia Hills); Harington, J. Bombay N. H. Soc. 19, 1909, p. 119 (Bhamo District, Burma: not uncommon in the hills, breeds); Harington, Birds Burma, 1909, p. 81; Harington, J. Bombay N. H. Soc. 20, 1910, p. 520 (Bhamo Hills); Madarász, Ann. Mus. Nat. Hung. 9, 1911, p. 422, pl. 16 fig. 2 (no locality); (pt.) Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 3 (Dibrughar, Assam, eggs); Dewar, Birds Ind. Hills, 1915, p. 110 (Eastern Himalayas); Inglis, Travers, O'Donel & Shebbeare, J. Bombay N. H. Soc. 26, 1920, p. 989 (Jalpaiguri District, Bengal, near Bhutan border: very common); (pt.) Fletcher & Inglis, Agricult. Journ. India 16, 1921, p. 595-597, plate; Porsch, Jahrb. wiss. Bot. 63, 1924, p. 562; Salim Ali, Book Ind. Birds, 4th ed., 1946, p. 166, 167; Stanford, Ibis 89, 1947, p. 508 (north-eastern Burma); Simmons, J. Bombay N. H. Soc. 47, 1948, p. 641 (Chittagong: a fairly common garden bird in every month of the year); Salim Ali, Indian Hill Birds, 1949, p. 127-128 (particulars); Proud, J. Bombay N. H. Soc. 48, 1949, p. 712 (Katmandu, particulars); Lister, J. Bombay N. H. Soc. 49, 1951, p. 718 (Bengal: mixed jungle; Jessore: a few seen occasionally); Lister, J. Bombay N. H. Soc. 51, 1953, p. 375; Lister, J. Bombay N. H. Soc. 52, 1954, p. 57 (Darjeeling: song); Lavkumar, J. Bombay N. H. Soc. 53, 1956, p. 326 (common in the lower Mandakini and at Rudra Prayag, Garhwal).

Zosterops madaraspatana; Hodgson, J. As. Soc. Bengal 24, 1855 = 1856, p. 576 (Nipal).

Zosterops simplex; Blanford, J. As. Soc. Bengal 41, 1872, p. 157 (Eastern Nipal); Hume, Stray Feathers 7, 1878, p. 403 (Sikkim); Stuart Baker, J. Bombay N. H. Soc. 8, 1893, p. 207 (Cachar, particulars); Stuart Baker, Ibis (7) 1, 1895, p. 222 (North Cachar Hills: breeding); Rippon, Ibis (7) 2, 1896, p. 359 (Kalaw, S. Shan States); Turner, J. As. Soc. Bengal 68, 1899, p. 237 (Khambiching, Manipur); Bingham & Thompson, J. As. Soc. Bengal 69, 1900, p. 109 (S. Shan States, Kalaw and throughout the state at an elevation of 3000 ft. and above); Rippon, Ibis (8) 1, 1901, p. 534 (S. Shan); Finn, J. Bombay N. H. Soc. 14, 1902, p. 567 (Calcutta: a very common captive); Hopwood, J. Bombay N. H. Soc. 18, 1908, p. 494 (Maymyo, particulars); Harington, J. Bombay N. H. Soc. 20, 1911, p. 1006 (Maymyo); Cook, J. Bombay N. H. Soc. 21, 1912, p. 670 (Thandaung, Burma: a common little bird); Cook, J. Bombay N. H. Soc. 22, 1913, p. 263 (this species?); Hopwood & Mackenzie, J. Bombay N. H. Soc. 25, 1917, p. 81 (North Chin Hills, Burma: two nests, particulars).

Zosterops siamensis; *Tirant, Ois. de la Basse-Cochinchine, 1879, nr. 119.

Zosterops auriventer; Salvadori, Ann. Mus. Civ. Genova 25, 1888, p. 592 (Thagatà 300-400 m, Sud-Ovest del Mooleyit).

Zosterops aureiventris; (pt.) Oates, Fauna Brit. Ind., Birds I, 1889, p. 215; Rippon, Ibis (7) 3, 1897, p. 2 (Kalaw, S. Shan States); Rippon, Ibis (8) 1, 1901, p. 534 (S. Shan States: very common); Harington, Birds Burma, 1909, p. 81; Cook, J. Bombay N. H. Soc. 22, 1913, p. 263.

Zosterops mesoxantha; Fea, Viaggio di Leonardo Fea LXXVI, Ris. Zool., 1897, p. 62; Finsch, Tierreich 15, 1901, p. 17; Sharpe, Hand-List Birds 5, 1909, p. 4; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 252.

Zosterops palpebrosa Var. *Mesoxantha*; Dubois, Syn. Av. I, 1902, p. 707.

Zosterops aureiventer; Bingham, Ibis (8) 3, 1903, p. 591 (Ménétaung, S. Shan States).

Zosterops palpebrosa palpebrosa; Ingram, Nov. Zool. 19, 1912, p. 303 (Mengtse, S. Yunnan); Stevens, J. Bombay N. H. Soc. 23, 1914, p. 244 (Upper Assam: common throughout the plains in secondary growth); (pt.) Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 85; (pt.) Stuart Baker, Ibis (11) 4, 1922, p. 143 (Bengal); (pt.) Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 358 (Bengal); Riley, Proc. U. S. Nat. Mus. 70, art. 5, 1926, p. 52 (Salween Valley, and between Yünlung and Tanten, this species?); Prater in Landon, Nepal I, 1928, Appendix XIII, p. 314 (Valley of Nepal: exceedingly common throughout the year); (pt.) Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 280; Stanford & Ticehurst, J. Bombay N. H. Soc. 34, 1931, p. 915 (3000 ft., about a mile east of the Taungup pass into Arakan; observed at Thayetmyo); Gee, Peking Nat. Hist. Bull. 5 (3), 1931, p. 66 (China); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 209; Delacour & Jabouille, Ois. Indoch. Franç. IV, 1931, p. 295; Engelbach, Ois. & Rev. Fr. d'Orn. N. S. 2, 1932, p. 493 (commun sur le plateau des Belovens et ses versants, Laos méridional); Chasen & Kloss, Journ. Siam Soc., Nat. Hist. Suppl. 8, 1932, p. 248 (Doi Sutep 4600 ft.); Chasen, Bull. Raffl. Mus. 11, 1935, p. 263 (India); Ludlow & Kinnear, Ibis (14) 1, 1937, p. 482 (Bhutan: Satsalor, Khomanagri, Gamri Chu, Diwangiri: tolerably common up to 5000 ft. in summer); Mayr, Ibis (14) 2, 1938, p. 301 (Singhalinghkamti, Chindwin, Upper Burma); Stanford, Ibis (14) 2, 1938, p. 632 (N. Burma: Sima 4000 ft., Sadon, Mali Valley); Delacour & Greenway, Ois. & Rev. Fr. d'Orn. N. S. 10, 1940, p. 56 (la province du Haut-Mekong et le Royaume de Luang-Prabang: commun partout); Delacour & Jabouille, Ois. & Rev. Fr. d'Orn. N. S. 10, 1940, p. 208 (toute l'Indochine); Smythies, Birds Burma, 1940, p. 219, 532 (Burma, particulars); Stanford & Mayr, Ibis (14) 5, 1941, p. 479 (Burma: Htawgaw 6000 ft., Shingaw 750 ft., in the N'Mai Valley, and between Htawgaw and Laukkaung); Smith, Notes Birds Burma, 1943, p. 155 (Anisakan 3000 ft., Mandalay district; near Maymyo 3500 ft., Mandalay district; Upper Madaya Reserve, Mandalay district; Thandaung 4000 ft., Karen Hills, Toungo District); Ludlow, Ibis 86, 1944, p. 635 (S. E. Tibet: Trashigong 3000 ft., Kinney 4500 ft., Changpu 6500 ft., Diwangiri 2000 ft.); David-Beaulieu, Oiseaux du Tranninh, 1944, p. 162 (Tranninh, particulars); Salim Ali & Ripley, J. Bombay N. H. Soc. 48, 1948, p. 34 (Mishmi Hills: Sadiya, Dening); Roonwal & Nath, Rec. Ind. Mus. 46, 1949, p. 154 (Ragailous Camp, about 63 miles from Imphal on Silchar Road, Manipur, ca. 3250 ft.); David-Beaulieu, Ois. & Rev. Fr. d'Orn. N. S. 20, 1950, p. 37 (province de Savannakhet, Bas-Laos); Ripley, J. Bombay N. H. Soc. 49, 1950, p. 411 (Nepal); Ripley, J. Bombay N. H. Soc. 50, 1952, p. 511 (Naga Hills); Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops paaepebrosa; Stevens, J. Bombay N. H. Soc. 23, 1914, p. 268.

Zosterops mesozantha; Robinson & Kloss, Ibis (11) 5, 1923, p. 151.

Zosterops aureiventer aureiventer; (pt.) Stuart Baker, Ibis (11) 5, 1923, p. 358 (Karenne and the Shan States); Delacour & Jabouille, Ois. Indoch. Franç. IV, 1931, p. 295.

Zosterops joannae; La Touche, Ibis (11) 5, 1923, p. 641 (Mengtsz, Mitali, Tachouang); La Touche, Handb. Birds Eastern China I, 1930, p. 460.

Zosterops palpebrosa elwesi; Stevens, J. Bombay N. H. Soc. 30, 1925, p. 665 (Sikkim: generally distributed up to at least 5000 ft., in winter at Gopaldhara 4700 ft.); (pt.) Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 360; Rothschild, Nov. Zool. 33, 1926, p. 318 (Momien; Tengyueh District; Shweli-Salwin Divide); Wickham, J. Bombay N. H. Soc. 34, 1930, p. 51 (North Shan Hills and Kachin Hills); Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 281; Snouckaert, Alauda (2) 3, 1931, p. 15; Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 189.

Zosterops palpebrosa subsp.; Delacour & Jabouille, Ibis (12) 1, 1925, p. 260 (Hanoï, Haiphong, this race?); Smith, Garthwaite, Smythies & Ticehurst, J. Bombay N. H. Soc. 41, 1940, p. 591 (Nattaung, Karenni, 4500 ft.); Smith, Garthwaite, Smythies & Ticehurst, J. Bombay N. H. Soc. 44, 1943, p. 69 (Thandaung: common).

Zosterops palpebrosa cacharensis; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 361, plate 4; Wickham, J. Bombay N. H. Soc. 34, 1930, p. 51 (Chin Hills); Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 281; Snouckaert, Alauda (2) 3, 1931, p. 15; Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 191; de Schauensee, Proc. Ac. Nat. Sc. Philad. 86, 1934, p. 239 (Chieng Mai; Chieng Dao; Keng Tung, S. Shan States; Loi Mwe, S. Shan States; Sop Lao, S. Shan States); Riley, Bull. U. S. Nat. Mus. 172, 1938, p. 523 (summit Doi Sutep, Doi Hua Mot); Stuart Baker, Cuckoo Problems, 1942, p. 188, 190.

Zosterops aureiventer mesoxantha; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 365; Wickham, J. Bombay N. H. Soc. 34, 1930, p. 52 (S. Shan Hills); Delacour & Jabouille, Ois. Indoch. Franç. IV, 1931, p. 178 (Bokor à 1000 m); Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 195.

Zosterops palpebrosa williamsoni; Rothschild, Nov. Zool. 33, 1926, p. 318 (Yunnan); Bangs, Bull. M. C .Z. 70, 1930, p. 355; Gee, Peking Nat. Hist. Bull. 5, (3), 1931, p. 66 (China); Bangs & Van Tyne, Field Mus. Nat. Hist., Zool. 18, 1931, p. 117 (Tonkin: Muong Moun, Ba Nam Nhung, Muong Boum; Laos: Phong Saly, Muong Yo); Delacour & Jabouille, Ois. Indoch. Franç. IV, 1931, p. 175; Yen, Quart. Journ. Sc. Wu-Han Univ. 5, 1934, p. 278 (China); David-Beaulieu, Ois. & Rev. Fr. d'Orn. N. S. 9, 1939, p. 178 (Pleiku, Hauts Plateaux de Sud-Annam: commun; this race?).

Zosterops palpebrosa Elwesi; Bourret, Invent. Gén. de l'Indochine, Faun. Vert., 1927. p. 126.

Zosterops aureiventer subsp.; Delacour, Ibis (12) 5, 1929, p. 429 (Bokor).

Zosterops palpebrosa joanna; Delacour, Ibis (12) 5, 1929, p. 429.

Zosterops palpebrosa vicina; de Schauensee, Proc. Ac. Nat. Sc. Philad. 81, 1930, p. 562 (Doi Soutep 5500 ft.); Snouckaert, Alauda (2) 3, 1931, p. 17; Deignan, Journ. Siam Soc., Nat. Hist. Suppl. 8, 1931, p. 154 (Chiengmai).

Zosterops palpebrosa joannae; La Touche, Handb. Birds Eastern China I, 1930, p. 460; Greenway, Bull. M. C. Z. 87, 1940, p. 190 (Mt. Nangkao, Siam); Delacour & Greenway, Ois. & Rev. Fr. d'Orn. N. S. 11, No. Spécial, 1941, p. XX; Deignan, Zoologica 28, 1943, p. 201 (at all seasons in the lowland evergreen of Chiengrai province); Deignan, Bull. U. S. Nat. Mus. 186, 1945, p. 554 (Doi Chiang Dao 6200 ft., Doi Nang Kaeo 2800 ft., Phu Kha 4500 ft., particulars); de Schauensee, Proc. Ac. Nat. Sc. Philad. 98, 1946, p. 121 (Keng Tung, Sop Lao, Loi Mwe); Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops aureiventer joannae; Snouckaert, Alauda (2) 3, 1931, p. 22.

Zosterops palpebrosa mesoxantha; Deignan, Zoologica 28, 1943, p. 201 (distribution in Siam); Deignan, Bull. U. S. Nat. Mus. 186, 1945, p. 553 (distr. in northern Siam); Smythies, Birds Burma, 2nd ed., 1953, p. 265; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Very close to *egregia*, from which this form differs in series by its slightly greener upper parts.

Unfeathered parts. Nepal: iris brown; bill horn, or black, or dark horn, or greyish horn; legs grey, or dark grey, or dark brown, soles yellowish (Bailey); iris brownish yellow, or light brown, or brownish grey, or brownish white, or pale brown; bill black, lower mandible basally grey, or slaty; legs grey, or bluish grey (dark), or slate (Ripley); iris creamy white; bill black, greyish at base of lower bill; legs and feet bluish slaty; claws horny; pads dirty white (B. Biswas).

Assam and Burma: iris brown; bill blackish grey, feet and claws bluish black (Stanford); bill brown, pale below; legs slaty brown (Wardlaw-Ramsay); iris yellowish hazel; bill black except base of lower mandible horny; legs and feet pale plumbeous; claws very pale horn (Venning).

Yunnan and Szechuan: iris yellowish (Rock).

Siam: iris brown; bill black (Williamson).

Indo-China: iris yellow; bill black, mandible grey, or lead grey, or bluish grey; legs bluish, or brown, or bluish grey (Delacour & Jabouille).

Measurements. Nepal: wing 19 ♂, 52-57 (54.18); 18 ♀, 51½-55 (53.84); 47 specimens, 51½-57 (53.85); tail 19 ♂, 32½-37 (34.89); 18 ♀, 33-36½ (34.78); 47 specimens, 32½-37 (34.70); tarsus 44 specimens, 14¾-16, 17 (15.27); entire culmen 45 specimens, 11½-13 (12.29); exposed culmen 45 specimens, 8½-10¼ (9.41); culmen from anterior point of nostril 45 specimens, 6-7½ (6.77).

Burma and Assam: wing 11 ♂, 51-54 (52.41); 11 ♀, 52-56 (53.50); 29 specimens, 51-56 (53.17); tail 11 ♂, 32-36½ (34.00); 11 ♀, 33-36 (34.32); 29 specimens, 32-36½ (34.34); tarsus 26 specimens, 14-16¼ (15.08); entire culmen 25 specimens, 11½-13 (12.03); exposed culmen 26 specimens, 8½-10 (9.04); culmen from anterior point of nostril 26 specimens, 6-7 (6.54).

Yunnan and Szechuan, 12 specimens (4 ♂, 6 ♀, 2 ○); wing 52-58 (54.42), tail 33½-37 (35.33), tarsus 14¾-15¾ (15.08), entire culmen 11¾-13 (12.32), exposed culmen 8¾-9¾ (9.33), culmen from anterior point of nostril 6½-7 (6.67).

Siam: wing 9 ♂, 52-55 (53.22); 4 ♀, 52-55 (53.63); 13 specimens, 52-55 (53.35); tail 10 ♂, 32½-36½ (34.10); 4 ♀, 32½-36½ (34.88); 14 specimens, 32½-36½ (34.32); tarsus 13 specimens, 14¼-15¼ (14.85); entire culmen 14 specimens, 11-13 (12.13); exposed culmen 14 specimens, 8-9½ (8.93); culmen from anterior point of nostril 14 specimens, 6-7¼ (6.52).

Indo-China: wing 16 ♂, 52-54 (52.63); 10 ♀, 50-54½ (52.65); 27 specimens, 50-54½ (52.65); tail 15 ♂, 34-36½ (35.27); 10 ♀, 32½-38 (35.00); 26 specimens, 32½-38 (35.15); tarsus 26 specimens 14¼-15½ (14.68); entire culmen 24 specimens, 11½-12¾ (11.99); exposed culmen 24 speci-

mens, 8½-9½ (9.04); culmen from anterior point of nostril 24 specimens, 5¾-6¾ (6.40).

Distribution. Nepal, Sikkim, Bhutan, Bengal, perhaps the eastern parts of Bihar and Orissa whence I have not examined material, Assam, south-eastern Thibet (Ludlow, 1944) whence, however, I have not seen authentical specimens, the whole of Burma with the exception of the ranges of *siamensis* and *auriventer*, northern Siam, Yunnan, Szechuan, Indo-China.

The record of the occurrence of this species in Szechuan is apparently new; among specimens labelled as *simplex*, belonging to the collections of the USNM, I found one specimen from Ningyenfu, Szechuan, 6000 ft., evidently belonging to the present species (USNM nr. 310769). I am in doubt about the subspecific status of the white-eyes that have been reported from Hanoï and Haiphong (cf. Delacour & Jabouille, 1925), as perhaps the race *williamsoni* extends up the Indo-China coast, though on the other hand confusion with *simplex* may have occurred. I have written to the museum in Paris for material from this region, but at the moment of closing this report no answer has yet been received.

Though in Bengal this race occurs at sea-level, it is, according to Deignan (1943, 1945), confined to the mountains in northern Siam; the vertical distribution, in various parts of its range, is from sea-level to at least 7000 ft.

First collector. Dussumier before 1824 in Bengal.

Figures. Temminck (1824), fig. 3 (coloured, fair); Madarász (1911), plate 16 fig. 2 (coloured, fair); Stuart Baker (1926), plate 4 (coloured plate of bird at nest drawn by Stuart Baker, ¾ natural size, quite good); Smythies (1953), plate 13 fig. 4 (coloured, but small and colours not quite natural).

Type. RMNH cat. nr. 1, in good condition (type examined); types of *mesoxantha*, three out of six original cotypes are in the Mus. Civ. Genova, among them Salvadori's cotype a; the three other cotypes are not in Genova, perhaps they are in Torino (Capra, in litt., 1950); the two cotypes of *joannae* are now MCZ nrs. 130604 and 130605 (cf. Bangs, 1930, who incorrectly writes the name *johannae* instead of *joannae*, and moreover synonymizes it with *williamsoni* instead of with the nominate race). The types of *elwesi* and *cacharensis* were not traced (I did not find them in the BM though they may be present there); the type of *vicina* is USNM nr. 311617.

Moult. Nepal: specimens collected in January (4), February (2), March (3), April (10), May (7), June (5), August (1), November (4) and December (5) are not in moult. One specimen from July does not show moult in its wings, but is moulting rectrices. Specimens collected from November to January are in fresh plumage, specimens collected from May to August are

in more or less abraded plumage. Evidently the main moult takes place in September and October in Nepal.

Burma, Assam, etc.: specimens collected in January (1), February (3), March (4), April (2), May (4), June (1), July (2), October (1), and December (4), are not in moult. One specimen collected in March is moulting primaries; one specimen collected in May is moulting rectrices. Specimens collected from December to February are in fresh plumage.

Yunnan and Szechuan: specimens collected in January (1), and March (5), are not in moult. One specimen collected in August is moulting primaries; out of two specimens collected in September, one is moulting primaries, the other one is moulting both primaries and rectrices.

Siam: specimens collected in March (2), April (2), July (1), September (2), and December (3), are not in moult. One specimen collected in July is moulting upper wing coverts; one specimen collected in July is moulting primaries, the tail being old and not yet in moult; one specimen collected in August is moulting primaries.

Indo-China: specimens collected in Januari (1), February (2), March (2), May (6), June (3), July (1), October (2), November (1), are not in moult. One specimen collected in May is moulting rectrices; one specimen collected in June is moulting secondaries; two specimens collected in June are moulting primaries; one specimen collected in June is moulting primaries and secondaries; one specimen collected in July is moulting rectrices; one specimen collected in December is moulting rectrices, the wing-feathers having obviously freshly moulted.

Nidification. The evidence concerning this form, which is much more scanty than in *egregia*, indicates that there is a breeding season from the end of January until early September, and mainly from April to July (Hopwood, 1908; Stuart Baker, 1930; Stuart Baker, 1934; Ogilvie-Grant, 1912; Smith, 1943). According to Stuart Baker (1934), who has made the most important contribution, the clutch size is generally four, less often three, and once he has found five. Stuart Baker states that both sexes incubate, and that both sexes participate in nest-building, though the female does most of the work.

Habits. Not different from those of *egregia*. Interesting is David-Beaulieu's (1944) observation that specimens of this form obtain the nectar of *Hibiscus*-flowers by pecking small holes in the base of the calyx; this was done so thoroughly that hardly a flower could be found that was not pierced in this way.

Stuart Baker (1942) found this race parasitized upon by cuckoos; 3 eggs out of a total of 2117 of *Cuculus canorus bakeri* Hartert were found with it;

one egg out of 71 of *Cuculus poliocephalus poliocephalus* Latham; and one egg out of 180 of *Cacomantis merulinus querulus* Heine. Certainly the figures show that the white-eye is at most but an unusual foster parent of any species of cuckoo in this region. Moreover I cannot refrain from expressing my regret that egg-collectors (and this pertains much more to Europe than to India) always collect the cuckoo's eggs they find in the nests of somewhat unusual foster species. The important point, biologically seen, is not, that a cuckoo will sometimes accidentally lay its egg in a nest of a species which it does not usually parasitize, but the question whether or not such eggs are accepted by their hosts, and, much more important, whether or not the young cuckoo will be successfully reared.

5. **Zosterops palpebrosa nicobarica** Blyth

Z[osterops] nicobaricus Blyth, J. As. Soc. Bengal 14, 1845, p. 563 — Nicobar Islands.

Zosterops ventralis Richmond, Proc. U. S. Nat. Mus. 25, 1902, p. 288 — Car Nicobar.

Zosterops palpebrosus; Blyth, J. As. Soc. Bengal 15, 1846, p. 44, footnote (My *Z. nicobarica*... would seem to be merely the young of *Z. palpebrosus*); (pt.) Blyth, J. As. Soc. Bengal 15, 1846, p. 370; (pt.) Blyth, Cat. Birds Mus. As. Soc., 1849, p. 220 (Nicobar Islands); Blyth in Mouat, Adv. Res. Andaman Islanders, 1863, p. 361; Beavan, Ibis N. S. 3, 1867, p. 328 (Aberdeen Point, Andamans); Ball, J. As. Soc. Bengal 39, 1870, p. 31 (Camorta, Nicobars); Ball, Stray Feathers 1, 1873, p. 74; (pt.) Blyth, Cat. Mamm. Birds Burma, J. As. Soc. Bengal II Extra Nr., 1875, p. 110 (Nicobar Islands); (pt.) Mason & Theobald, Burma I, 1882, p. 377 (Nicobars).

Zosterops nicobarica; G. R. Gray, Gen. Birds I, 1848, p. 198; Bonaparte, Consp. Gen. Av. I, 1850, p. 390; Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 96; G. R. Gray, Hand-List Birds I, 1869, p. 163 (Nicobar I.); Tristram, Cat. Coll. Birds, 1889, p. 211 (Nicobars); Finsch, Tierreich 15, 1901, p. 17; Sharpe, Hand-List Birds 5, 1909, p. 4.

Zosterops nicobariensis; Hume, Stray Feathers 2, 1874, p. 242-243.

Zosterops palpebrosa; Walden, Ibis (3) 4, 1874, p. 143 (S. Andaman); (pt.) A. E. Brehm & Finsch, Gefangene Vögel I, 2, 1876, p. 285 (Nikobaren); (pt.) Giebel, Thes. Orn. III, 1877, p. 777 (Nicobarae); (pt.) Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 165-167; (pt.) Russ, Handb. Vogelliebh. I, 1887, p. 314 (Nikobaren); (pt.) Oates, Fauna Brit. Ind., Birds I, 1889, p. 214 (Nicobars); Butler, J. Bombay N. H. Soc. 12, 1899, p. 390 (Nicobars and Andamans, particulars); (pt.) Finn, List Birds Ind. Mus., 1901, p. 76 (Nicobars, Andamans); Osmaston, J. Bombay N. H. Soc. 17, 1906, p. 156 (Port Blair, particulars); Osmaston, J. Bombay N. H. Soc. 18, 1908, p. 358 (Barren Island, Andamans: very common).

Zosterops palpebrosa nicobariensis; Hume, Stray Feathers 4, 1876, p. 291 (Andamans, Nicobars, syst. discussion); Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 85 (Andamans and Nicobars, including Car Nicobar); Stuart Baker, Ibis (11) 4, 1922, p. 145; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 362; Ticehurst, Bull. B. O. C. 47, 1927, p. 90; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210.

Zosterops Nicobariensis; Mason & Theobald, Burma I, 1882, p. 377 (Andamans, Nicobars).

Zosterops palpebrosa nicobaricus; Richmond, Proc. U. S. Nat. Mus. 25, 1902, p. 288 (common on Car Nicobar, etc.).

Zosterops palpebrosa Var. *Nicobarica*; Dubois, Syn. Av. I, 1902, p. 707.

Zosterops ventralis; Sharpe, Hand-List Birds 5, 1909, p. 4; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 252; Robinson & Kloss, Ibis (11) 5, 1923, p. 151; Snouckaert, Alauda (2) 3, 1931, p. 26.

Zosterops nicobaricus; Porsch, Biol. Generalis 5, 1929, p. 159.

Zosterops palpebrosa nicobarica; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 281; Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 192; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Very similar to the nominate race, from which it can be distinguished by its definitely larger bill; colour differences sometimes described between *nicobarica* and the nominate race are, in my opinion, inconsequential.

The large bill and dark green coloration bring this race very near to *nilgiriensis*, and Ticehurst (1927) doubted if specimens from the Andamans — which tend to be larger than those from the Nicobars — could be differentiated from that race. Fortunately, however, birds from the Andamans not only average smaller than *nilgiriensis* as regards wing-size, but they have also relatively much shorter tails, their tail-index agreeing with that of the other continental races of *palpebrosa*, and not with that of the long-tailed *nilgiriensis*. On these characters it seems possible to differentiate at least the great majority of specimens from *nilgiriensis*.

My series were too small to ascertain if the difference in average size between the Andaman and the Nicobar specimens is really as great as suggested by Ticehurst (1927).

Unfeathered parts. Iris bright red brown, or light reddish brown; bill above dark horny, below whitish, or bill slaty brown; legs greenish grey, or slaty green (Wardlaw-Ramsay); iris dark brown; bill black; legs slaty (Andaman Zool. Survey).

Measurements. Andamans: wing 5 ♂, 54-56 (54.80); 5 ♀, 52-56 (54.30); 12 specimens, 52-56 (54.54); tail 5 ♂, 34-36 (35.00); 5 ♀, 33½-35½ (34.80); 12 specimens 33½-36 (35.00); tarsus 10 specimens, 15½-16¾ (15.80); entire culmen 11 specimens, 12½-14¼ (13.39); exposed culmen 11 specimens, 10-11¼ (10.43); culmen from anterior point of nostril 11 specimens, 7-8¼ (7.68).

Nicobars: wing 1 ♂, 55; 3 ♀, 52-53 (52.50); 5 specimens, 52-55 (53.00); tail 1 ♂, 35; 3 ♀, 32-34 (32.67); 5 specimens, 32-35 (33.50); tarsus 4 specimens, 15½-16¼ (16.00); entire culmen 4 specimens, 13-14 (13.31); exposed culmen 5 specimens, 10-10½ (10.15); culmen from anterior point of nostril 5 specimens, 7½-8 (7.70).

Distribution. Confined to the Andamans and Nicobars, where it seems to be fairly common.

In the Andamans it has been recorded as follows: Little Coco Island; South Andaman: Port Blair, Pt. Mouat, Mt. Harriet, Runguchang, Aberdeen Point (material from all these localities examined, I have not found Pt. Mouat on any map); North Cinque (Richmond, 1902), Barren Island (Richmond, 1902; Osmaston, 1908).

For the Nicobars I have found records for the following islands: Car Nicobar; Tillanchong; Chowra (Chaura); Trinkat; Katchall; Camorta (from specimens examined, and from literature by Ball, 1870; Hume, 1874; Richmond, 1902).

It does apparently not occur in the southern group of islands (Great Nicobar and Little Nicobar); Richmond (1902) expressly stated that it was not observed there, nor am I aware of any reference to its occurrence.

First collector. Blyth's correspondent M. Busch, in or before 1845. Blyth (1849) writes that the type is from 1846, but as he published the name *nicobarica* in 1845, this must be a mistake.

Not figured.

Type. Not traced. Blyth's type is a holotype, as this form was described on a single specimen. It was in the Museum of the Asiatic Society (cf. Blyth, 1849).

Moult. Specimens collected in January (2), February (2), March (4), April (2), May (1), June (1), and November (2), are not in moult; a specimen from 8 July is moulting primaries, on both sides the nrs. 2-5 being old and abraded, 6 fresh and not yet fully grown out, 7-10 fresh; no moult in the tail, which is much abraded and evidently still old.

Nidification. The scanty information available may be indicative of a distinct breeding season; Osmaston (1906) found this race (in the Andamans, apparently in the vicinity of Port Blair) a late breeder, laying in June and July, though Davison (in Hume, 1874) saw (in the Nicobars) young birds that had only just left the nest in February, whereas Stuart Baker (1934) mentions the taking of eggs from the 6th May to the 9th July, and of one clutch of two eggs in Car Nicobar on 18 March.

According to Stuart Baker (1934) the clutch size is generally two, fairly often three, and once a nest with four eggs was found. He describes the eggs as quite typical, but larger than those of the other races, and gives measurements.

Habits, etc. This bird is common in the Nicobars, and apparently slightly less so in the Andamans (Davison in Hume, 1874; Butler, 1899; Richmond, 1902, etc.). Its habits are described by Davison (in Hume, 1874), they agree perfectly with those of the continental races.

Discussion. Blyth's diagnosis of this form was based on an apparently

aberrant or juvenile individual, to which fact he himself was the first to draw attention (Blyth, 1846).

Apparently Hume (1874) was the first to recognise the true diagnostic characters of this race, whereas only a few months later Walden (1874) arrived at the same conclusion. In his above-mentioned paper Hume expressed the opinion that, apart from the large bill, the form can be distinguished from continental specimens by its greener, less yellow upper parts. It may be remarked that the colour difference as noted by Hume, is probably due to the fact that a very great proportion of the specimens in the Hume collection belonged to the yellower race *egregia*; specimens of *nicobarica* are, as regards coloration, identical with the nominate race. Hume (1876) himself — probably after having acquired better material from the nominate form — also became aware that the colour difference was negligeable, and even now, eighty years later, there is little to add to his words.

The fact that *nicobarica* is so close to the nominate race, whereas it conspicuously differs from *buxtoni*, occurring in Sumatra, and from *auriventer*, occurring in the Malay Peninsula, by its relatively longer tail, the presence of greenish edges to the rectrices, etc., shows that the Andamans and Nicobars have been colonized from the continent, and moreover that these islands have not played a part in the colonisation of Sumatra. The fact that no white-eyes are found on the southern islands of the Nicobars is consistent with this view.

6. **Zosterops palpebrosa siamensis** Blyth

Z[osterops] siamensis Blyth, Ibis N. S. 3, 1867, p. 34 — Tenasserim.

Z[osterops] austeni Walden, in Blyth, Cat. Mamm. Birds Burma, J. As. Soc. Bengal II Extra Nr., 1875 (Aug.), p. 111 — Karen nee at 2500 feet.

Zosterops siamensis; G. R. Gray, Hand-List Birds 1, 1869, p. 162 (Tenasserim); Hume, Stray Feathers 2, 1874, p. 479; Blyth, Cat. Mamm. Birds Burma, J. As. Soc. Bengal II Extra Nr., 1875, p. 111 (Tenasserim Mountains, (Rangoon)); Walden, Ibis (3) 6, 1876, p. 350, pl. 10; Giebel, Thes. Orn. III, 1877, p. 777 (Siam); Hume & Davison, Stray Feathers 6, 1878, p. 375 (mangrove swamps to the south of Thatone, and again many near the top of Mooleyit; also near Amherst); Oates, Stray Feathers 10, 1882, p. 228 (very abundant from Rangoon up to Kyeikpadein and Pegu); Oates, Birds Brit. Burma I, 1883, p. 343 (very abundant in southern Pegu from Rangoon to Kyeikpadein and Pegu); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 180 (Lower Pegu, Tenasserim); Salvadori, Ann. Mus. Civ. Genova 25, 1888, p. 592 (Mooleyit, Plapoo 1200-1400 m; Picco del Mooleyit 1800-1900 m); Oates, Fauna Brit. Ind., Birds I, 1889, p. 216; Tristram, Cat. Coll. Birds, 1889, p. 212 (Lower Pegu); Fea, Viaggio di Leonardo Fea LXXVI, Riass. Gen. Ris. Zool., 1897, p. 62; Finsch, Tierreich 15, 1901, p. 24; Finn, List Birds Ind. Mus., 1901, p. 78 (Tenasserim); Dubois, Syn. Av. I, 1902, p. 708; K. C. Macdonald, J. Bombay N. H. Soc. 17, 1906, p. 186 (common on Popa, Myingyan District, Burma); Mearns & Oates, J. Bombay N. H. Soc. 18, 1907, p. 80 (Kani, Chindwin District); Harington, Birds Burma, 1909, p. 81; Sharpe, Hand-List Birds 5, 1909, p. 8; (?) Nehrkorn, Nachtr. Eierkat., 1914, p. 26 (eggs, Assam);

Lydekker, Wild Life of the World II, 1916, p. 183 (Pegu, Tenasserim, Siam, Cochin China); Gyldenstolpe, Ibis (11) 2, 1920, p. 466; Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 86 (Pegu, S. W. and Central Burma, Siam, Cochin China, etc.); Stuart Baker, Ibis (11) 4, 1922, p. 146; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 364; Wickham, J. Bombay N. H. Soc. 34, 1930, p. 51 (Chin Hills, Burma); Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 281; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 212; Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 194 (nidification); Stanford, J. Bombay N. H. Soc. 37, 1935, p. 873 (Sittang-Irrawaddy Plain: Zepathwe reserve); Smythies, Birds Burma, 1940, p. 220, 532 (Burma, Siam and Cochin China); Smith, Garthwaite, Smythies & Ticehurst, J. Bombay N. H. Soc. 44, 1943, p. 69 (Nattaung); Smythies, Birds Burma, 2nd ed., 1953, p. 266.

Zosterops austeni; Walden, Ibis (3) 6, 1876, p. 351; Hume & Davison, Stray Feathers 6, 1878, p. 376 (Thatone, Mooleyit, Amherst); Finsch, Tierreich 15, 1901, p. 31; Dubois, Syn. Av. I, 1902, p. 708; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 446; Sharpe, Hand-List Birds 5, 1909, p. 12.

Zosterops Siamensis; Mason & Theobald, Burma I, 1882, p. 377 (Martaban, Mooleyit); Boutan, Déc. Zool. Oiseaux Indo-Chine 5, 1906, p. — (Cochinchine).

Zosterops Austeni; Mason & Theobald, Burma I, 1882, p. 377 (Karen-ni at 2500 ft.).

Zosterops palpebroza siamensis; Bourret, Invent. Gén. Indoch., Faune, Vert., 1927, p. 126 (apparently Indo-China).

Zosterops palpebrosa siamensis; Stresemann, Journ. f. Orn. 87, 1939, p. 156-164; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

? Zosterops palpebrosa; Christison, Buxton, Emmet & Ripley, J. Bombay N. H. Soc. 46, 1946, p. 20 (coastal Arakan and the foothills of Yomas).

Subspecific characters. Similar to the nominate race, but entire under surface deep yellow. There is an amount of non-geographic variation in this form, some specimens being greener above, and with much greener flanks, than others. These greenish birds have been described as *Zosterops austeni*.

I have tried to correlate these differences in plumage with sex, season (wear), and age, and found the following: a very dull male with greenish grey flanks is almost certainly a juvenile, its beak being short and soft, and its legs being pale; further, however, I see no evidence that there is any correlation, for, although a majority of the very bright and yellow specimens is of the male sex, this is probably only because males are much richer represented among the material examined than females; there are dull males collected in the same months and localities. It may, of course, be that the greener birds are specimens that are not quite mature, but I see no method of checking this possibility in preserved skins.

Unfeathered parts. Iris pale yellowish brown, or yellowish brown; bill black, base of lower mandible plumbeous; legs, feet, and claws plumbeous, or pale plumbeous (Davison); iris dark brown; bill black; legs, feet, claws, slaty brown (Darling); iris pale brown; legs and feet greenish plumbeous (Davison); iris light reddish brown; bill horn-colour, plumbeous at the base of the lower mandible and at the gape; mouth flesh-colour; feet and claws light plumbeous (Oates, 1889).

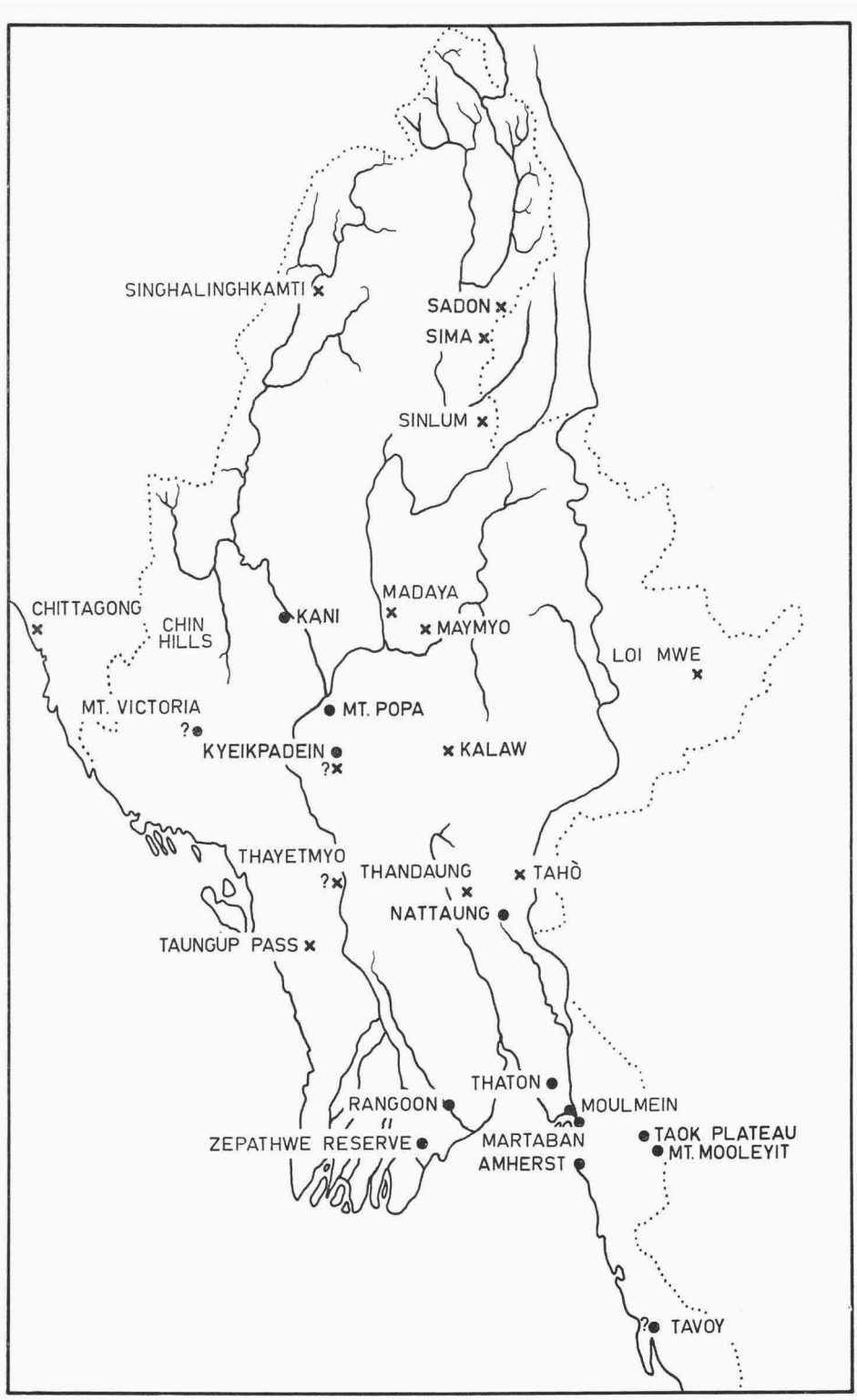

Fig. 4. The distribution of the yellow-bellied *Zosterops palpebrosa siamensis* (dots), and of the grey-bellied *Z. p. palpebrosa* in Burma (crosses). A query indicates that the record is doubtful. From the Chin Hills both *siamensis* and *palpebrosa* have been recorded, though their occurrence there needs confirmation. The locality Weppatau, whence I examined a specimen of *siamensis,* could not be traced.

Measurements. Wing 16 ♂, 51-54 (52.16); 5 ♀, 51-54½ (52.40); 26 specimens, 51-54½ (52.08); tail 16 ♂, 31½-35 (33.28); 5 ♀, 32-35 (33.20); 26 specimens, 31½-35 (33.31); tarsus 26 specimens, 14-16 (14.82); entire culmen 21 specimens, 11¾-13 (12.25); exposed culmen 23 specimens, 8½-10 (9.20); culmen from anterior point of nostril 21 specimens, 6-7½ (6.73).

Distribution (fig. 4). Southern Burma, whence it has been recorded as follows: Lower Pegu; Tenasserim; Karen-nee 2800 ft. and 2500 ft.; Rangoon; Thatone Creek, B. Burma; Weppatau; Mooleyit; Nattaung 4000 and 5000 ft.; Kyeikpadein, Lower Pegu; Kani, L. Chindwin; Popa, Myingyan District; Taok Plateau, Tenasserim 3050 ft., Amherst (specimens from all these localities examined); Mooleyit, Plapoo 1200-1400 m and Picco del Mooleyit 1800-1900 m (Salvadori, 1888); Chin Hills (Wickham, 1930); Sittang-Irrawaddy Plain (Stanford, 1935); Moulmein; Tavoy (Stuart Baker, 1934).

The range of this subspecies and its limits against the range of the nominate race are still insufficiently known. Therefore I have shown in fig. 4 not only the localities where *siamensis* is known to occur, but also those whence grey-bellied *Z. p. palpebrosa* has been recorded.

Stresemann (1939), in his attempt to show that *siamensis* is a race of *palpebrosa* and not a separate species, was apparently the first to define the range of *siamensis*. He wrote that to the north the form ranged at least to Mt. Popa, and by dismissing the records of *palpebrosa* from Kyeikpadein (Oates, 1882, 1883) and Thayetmyo (Hume, 1875; also a sight record by Stanford & Ticehurst, 1931) as probably pertaining to migrants of *Z. japonica simplex*, he obtained a fairly well-defined range for *siamensis* in southern Burma and the northern part of Tenasserim.

The true range, however, is more puzzling than indicated by Stresemann, who apparently overlooked the record for Kani by Mearns & Oates (1907). I have examined one of Mearns's specimens from Kani. This brings the already narrow strip of country in which *siamensis* is known to occur a good deal farther to the North. Other records are from the Chin Hills (Wickham, 1930) and from Mt. Victoria (Stuart Baker, 1934). Perhaps Wickham's observation is not quite infallible, as, apparently, no specimens were collected, and I have been unable to trace Stuart Baker's source for including Mt. Victoria in the range of the form. Stresemann & Heinrich (1939) do not list any species of *Zosterops* from Mt. Victoria.

Hopwood & Mackenzie (1917) found *Z. p. palpebrosa* (misidentified as *simplex* by these authors) breeding in the North Chin Hills, whereas this is doubtless the form occurring at Chittagong (Simmons, 1948), in Manipur

(specimens examined), and at Maymyo (specimens examined). In the Karen Hills and Karen-ni, *palpebrosa* has been collected at Tahò (this is probably Tahohta, 19° 05′ N., 97° 30′ E., in Bawlakhé State, now part of Kaya State — Smythies, in litt., 12-X-1956), and at Thandaung (Smith, 1943); whereas *siamensis* has for certain been taken at Nattaung. The localities of specimens collected earlier in this region (by Wardlaw-Ramsay) unfortunately are insufficiently labelled as originating from "Karen-ni" and "Karen Hills".

Stuart Baker's (1934) record of Tavoy (the type locality of the grey-bellied *auriventer*!) where his collector has taken nests of *siamensis*, stands alone, and as no birds were procured, the eggs and nests may have been misidentified.

The range of *siamensis* as described above, would be fairly well-defined and understandable, were it not for the fact that in Arakan and the Arakan Yomas *palpebrosa* has been observed, and not *siamensis*. Apart from the observations at Thayetmyo already mentioned above, two rather awkward records appear in recent literature. One is by Christison et al. (1946) on *Zosterops palpebrosa*, which would seem to imply the occurrence of the nominate race in the coastal region of Arakan and the foothills of the Yomas. Dr. Ripley (in litt., 20-II-1956) informs me, however, that the identification of the specimens was somewhat doubtful: "I should disregard the record if I were you. They might be *palpebrosa*, they might be *siamensis*".

The other record of *palpebrosa* for Arakan, by Stanford & Ticehurst (1931) cannot be dismissed so easily. I have received the specimen on loan (BM nr. 1941.5.30.8199), and notwithstanding the fact that on a later label its identification has been changed to *simplex*, there is no doubt that it is a typical *palpebrosa*. Its data are: ♂, 10-IV-1929, Kyengyi, Prome Dt., crest of Arakan Yomas, coll. J. K. Stanford, iris brown, feeding in bamboo. Measurements, wing 51, tail 33, tarsus 14¾, entire culmen 12½, exposed culmen 9¾, culmen from anterior point of nostril 7 (these figures are not included in the averages presented under the heading Subspecific Characters of the nominate race). There is a feeble yellow streak over the belly. I have compared the specimen with both *palpebrosa* and *auriventer*, and the distinct greenish edges to the rectrices, combined with the feeble yellow streak, show that it belongs to the nominate race, of which it is a thoroughly normal representative.

Unless in future migration of grey-bellied *palpebrosa* to within the geographical limits of yellow-bellied *siamensis* would be found to occur, the distribution of the two races in Burma is complicated and difficult to understand. Much more field work, particularly in the Chin Hills, Arakan, and the

Arakan Yomas, is necessary. As Prome is not far from Thayetmyo, one begins to wonder if Stresemann (1939) was right in rejecting the records of *palpebrosa* from there as pertaining to *simplex*, particularly so as the only Burma specimens of *simplex* I have been able to trace in the British Museum, are from Moulmein.

As repeatedly stated by several ornithologists, this form, notwithstanding its scientific name, has never been collected within the boundaries of Siam, though it is common quite close to the Siamese border. The fable of the occurrence of this form in Cochin-China can be traced back to Tirant (1879) (cf. Delacour & Jabouille, 1931, p. 178; I have not seen Tirant's publication).

The distributional data indicate that the form occurs in both the true lowlands at sea-level (Zepathwe reserve, etc.; cf. Stanford, 1935), and the mountains up to at least some 1800 or 1900 m (cf. Salvadori, 1888).

First collector. Probably Tickell before 1865, for Hartlaub's remark (Jan. 1865) under *Zosterops flava*: "Tickell soll diese Art in Tenasserim gesammelt haben (?)" can hardly be referred to any form but this one. At the same time Blyth (Jan. 1865) also mentioned specimens: "... the species from Moulé-yit mountain in South Burma, which (if I remember rightly) only differs from the Indian *Z. palpebrosus* (T.) by having the abdominal region yellow". Obviously both these authors have drawn their information from some source not traced by me.

I have not seen specimens certainly collected before 1865, the types of the race being undated.

Figure. Walden (1876), plate 10 fig. 1 (coloured, natural size, by J. G. Keulemans).

Types. Two specimens, BM nrs. 81.5.1.665 and 81.5.1.667, ex Gould collection, Tenasserim, no date and collector, are preserved as the cotypes. They may be the specimens collected by Tickell and referred to by Hartlaub (1865) and Blyth (1865).

The type of *Zosterops austeni* Walden is BM nr. 88.7.1.783; it is a female, 15-III-1874, Karen-nee, 2800 ft., ex. coll. R. G. Wardlaw-Ramsay. I read 2800 ft., not 2500 ft. on the label. All these type specimens were examined by me.

Moult. Specimens collected in January (2), February (8), March (3), April (2), July (1), and December (4), are not in moult; the specimens from October, December and January are in fresh plumage, the July specimen is in abraded plumage, which makes it likely that the main moult takes place about September.

Nidification. Stuart Baker (1934) records two nests and eggs, taken with the parent birds, near Moulmein on 24 and 27 March; and one nest obtained

on 13 May near Tavoy. He describes the eggs as quite typical, and gives measurements.

Like Stuart Baker (1934) I could not trace other certain records of nests or eggs; Nehrkorn (1914) records eggs from Assam, but as *siamensis* does not occur in Assam, and as it is likely that the eggs of this form are not or scarcely distinguishable from those of the nominate race breeding in Assam (Stuart Baker calls them quite typical), it is impossible to say now whether their identification, or their recorded place of provenance, or both, are wrong. Personally I consider it most likely that Nehrkorn's eggs really do come from Assam, and belong to the nominate race.

Habits, etc. As regards habits and voice, the following stands on record: "In all its habits and its voice it exactly resembles *Z. palpebrosa*, so common in India, like it going about in small parties hunting for insects among the foliage. I found it avoided the dense forest, and kept along the outskirts, and especially among the stunted clumps of trees dotted about the grassy lands near the top of Mooleyit" (Davison in Hume, 1878).

Oates (1882) found it going about in flocks and frequenting tall trees, whereas K. C. Macdonald also observed its living in little parties, and Stanford (1935) saw several large parties in the Zepathwe reserve near the sea in mid-February 1932.

All these records indicate that this form agrees in habits and voice with the adjacent grey-bellied races of *Zosterops palpebrosa* — interesting is that the form inhabits both mangrove and mountains — and only Smith et al. (1943) thought that "Its note differs from that of *palpebrosa* and is stronger".

Discussion. The field-notes of various observers have been given in extenso above, in order to show that the published evidence indicates a thorough similarity in voice and behaviour of *siamensis* and *palpebrosa*, and notwithstanding the recent claim of some field-ornithologists that *siamensis* differs from *palpebrosa* by its more solitary habits and stronger voice, the experience of others does not seem to confirm this claim, which was the base for recognising *siamensis* as a distinct species and not as a race of *palpebrosa*, as proposed by Stresemann (1939).

Personally I share Stresemann's opinion on the subject; the fact that both grey-bellied and yellow-bellied birds have been collected in Karen-ni can not be an excuse for keeping these forms separate, as long as their exact ranges have not been much more carefully destined.

Of course I have carefully examined specimens of *siamensis* from Karen, hoping to find traces of intermediacy between this form and grey-bellied *palpebrosa*, but none could be found.

After the foregoing discussion had been written, Smythies (in litt., 12-X-1956) informed me that, when revising "The Birds of Burma", he overlooked Stresemann's (1939) paper, and that otherwise he would probably have followed him in reducing *siamensis* to a race of *palpebrosa*. This certainly means a big step towards general acceptance of *siamensis* as a race of *palpebrosa*.

7. **Zosterops palpebrosa williamsoni** Robinson & Kloss

Zosterops palpebrosa williamsoni Robinson & Kloss, Journ. Nat. Hist. Soc. Siam 3, 1919, p. 445 — Meklong, Central Siam.

Zosterops palpebrosa; Ogilvie-Grant, Fasc. Malayenses, Zool. 3, 1905, p. 75 (Tanjong Patani).

Zosterops aureiventer; Williamson, Journ. Nat. Hist. Soc. Siam 3, 1918, p. 24 (Meklong).

Zosterops palpebrosa aureiventer; Stuart Baker, Journ. Nat. Hist. Soc. Siam 3, 1919, p. 190 (Meklong).

Zosterops palpebrosa auriventer; (pt.) Gyldenstolpe, Ibis (11) 2, 1920, p. 466 (Meklong, Tanjong Patani).

Zosterops palpebrosa williamsoni; Robinson & Kloss, Ibis (11) 5, 1923, p. 151 (Meklong River); Stuart Baker, Ibis (11) 5, 1923, p. 358; Snouckaert, Alauda (2) 3, 1931, p. 17; (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210; Riley, Bull. U. S. Nat. Mus. 172, 1938, p. 522 (Nakon Sritamarat, Bangkok); Deignan, Zoologica 28, 1943, p. 202 (eastern shore of the Malay Peninsula from Bangkok to Patani); Gibson-Hill, Bull. Raffl. Mus. 19, 1949, p. 150; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Mees, Sarawak Mus. Journ. 6, 1954, p. 139, footnote 3.

Zosterops aureiventer williamsoni; Robinson, Birds Malay Peninsula I, 1927, p. 316 (Patani).

Zosterops palpebrosa auriventer; (pt.) Stresemann, Journ. f. Orn. 87, 1939, p. 158.

Subspecific characters. Differs from the following subspecies (*auriventer*), with which it has constantly been confused, by having a less distinct yellow streak over the centre of the under parts (sometimes this streak is almost entirely absent), by having the yellow of the throat and under tail coverts slightly paler, and by having definitely more yellow above the lores. Greenish edges to the tail-feathers are usually fairly distinct, whereas they are practically absent in *auriventer*. From the nominate race this form may also be distinguished by its brighter yellow supra loral region.

The many well-made skins from the Williamson collection in the British Museum are all very bright and yellow; as many of these specimens have been taken on a single day, so that they can hardly have been skinned at once, they may have been preserved in formalin for some time, a liquid that, contrary to alcohol, tends to brighten and deepen the yellow colour.

Unfeathered parts. Iris reddish brown (Williamson); iris greyish hazel; bill black, base lead; feet lead (Robinson).

Measurements. Wing 13 ♂, 52-56 (53.15); 7 ♀, 50-56 (52.93), 22 specimens, 50-56 (52.93); tail, 13 ♂, 30½-35 (33.35); 7 ♀, 30-35½ (32.79); 22 specimens, 30-35½ (33.14); tarsus 21 specimens, 14½-15¾ (15.04); entire culmen 18 specimens, 12-14 (12.71); exposed culmen 19 specimens, 8¾-10 (9.58), culmen from anterior point of nostril 19 specimens, 6½-8 (7.22).

Structurally this form agrees with the other races of the region; its 2nd primary is in length between the 6th and the 8th.

Distribution. A coastal form, which is exclusively known from the eastern coast of Siam, between Bangkok and Tandjong Patani. Localities are: Bangkok, Meklong, Lacon Sritamarat, Tandjong Patani (specimens examined). Gyldenstolpe's (1920) record of Nawngchik and Bukit Besar is due to confusion with *Z. everetti tahanensis*.

On the western coast of the Malay Peninsula this subspecies is replaced by the ecologically similar form *auriventer*, which goes to the south at least as far as Singapore, but from the eastern coast of Malaya very little, if anything, seems to be known as regards the occurrence of either form, so that it is not known if the two forms meet and intergrade somewhere between Singapore and Tandjong Patani.

It is very well possible that this race extends in eastern direction to the southern coast of Indo-China, but I have not seen specimens.

First collector. Probably H. C. Robinson, who took a specimen on 28 September 1901 at Tandjong Patani (BM nr. 1905.2.1.327).

Not figured.

Type. BM nr. 1955.1.4025 (type examined).

Moult. Specimens collected in January (2), February (3), and June (1) are not in moult.

One specimen from February has the tail in full moult, the wings do not show moult; two specimens from the end of September are both in an advanced stage of primary-moult, and one of them is also moulting rectrices; a specimen from the last part of November is moulting primaries and rectrices, it has, however, nearly completed its wing moult, the 2nd primary being very short, and the 3rd rather less than normal length.

The type, though not moulting, shows a most curious anomality in the left wing, the webs on both sides of the 2nd primary being equal in shape and length, both being broad. Normally, of course, the outer web is very much narrower than the inner web.

Nidification. Unrecorded.

Habits, etc. This form is perhaps less well known than any other race of *Z. palpebrosa* with the exception of *unica*. Williamson (1918) noted it as

very common in coconut palms, which were then in flower, at the type locality, whereas the occurrence about Bangkok is stated to be rather erratic (Riley, 1938).

Discussion. The problem of the confusion between this subspecies and the following will be fully dealt with in the discussion of that race (*auriventer*).

8. **Zosterops palpebrosa auriventer** Hume

[*Zosterops*] *auriventer* Hume, Stray Feathers 6, 1878 (June), p. 519 — Tavoy.

Zosterops palpebrosa erwini Chasen, Bull. Raffl. Mus. 9, 1934, p. 96 — P. Panjang, S. Natuna Isl.

? Zosterops palpebrosus; Hume, Stray Feathers 2, 1874, p. 479 (Tenasserim).

Zosterops lateralis; Hume, Stray Feathers 7, 1878, p. 452; Hume, Stray Feathers 8, 1879, p. 65, 104 (Penang, Malacca).

Zosterops auriventer; Hume, Stray Feathers 8, 1879, p. 183, 497; (pt.) Finsch, Tierreich 15, 1901, p. 17; Dubois, Syn. Av. I, 1902,p. 707.

Zosterops aureiventer; (pt.) Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 163 (Pulo Pinang); Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 288 (île Pinang); Robinson, Journ. F. M. S. Mus. 1, 1905, p. 101; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 391 (type in BM); Robinson, Journ. F. M. S. Mus. 2, 1907, p. 83; Robinson, Journ. F. M. S. Mus. 2, 1909, p. 215 (coasts of the Malay Peninsula and the islands in the immediate vicinity); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 4; Moulton, Ninth Rep. Sarawak Mus., 1910, p. 40 (Borneo); Robinson, Hand-List Birds Malay Peninsula, 1910, p. 20 (Malay Peninsula); Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Malakka, eggs from this form or *Cisticola*?); Robinson & Kloss, Ibis (9) 5, 1911, p. 79; Moulton, Twelfth Rep. Sarawak Mus. 1913, 1914, p. 39, footnote (this species or *tahanensis*?); Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 252; Schönwetter, Beitr. Fortpfl. Vögel 4, 1928, p. 168.

Zosterops aureiventris; (pt.) Oates, Fauna Brit. India, Birds I, 1889, p. 215; Fea, Viaggio di Leonardo Fea LXXVI, Rias. Gen. Ris. Zool., 1897, p. 62.

Zosterops palpebrosa williamsoni; (pt.) Robinson & Kloss, Journ. Nat. Hist. Soc. Siam 3, 1919, p. 445 (Koh Rah, Takuapa, West Coast of Peninsular Siam; Batu, Selangor, Malay States); Robinson & Kloss, Journ. Nat. Hist. Soc. Siam 5, 1924, p. 395 (Koh Rah); (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210; Chasen, Bull. Raffl. Mus. 5, 1931, p. 120 (Kundur); Edgar, Bull. Raffl. Mus. 8, 1933, p. 161 (Sitiawan, Perak, notes on nidification); Chasen, Bull. Raffl. Mus. 11, 1935, p. 263; Chasen, Birds Malay Peninsula IV, 1939, p. 419 (Malay Peninsula, coast); Madoc, Malayan Nat. Journ. 2, 1947, p. 115 (western coast of Malaya, particulars); Gibson-Hill, Bull. Raffl. Mus. 20, 1949, p. 245 (distribution in Malaya); Gibson-Hill, Bull. Raffl. Mus. 21, 1950, p. 175 (Singapore Island); Glenister, Birds Malay Peninsula, 1951, p. 239, pl. 16 (Malaya, only near the west coast); Gibson-Hill, Bull. Raffl. Mus. 24, 1952, p. 332, 333, 361, 370, 376 (Pulau Pisang, P. Ubin, P. Ayer Merbau, P. Kundur); Cairns, Malayan Nat. Journ. 10, 1955, p. 21 (Penang, particulars).

Zosterops aureiventer aureiventer; (pt.) Stuart Baker, J. Bombay N. H. Soc. 28, 1921, p. 86 (Tenasserim, Malay Peninsula); Stuart Baker, Ibis (11)4, 1922, p. 146; Robinson & Kloss, Ibis (11) 5, 1923, p. 151; Chasen, Singapore Nat. 2, 1923, p. 108 (Singapore Island); Stuart Baker, Ibis (11) 5, 1923, p. 358; Chasen, Singapore Nat. 3, 1924, p. 36 (P. Tekong); Robinson & Kloss, Journ. Nat. Hist. Soc. Siam 5, 1924, p. 394 (Koh Rah); Riley, Bull. U. S. Nat. Mus. 172, 1938, p. 523 (Telibon Island, Trang; Pulo Pinto Gedong); Ripley, Bull. M. C. Z. 94, 1944, p. 414 (Banka).

Zosterops aureiventris aureiventris; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. III, 1926, p. 365; Stuart Baker, Fauna Brit. Ind., Birds, 2nd ed. VII, 1930, p. 282; Stuart Baker, Nidification Birds Ind. Emp. III, 1934, p. 194 (nidification); Smythies, Birds Burma, 1940, p. 220, 532 (from Tenasserim through the Malay States).

Zosterops auriventer subsp.; Robinson, Birds Malay Peninsula I, 1927, p. 315-316.

Zosterops auriventer williamsoni; Robinson, Birds Malay Peninsula II, 1928, p. 284 (Malay Peninsula, coast).

Zosterops palpebrosa buxtoni; (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210 (Borneo).

Zosterops palpebrosa erwini; Chasen, Bull. Raffl. Mus. 11, 1935, p. 264 (S. Natuna Isl.); Gibson-Hill, Bull. Raffl. Mus. 19, 1949, p. 150.

Zosterops palpebrosa; (?) Banks, Twenty-seventh Rep. Sarawak Mus. 1936, 1937, p. 8 (perhaps *tahanensis*); Harrisson, Sarawak Mus. Journ. 5, 1951, p. 588 (Matang Road, Kuching).

Zosterops palpebrosa sumatrana?; Stresemann, Journ. f. Orn. 87, 1939, p. 161 scheme (Borneo).

Zosterops palpebrosa auriventer; Stresemann, Journ. f. Orn. 87, 1939, p. 158-164 (systematic discussion of name *auriventer*); Deignan, Zoologica 28, 1943, p. 202 (western coast of Peninsular Siam); Mees, Sarawak Mus. Journ. 6, 1954, p. 138, 148, 152 (distribution).

Zosterops palpebrosa aureiventer; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Closest to *buxtoni* from West Java and Sumatra, but can be distinguished by its slightly larger average size, paler under parts, and slightly more yellowish upper parts; from *williamsoni* it may be distinguished by the well developed mesial yellow streak over the under parts, by the less yellow front, and by the less distinct or obsolete greenish edges to the rectrices. From other continental races it differs also in having these edges practically absent (there is some variation in this character), and by its comparatively shorter tail, in which it agrees with the forms from the Soenda Islands, and not with the other continental subspecies.

Unfeathered parts. Iris clear brown; bill black, paler beneath at base; feat leaden (Abbott); iris dark or dark hazel; bill plumbeous, black at tip; feet pale slate (Robinson, 1927).

Measurements. Wing 15 ♂, 50-55 (52.70); 10 ♀, 49-56 (52.40); 27 specimens, 49-56 (52.65); tail 15 ♂, 27, 30-34 (31.37); 10 ♀, 27-34 (30.90); 27 specimens, 27-34 (31.17); tarsus 26 specimens, 13-15½ (14.37); entire culmen 8 specimens, 12-14 (12.94); exposed culmen 25 specimens, 9-10½ (9.73); culmen from anterior point of nostril 25 specimens, 6½-8 (7.27).

Distribution. A form of the lowlands and coasts, known from the western coastal districts of the Malay Peninsula from Tavoy to Singapore; probably the eastern coast of Sumatra; Rhio Islands (P. Koendoer); South Natoena Islands (P. Pandjang and P. Kerdau); Bangka; and the extreme west of Borneo (only known from the Kuching area). A map of its distribution was given by Mees (1954, map I), to which map the following additions can be

made: Koh Rah, Peninsular Siam (Robinson & Kloss, 1919, 1924); Penang (Hume, 1879; Cairns, 1955. Gibson-Hill, 1949, doubted the old records for Penang, but according to Cairns, 1955, the form has probably always been present there, and is now increasing. There is, indeed, no reason why it should be absent from the island); Pulo Pisang; P. Ayer Merbau (Gibson-Hill, 1952). The record for Koh Rah conveniently bridges a part of the large grap still existing in known distribution between Tavoy, the type locality of the form, and the southern localities.

First collector. Perhaps Davison in April 1878 near Tavoy. I am not convinced that Hume's earlier record (1874), as quoted above in the synonymy, concerns this subspecies.

Figure. The coloured plate of Glenister (1951, pl. 16) is small ($^2/_5 \times$ natural size), and the colours are not quite natural, hence it is of local use only.

Type. BM nr. 86.12.1.1724 (type examined). For further particulars on the type specimen, see the discussion.

Moult. Not checked.

Nidification. As there is a good chance that the eggs of the Nehrkorn collection really belong to *Cisticola exilis* (cf. Schönwetter, 1928), it seems that Edgar (1933) was the first to contribute anything to the knowledge of the nidification; further particulars are given by Stuart Baker (1934) and Cairns (1955).

The breeding season is described to last from December to June, with its peak in April on Penang, and to extend till August in Perak.

The nest is of the normal *Zosterops*-type, and the clutch size is three or four (Cairns, 1955); Stuart Baker (1934) gives as clutch size two or three, generally the latter, but as he especially states that his eggs were fresh, the clutches may have been incomplete. The colour of the eggs is pale blue.

Habits, etc. Notwithstanding the fact that this race is common in Malaya, and even on Singapore Island, very little has been recorded concerning its habits. Gibson-Hill (1949) mentions its distribution in Malaya, and adds a few notes about its habitat, from which it appears that, though the race is largely confined to mangrove and coastal areas, it is sometimes found, in the lowlands of Perak and Selangor, in gardens and rubber plantations, from 10 to even 30 miles inland.

Voice. Cairns (1955) mentions the call phrase as: "Chiree-tweep, chiree-tweep", whereas the birds also utter a very high pitched "Chreep" like the thin piping of a bat, which is surprisingly easy to hear and to be identified above and from the other sounds.

Discussion. This subspecies has consistently been confused with *william-*

soni from the coast of the Gulf of Siam; a mistake that apparently dates back to the describers of *williamsoni* themselves (Robinson & Kloss, 1919), who included in their original material a specimen from Koh Rah, western coast of Siam, whereas as paratypes they took a number of specimens from Batu, Selangor coast. Apparently they intended to describe that particular form of *Zosterops palpebrosa* that inhabits the coastal area of the Malay Peninsula, without realizing that the birds from the eastern coast are distinct from those of the western coast. That they did not have a good idea of what *auriventer* Hume is, and of the points of difference between *auriventer* and *williamsoni*, is shown most clearly by the fact that they (Robinson & Kloss, 1924) list the single specimen from Koh Rah, western coast of Siam, twice, once under the name *Zosterops aureiventer aureiventer*, and on the following page as *Zosterops palpebrosa williamsoni*. That indeed these names were referred to one and the same individual, is shown by its collector's number.

Later Robinson (1927) apparently realized that the birds from Malaya are distinct from true *williamsoni*, but he did not yet accept the identity of the latter with Hume's *auriventer* from Tavoy. In more recent years ornithologists of the Raffles Museum and from elsewhere have applied the name *auriventer* to the bird here named *Z. everetti tahanensis*, still identifying the coastal race with *williamsoni*. Stresemann (1939) and Deignan (1943) finally arrived at the classification accepted here.

Evidently the confusion about the name *auriventer* could be cleared by examination of the type specimen. Though formerly it had been identified with *tahanensis*, Stresemann (1939), from an examination by Kinnear, accepted it as belonging to *palpebrosa*. In the autumn of 1955 I had the opportunity to compare this specimen with the types of both *williamsoni* and *tahanensis*, and also with other material, including skins from the Malayan coast and topotypical specimens of *Z. everetti wetmorei* from Peninsular Siam. At once it was evident why there has been such a difference of opinion, for the problem, even with the type specimen at hand, proved less easy to solve than I had expected.

The type, as compared with *auriventer* from Malaya and *tahanensis*, is darker grey underneath than any specimen of the former race with which I could compare it, agreeing in this respect with *tahanensis*; the broad yellow longitudinal streak over the belly is also indicative of that race, as is the slightly duller yellow throat. On the other hand the type agrees with *auriventer* rather than with *tahanensis* in the coloration of the upper parts, which are slightly more yellowish than in *tahanensis*, though somewhat greener than in most specimens of *auriventer*, and in the slightly more yellowish-green, not green, forehead; moreover the specimen has a small bill, similar

in size to the bills of *auriventer* and *tahanensis,* and unlike *wetmorei* to which race one would expect it to belong if it had to be placed in the species *Z. everetti.* As regards wing formula, the type is somewhat aberrant (fig. 2b), in its relatively long 2nd primary, in which it differs from both *auriventer* and *tahanensis,* which are, in this character, identical.

As can be gathered from the comparative notes given above, at first sight the type looks more like *tahanensis* than like *auriventer.* Nevertheless, after ample consideration and reexamination, I feel that the type specimen really agrees best with *Z. palpebrosa* and not with *tahanensis,* so that the nomenclature introduced by Stresemann (1939), and used by Deignan (1943) and Mees (1954), remains valid.

That it is not at all an easy task to distinguish some specimens of *tahanensis* and *wetmorei* from *Z. palpebrosa* is shown by the many misidentifications made even by competent systematists; the problem will be more fully discussed under *tahanensis.*

A part of the difficulties of assigning the type seems due to the fact that there is a little pronounced geographical gradient in certain characters; going up the western coast of the Malay Peninsula, the yellow streak over the under surface gradually becomes broader, and the amount of yellow on forehead and supra loral region diminishes. This conclusion is not based on much material, and may prove wrong. On the other hand these differences are not unexpected as the race *williamsoni* from the eastern coast of the Malay Peninsula shows the characters of the southern birds even more pronounced: the yellow streak is practically absent, and it has a large and distinct yellow forehead and supra loral region.

9. **Zosterops palpebrosa buxtoni** Nicholson

Zosterops buxtoni Nicholson, Ibis (4) 2, 1879, p. 167 — nomen novum for *Zosterops lateralis* Hartlaub, nec *Sylvia lateralis* Latham, nec *Zosterops lateralis* Sundevall.

Z[osterops] lateralis Hartlaub (ex Temminck MS), Journ. f. Orn. 13, 1865 (Jan.), p. 15 — Java und Sumatra, restricted to village (not "Berg") Tapos, N. W. slope of Mt. Pangerango, W. Java, by Mees (1954, p. 141, footnote 6).

Zosterops palpebrosa sumatrana Stresemann (ex Kloss MS), Mitt. Zool. Mus. Berlin 17, 1931 (1 June), p. 210 — nomen nudum.

Zosterops aureiventer sumatrana Kloss, Treubia 13, 1931 (Dec.), p. 369 — Siolak Dras, Korinchi Valley, Sumatra, 900 meters.

Dicaeum flavum; Boie, Bijdr. Natuurk. Wetensch. 3, 1828, p. 245 (Tapos); Boie, Isis 21, 1828, col. 1032 (Tapos); Temminck, Recueil d'Oiseaux, 98 livr., 1835; S. Müller, De Gids, Wetensch. Bijdr., 1837, p. 10.

Zosterops palpebrosa; Lichtenstein, Nomencl. Av. Mus. Zool. Berol., 1854, p. 33 (Java); van Bemmel, Irena 1, 1941, p. 7.

Zosterops lateralis; G. R. Gray, Hand-List Birds 1, 1869, p. 163 (Java); Carus in Carus & Gerstaecker, Handb. Zool. I, 1868-75, p. 285 (Java und Sumatra); Tweeddale, Ibis (4) 1, 1877, p. 303 (District of Lampong, S. Sumatra); Vorderman, Nat. Tijdschr.

Ned. Ind. 44, 1885, p. 194 (Java); Vorderman, Nat. Tijdschr. Ned. Ind. 45, 1886, p. 333 (Tjitjati).

Zosterops Buxtoni; Reichenow & Schalow, Journ. f. Orn. 28, 1880, p. 198; Crowley, Cat. Birds' Eggs, 1883, p. 16.

Zosterops auriventer; Nicholson, Ibis (4) 5, 1881, p. 152 (Kosala); Nicholson, Ibis (5) 1, 1883, p. 253 (near Paoe, foot of Mt. Dempo 3200 ft.); Hartert, Ornis 7, 1891, p. 115 (Preanger); Seebohm, Ibis (6) 5, 1893, p. 218; (pt.) Finsch, Tierreich 15, 1901, p. 17 (Java, Sumatra); Dubois, Syn. Av. I, 1902, p. 707; Koningsberger, Med. Dept. Landbouw 7, 1909, p. 5; Koningsberger, Java Zoöl. en Biol., 1912, p. 240 (Buitenzorg); de Beaufort & de Bussy, Bijdr. Dierk. 21, 1919, p. 270 (Brastagi, Batang Kwis).

Zosterops aureiventer; (pt.) Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 163 (Java); Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1889, p. 401 (Sumatra); Tristram, Cat. Coll. Birds, 1889, p. 210 (Java, Bantam); Hartert, Kat. Vogelsamml. Senckenb., 1891, p. 32 (Java); Vorderman, Nat. Tijdschr. Ned. Ind. 60, 1901, p. 76 (Java); Koningsberger, Med. 's Lands Plantentuin 50, 1901, p. 192, 193 (Java); Bartels, Nat. Tijdschr. Ned. Ind. 61, 1902, p. 147 (District Palaboehan, Pangerango); Bartels, Journ. f. Orn. 54, 1906, p. 406 (Palaboehan, Pangerango 3000 ft.); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 432; Bartels, Tijdschr. Nijverh. Landb. Ned. Ind. 75, 1907, p. 119; (pt.) Sharpe, Hand-List Birds 5, 1909, p. 4 (Java, Sumatra); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 4 (Java); van Balen, Dierenw. Insulinde II, 1915, p. 482 (Java, Sumatra en de Kleine Soenda Eilanden); Siebers, Midden-Oost-Borneo Exp. 1925, 1927, p. 386 (Java); Cammerloher, Oesterr. Bot. Zeitschr. 77, 1928, p. 48 (Buitenzorg).

Zosterops aureiventris; Robinson, Bull. Liverpool Mus. 2, 1899, p. 47, plate 1 fig. 2 (Java).

Zosterops; (pt.) Koningsberger, Teijsmannia 18, 1907, p. 70 (Tjibodas).

Zosterops buxtoni; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 251, 258, 283 (Korinchi Valley: Sandaran Agong 2450 ft., Sungei Penoh 2700 ft., Siolak Daras 3000 ft.); Robinson & Kloss, J. Straits Br. R. As. Soc. 81, 1920, p. 83 (N. E. Sumatra); Jacobson in Robinson & Kloss, Journ. F. M. S. Mus. 11, 1924, p. 347 (vernacular).

Zosterops aureiventer buxtoni; Stuart Baker, Ibis (11) 4, 1922, p. 146; Robinson & Kloss, Ibis (11) 5, 1923, p. 151; Robinson & Kloss, Journ. F. M. S. Mus. 8, add., 1923, p. 354; Snouckaert, Jaarber. C. N. V. 13, 1923, p. 110 (Buitenzorg); Robinson & Kloss, Treubia 5, 1924, p. 298 (Oedjoengteboe, Tjiomas, Tjibodas); Robinson & Kloss, Journ. F. M. S. Mus. 11, 1924, p. 338 (Fort de Kock, Suban Ajam, Air Njuruk 1400 m, Pasumah Estate 900 m); Snouckaert, Jaarber. C. N. V. 16, 1926, p. 84 (Buitenzorg); Sody, Jaarber. C. N. V. 16, 1927, p. 184; Sody, Nat. Tijdschr. Ned. Ind. 87, 1927, p. 197; Dammerman, Fourth Pacific Sc. Congr., Exc. Tjibodas, 1929, p. 28 (Tjibodas); Bartels Jr. & Stresemann, Treubia 11, 1929, p. 143 (Java); Sody, Tectona 23, 1930, p. 198.

Zosterops auriventer buxtoni; Snouckaert, Jaarber. C. N. V. 13, 1923, p. 19 (Buitenzorg); Docters van Leeuwen, Trop. Nat. 20, 1931, p. 105 (Buitenzorg); Docters van Leeuwen, Ann. Jard. Bot. Buitenzorg 42, 1932, p. 79, 88.

Zosterops palpebrosa buxtoni; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210; Kuroda, Birds Isl. Java I, 1933, p. 121; Chasen, Bull. Raffl. Mus. 11, 1935, p. 264 (Java (west and central)); Bartels Jr., Orn. Monatsber. 45, 1937, p. 143; Delacour, Birds Malaysia, 1947, p. 319; Hoogerwerf, Treubia 19, 1948, p. 107, 134 (Java); Hoogerwerf, Limosa 22, 1949, p. 248 (eggs); Hoogerwerf, Bijdr. Oöl. Eil. Java, 1949, p. 248 (eggs from Java); Hoogerwerf, Avif. Tjibodas, 1949, p. 139 (Tjibodas); Hoogerwerf, Avif. Plantentuin, 1949, p. 106 (Buitenzorg); Hoogerwerf, Limosa 23, 1950, p. 139, 264 (Buitenzorg, Tjibodas, particulars); Mees, Ardea 39, 1951, p. 196-218 (distribution in Java); Docters van Leeuwen, Beaufortia 4, 1954, p. 151, 175, 180; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Mees, Sarawak Mus. Journ. 6, 1954, p. 141 (designation of lectotype).

Zosterops auriventer sumatrana; Snouckaert, Alauda (2) 4, 1932, p. 110.
Zosterops palpebrosa sumatrana; Chasen, Bull. Raffl. Mus. 11, 1935, p. 264; de Schauensee & Ripley, Proc. Ac. Nat. Sc. Philad. 91, 1940, p. 361 (Blangnanga 3600 ft.); Chasen in Chasen & Hoogerwerf, Treubia 18, suppl., 1941, p. 105 (Atang Poetar-Teket 900-1000 m); Delacour, Birds Malaysia, 1947, p. 319; Gibson-Hill, Bull. Raffl. Mus. 19, 1949, p. 150.

Subspecific characters. The smallest race. Slightly darker and greener above than the nominate race (though some specimens from the eastern part of the range of the latter are quite as dark); no greenish edges along the rectrices; primaries and rectrices rather darker (more blackish) than in the continental forms; rump yellower than remainder of upper parts; a very distinct yellow median streak over the under parts; flanks slightly darker grey than in the continental races. From *auriventer,* to which it is closest, this race differs in its average smaller size, and darker under parts.

Unfeathered parts. Eyes pale brown, or pale yellowish brown, or pale yellow, or very pale chocolate brown, or pale violet-grey, or greyish pink; bill, upper brownish black, lower grey, or black, or grey, or upper horny black, lower leaden grey, or upper horny black, lower grey, tipped black, or upper horny black, lower horny black, base whitish, or upper brownish black, lower grey, tipped with brownish black, or upper greyish black, lower bluish grey, base yellowish, or black, lower greyish; legs grey, or dirty brownish pink, or bluish grey, or yellowish brown-grey, nails grey, or greyish pink, or pale pinkish grey; or dark leaden, or leaden, or bluish grey (Jacobson); eyes yellowish brown, or blackish grey; bill grey, or leaden; legs grey, or pale leaden, or black (van der Weele); eyes red; bill black; legs black (Groeneveldt); iris golden yellow, or reddish yellow; eye-rim black; bill blackish leaden; legs leaden or blackish leaden (J. H. Becking); iris hazel; upper mandible black, lower slate, tipped with black; feet pale grey (Robinson & Kloss, 1918).

Measurements. Wing 53 ♂, 49-53 (50.54); 47 ♀, 48-53½ (50.58); 114 specimens, 48-53½ (50.63); tail 4 ♂, 29½-31 (30.25); 6 ♀, 29-32 (30.67); 11 specimens, 29-32½ (30.68); tarsus 10 specimens, 13-15 (14.38); entire culmen 11 specimens, 10-13 (11.80); exposed culmen 11 specimens, 8-10 (9.11), culmen from anterior point of nostril 11 specimens, 5½-7½ (6.64).

Structure. Wing formula as typical of the species; tail relatively very short, as in the other southeastern races (cf. table I).

Distribution. The whole of Sumatra and the Residencies of Bantam and Buitenzorg in West Java, ranging from about 200-1600 m altitude, and occasionally lower down (Depok, 80 m) though never met with in the true lowlands.

In Sumatra it has been recorded from the following localities: Leuser (Atjeh), Isaq (Atjeh), Brastagi, Fort de Kock, Suban Ajam (Redjang, Bengkoelen), Korinchi Valley, Pasemah Estate and Air Njuruk (Palembang), Paoe at the foot of Mt. Dempo, between Telok Betong and Soekadana, Tandjong Karang. The eggs from Batang Kwis mentioned by de Beaufort & de Bussy (1919) do not fit into the picture of distribution, as this place is situated in the true lowlands not far from Medan, where one would not expect to find this form. As no specimen has been collected, this record may be based on a misidentification of the eggs.

For the distribution in Java I refer to a former publication (Mees, 1951, map I) with the following additions and corrections: Goenoeng Boender (north slope of Mt. Salak), specimens collected by O. Bryant in USNM. The locality Tapos is not Pasir Tapos on the northeast flank of Mt. Salak, as I surmised, but the village Tapos on the northwest slope of Mt. Pangerango (Boie, 1828a and 1828b); more about this locality is said in the discussion of the type specimen of the present race.

First collectors. Apparently Kuhl & van Hasselt; of the three oldest specimens in RMNH, one is labelled "Kuhl & van Hasselt, 1826", two merely "Java, 1826", without collector's name. Probably 1826 is the year in which the specimens were received in Leiden as both collectors had died several years earlier and neither of them could have taken any specimen after September 1823. The true year of collecting, therefore, must have been 1821, 1822, or 1823.

Figures. Robinson (1899), plate 1 fig. 2 (coloured, by J. Smit); Hoogerwerf (1949a and b, 1950), plate 20 fig. 219 (coloured, but very small).

Type. In a previous publication I chose as lectotype a specimen from Tapos, N. W. slope of Mt. Pangerango, West Java (Mees, 1954). The statement made in the same place that "At present there are no specimens of *buxtoni* from Sumatra in Leiden, collected before 1865", is not correct, as there is a single undated male labelled: "Sumatra", taken by Horner. Because of its being undated I overlooked the specimen, but Horner died in Padang, Sumatra, on 7 December 1838, so that the specimen must have been collected prior to that date.

The name Tapos is a fairly common one for localities in western Java. Personally I have visited three: Pasir Tapos, a hill on the N. E. slope of Mt. Salak; Pasir Tapos, a hill in the S. E. part of the Particulier Land Bolang, northwest of Buitenzorg (I climbed the hill in November 1948, and no white-eye does occur in the region), and a village Tapos on the northwestern slope of Mt. Pangerango. As Hartlaub (1865) indicated the locality where the type specimen had been collected as "Berg Tapos", I was led to believe

that the specimen had been collected on the hill at the foot of Mt. Salak, and I indicated this place on the published map referred to above. Afterwards, however, I became aware that Boie, the collector of the type specimen, has stayed for a considerable time at the village Tapos on the slope of Mt. Pangerango; and that this place is the type locality is shown by notes left by Boie, among which I found the following description, probably pertaining to the type specimen:

Gen. Dicaeum Cuv *Tapos der 6 Juli 1827*

Dic. flavum Horsf.

♀ *adulto*

Ganze Länge 3″ 8‴ Schwanz 1″ 2‴ aequal, die Flügel überragend um 8‴; Flügel 1″ 10‴ Flügelweiten 3″ 9‴; 4te rem. am längsten, 1ste 2‴ kürzer; (10; 6; 3.)

Schnabel vom M[und] W[inkel] 6‴ vom St[irn] 4½‴ myxa 3‴ Schnabel hoch an der Basis 2‴ ibid breit *ebenso* breit am M. W. 3‴; F... nicht abgeschieden; der ganze Schnabel weniger scharf u. gebogen als bei flammeum u. s. w.; Max. ton. vor der Spitze ausgeschnitten; Nasenlöcher wie bei Nectarinia u. Cinnyris.

Unterschenkel 9‴ Tarsus 6‴; acro... schildrig.; M. Z. 5‴ N. 1½‴; die N: der Seitenzehen erreichen das Ende des N. Gliedes. Hinterz. t. N. 4‴ N. 2‴ — M. N. fast ohne scanfelfösen. Vorsprung Schnabel mattschwarz, an der Basis der mand. blaugraul.; Füsse bleigrau; Nägel etwas dunkler. — Iris hellbraun. — Gefieder lang, weitstrahlig. Alle oberen Theile auf verdecktem hellgrauem Grunde schön olivegrün. — Stirn, Kinn u. Kehle so wie untere Schwanzdecker citronengelb; Zügel und unteres Augenlied schwarz; der ganze Augenliedrand schneeweiss; Brust u. Seiten silbergrau; Bauch weiss.

Im Magen ausser Ueberbl. von Insecten auch eine kleine weiche grüne Frucht.

This note conveniently settles date of collecting and locality of the type, with the awkward exception that Boie describes his specimen as a female, whereas on the label of the actual specimen the sex is given as male. It must be remarked, however, that the label of the specimen has been written by Finsch, about 1900, and that therefore the original label has probably been copied several times, with all possible errors originating from this; another example of how important it is to preserve original labels. Of course, Boie may have collected several specimens at Tapos in July 1827, and as locality and approximate date of collecting are certain, it does not matter so much if the specimen described in his notes is the actual type, or not.

Though I have not actually observed *Z. palpebrosa buxtoni* at Tapos, I found it plentiful near the village Pasimoentjang, about five kilometers away, in the months March and April, 1947.

In the British Museum I examined a specimen, preserved there as "type of *Z. buxtoni*", taken by Buxton, evidently one of the two skins Nicholson had before him when he gave the new name to *Z. lateralis* Hartlaub. It is in a deplorable condition — having been preserved in spirits during a considerable time before it was finally skinned (cf. Nicholson, 1879) — and I

found it not possible to take measurements. It is not dated, and the only indication of its locality of collecting is "W. Java". Through my act of restriction of the type to the Tapos skin, the specimen taken by Buxton has lost its nomenclatorial significance.

Moult. Not checked in the majority of specimens. Specimens collected in March (1), May (4), June (1), and July (1), are not in moult, the July specimen is in abraded plumage, especially its tail.

One specimen collected in February shows moult of its tail, two rectrices being very short; two specimens from July are moulting primaries, and one of them also rectrices. The data seem suggestive of a main moult in July.

Nidification. This form can probably be found breeding throughout the year, though no breeding has as yet been recorded for November and December (Sody, 1930; Hoogerwerf, 1949).

Hoogerwerf (1949a, 1949b, 1950) gives particulars on the nest, which seems not different from that of other Zosteropidae. He states the clutch-size to be two, and describes the eggs as pale bluish green or Niagara Green, slightly glossy. For a discussion of the measurements of the eggs as presented by Hoogerwerf, see under the heading nidification of the following race (*melanura*).

Habits, etc. The normal behaviour of this race has been adequately described by Robinson & Kloss (1924) from notes by Jacobson, who mentions it as very common, nearly always travelling in smaller or larger flocks, from six to thirty birds and more, among trees in open country, in groves, plantations, village and town gardens, and even in old forest. Earlier Robinson & Kloss (1918) had doubted the occurrence of this race in true forest.

Botanists working on flower-biology have always taken interest in white-eyes; and as *buxtoni*, common in the botanical gardens ('s Lands Plantentuin) of Buitenzorg is one of the common and accessible forms, it is not surprising that it was fairly often mentioned in botanical literature (Cammerloher, 1928; Docters van Leeuwen, 1932). Very recently Docters van Leeuwen (1954) has contributed an important summary on the relations between Loranthaceae and birds; of the race under discussion he writes that it opens the flowers by squeezing at the basis of the corolla-lobes. The behaviour, as here described, incidentally clears the birds from the suspicion of fertilizing *Loranthus*-flowers.

As regards the food of this race, I refer to Boie's description of the type specimen. More about food will be said under the following race, *melanura,* which doubtless has about the same menu.

Voice. When moving about in flocks, these birds constantly keep up a fine, high chirping. Song I never heard from them, but Bartels Jr. (in van Bem-

mel, 1941), writing on *Irena puella turcosa* Walden, mentioned that he has: "... een exemplaar een, niet zeer luiden, potpourri-zang ten beste hooren geven, in de geest zooals b. v. het Tuinbrilvogeltje (*Zosterops palpebrosa*) dat vaak doet".

Discussion. For a rather elaborate discussion of the distribution of this race, as also for the grounds of not recognising "*sumatrana*" as a distinct form, I refer to a former publication (Mees, 1951).

10. **Zosterops palpebrosa melanura** Hartlaub

Z[osterops] melanura Hartlaub (ex Temminck MS), Journ. f. Orn. 13, 1865 (Jan.), p. 15 — Pontianak auf Borneo (errore!) = Java, restricted to Bandoeng, West Java by Mees (1954, p. 141, footnote 6).

Zosterops gallio Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 185 — East Java.

Zosterops flava; Sclater, Proc. Zool. Soc. London, 1863, p. 219 (Java); Meyer, Sitzungsber. Abh. Ges. Isis, 1884, Abh. 1, p. 42 (Java, nidification); Vorderman, Nat. Tijdschr. Ned. Ind. 45, 1886, p. 333 (Doeren Gede); (pt.) Everett, J. Straits Br. R. As. Soc. 20, 1889, p. 141 (Pontianak).

Zosterops flavus; Blyth, Ibis N. S. 3, 1867, p. 33.

Zosterops melanura; G. R. Gray, Hand-List Birds 1, 1869, p. 164 (no locality); Salvadori, Ann. Mus. Civ. Genova 5, 1874, p. 189 (Pontianak); Giebel, Thes. Orn. III, 1877, p. 776 (Borneo); Wallace, Island Life, 1880, p. 353 (Borneo); W. Blasius, Verh. zool.-bot. Ges. Wien, 1883, p. 86 (Pontianak); Vorderman, Nat. Tijdschr. Ned. Ind. 46, 1887, p. 230 (Borneo); Vorderman, Nat. Tijdschr. Ned. Ind. 60, 1901, p. 77 (Java); Bartels, Nat. Tijdschr. Ned. Ind. 61, 1902, p. 148 (District Palaboehan 1000 ft., Pangerango 3000 ft.); Bartels, Tijdschr. Nijverh. Landb. Ned. Ind. 75, 1907, p. 119; Koningsberger, Teijsmannia 19, 1908, p. 88 (Pangerango: stomach contents); Koningsberger, Med. Dept. Landbouw 7, 1909, p. 5 (Java); Koningsberger, Java Zoöl. Biol. 1912, p. 240 (Java); Delsman, Trop. Nat. 16, 1927, p. 89 (Tjibodas).

Zosterops aureiventer; Vorderman, Nat. Tijdschr. Ned. Ind. 51, 1892, p. 392 (Salak).

Zosterops gallio; Seebohm, Ibis (6) 5, 1893, p. 218; van Balen, Dierenw. Insulinde II, 1915, p. 483 (Java).

Zosterops parvula; Finsch, Notes Leyden Mus. 22, 1901, p. 222 (Pontianak, Borneo; Java); (pt.) Finsch, Tierreich 15, 1901, p. 26 (Borneo, Java); (pt.) Dubois, Syn. Av. I, 1902, p. 709 (Bornéo, Java); Bartels, Journ. f. Orn. 54, 1906, p. 406 (District Djampang 1400 ft., Pangerango); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 9 (Java, Borneo); Robinson & Kloss, Treubia 5, 1924, p. 298 (Tjibodas, Tamansari); Snouckaert, Jaarber. C. N. V. 17, 1927, p. 31 (Tankoeban Prahoe 1500 m).

Zosterops; (pt.) Koningsberger, Teijsmannia 18, 1907, p. 70 (Tjibodas).

Zosterops parvula gallio; H. Docters van Leeuwen, Treubia 10, 1928, p. 446 (Klèdoeng); Dammerman & Siebers in Dammerman, Treubia 11, 1929, p. 63 (Java); Bartels Jr. & Stresemann, Treubia 11, 1929, p. 143; Sody, Tectona 23, 1930, p. 198; Kuroda, Tori 6, 1930, Eng. col. p. 74 (Mt. Tjerimaij 2500 m); Stresemann, Treubia 12, 1930, p. 430 (Papandajan).

Zosterops parvula galio; E. Bartels, Nat. Tijdschr. Ned. Ind. 91, 1931, p. 346 (Kole Beres 600-1000 m).

Zosterops melanura melanura; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 213 (Süd-Borneo: Bandjermasin, Pontianak); Mathews, Ibis (13) 2, 1932, p. 154 (South Borneo); Chasen, Bull. Raffl. Mus. 11, 1935, p. 265 (Borneo (south)).

Zosterops melanura gallio; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 213 (Java); Kuroda, Birds Isl. Java I, 1933, p. 123 (Java); Chasen, Bull. Raffl. Mus. 11, 1935, p. 265 (Java); Kuroda, Birds Isl. Java II, 1936, p. 704 (Java).

Zosterops palpebrosa buxtoni; van der Pijl, Trop. Nat. 25, 1936, p. 119 (Bandoeng).

Zosterops palpebrosa melanura; Bartels Jr., Orn. Monatsber. 45, 1937, p. 86 (Borneo); Delacour, Birds Malaysia, 1947, p. 319 (Borneo); Wynne, North W. Nat. N. S. 2, 1954, p. 625; Mees, Sarawak Mus. Journ. 6, 1954, p. 140-141 (Java, not Borneo).

Zosterops palpebrosa gallio; Bartels Jr., Orn. Monatsber. 45, 1937, p. 86 (Java); Delacour, Birds Malaysia, 1947, p. 319; Hoogerwerf, Treubia 19, 1948, p. 99, 134; Voous, Limosa 21, 1948, p. 100 (S. Serajoe Mts. 500 m, Mt. Tangkoeban Prahoe 1500 m); Hoogerwerf, Limosa 22, 1949, p. 248 (nidification); Hoogerwerf, Bijdr. Oöl. Eil. Java, 1949, p. 248 (nidification); Hoogerwerf, Avif. Tjibodas, 1949, p. 139 (Tjibodas); Hoogerwerf, Limosa 23, 1950, p. 139 (Tjibodas); Mees, Ardea 39, 1951, p. 196-218 (distribution in W. Java); Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops parvula (*palpebrosa*) *gallio*; F. C. van Heurn, Limosa 23, 1950, p. 370 (egg from Bandoeng).

Note. References to the hybrid populations *buxtoni* ≤ *melanura* from West-Java, have been included in the synonymy of this subspecies. As these hybrids are yellow-bellied, they have always been considered to belong to *melanura*.

Subspecific characters. Similar to *buxtoni*, but entire under surface yellow, and slightly larger on the average. From the yellow-bellied continental race *siamensis* it may be distinguished by the absence of greenish edges to the tail feathers, and further by being more greenish above, with a rather more yellowish rump, and by the relatively slightly shorter tail.

Unfeathered parts. Eyes brown; bill black, or grey; legs grey (van der Weele); eyes brown; bill black; legs black (Kooiman).

Measurements. Wing 28 ♂, 50-55 (52.39); 24 ♀, 50-55 (52.58); 53 specimens, 50-55 (52.45); tail 9 specimens, 28-35 (32.28); tarsus 8 specimens, 14¼-16¾ (15.03); entire culmen 9 specimens, 11¾-13 (12.14); exposed culmen 9 specimens, 9-10 (9.64); culmen from anterior point of nostril, 6¾-7¼ (6.97).

Distribution. Java, with the exception of the extreme western part (Residency of Bantam), where replaced by the preceding subspecies, and Bali. Populations in the neighbourhood of Mt. Pangerango are intermediate between the two races, but all the localities whence yellow-bellied birds, either pure or mixed, are known, are listed here.

Vertical range similar to that of *buxtoni*, about 200-1600 m; the occurrence at 2500 m as recorded by Kuroda (1930) must be exceptional and as Kuroda's specimen was not taken by an ornithologist, but by the dealer Menden, the altitude given on the label may be incorrect.

All records of the occurrence of this subspecies in Borneo are erroneous.

The race has been recorded as follows:

Western Java. Tjiapoes, Pasirmoentjang, Tjibodas, Pasir Datar, Tjibadak, Tjiboengoer, Doeren Gede, Tjisaat, Bodjonglopang, Gng. Andir near Tjibeber, Kiarakoneng, Kole Beres, Tjimahi, Bandoeng, Mt. Tankoeban Prahoe, Kamodjan, Tjikadjang, Tirtasari, Tjiodeng (Pangerango), Pasir Rananga, Pameungpeuk, Bandjarwangi (Tjikadjang), Mt. Tjerimaij, the majority of these localities can be found on the map published by Mees (1951, kaart I).

Central Java. Kalipoeti 1500 m, Kledoeng-Kedoe, Gng. Ngebra-Japara.

Eastern Java. South Smeroe, Soember Wringin, Tjisaroeni, Idjen-Plateau, Ngadiwono.

Bali. Bratan 1200 m.

First collector. Pierre Diard, in or about 1826, on Java.

Figures. Kuroda (1933), plate 6 fig. 12 (coloured, ½ × natural size, by S. Kobayashi); Hoogerwerf (1949, 1950), plate 20 fig. 219a (coloured, but too small to be of more than local use).

Type. RMNH cat. nr. 1, labelled Pontianak, 1826 (no original label, the present one being written by Finsch about 1900), leg. Diard.

Moult. Not checked in the majority of specimens. Specimens collected in January (3), May (2), and December (1) are not in moult; a specimen collected in July is in heavy moult.

Nidification. Some particulars have already been given with the preceding subspecies, and nearly all data on the present form in literature concerning W. Java probably refer to hybrids between *melanura* and *buxtoni*, and should therefore perhaps better been left out of consideration.

On the other hand the large amount of hybridization that evidently takes place between the two subspecies indicates that their breeding cycles — if, indeed, not both subspecies can be found breeding the whole year — must largely coincide.

Unfortunately Hoogerwerf (1949a, 1949b) does not distinguish between the eggs of *buxtoni* and *melanura* ("*gallio*" auct.); as *melanura* is a slightly larger race than *buxtoni*, it might perhaps be expected that on the average its eggs also range slightly larger. Curiously F. C. van Heurn (1950) records an egg from Bandoeng, certainly within the range of true *melanura*, that is remarkable small: 13.8 × 10.8 mm. Dr. van Heurn kindly presented the egg to the Leiden Museum; I am not sufficiently familiar with eggs of birds from Java to be able to judge if the possibility of misidentification is altogether excluded. On the other hand, Dr. van Bemmel, at the time still curator of birds at the Buitenzorg Museum, could supply me with the following measurements of a clutch from Wonosobo, a clutch apparently not measured by Hoogerwerf: 16.1 × 11.8 and 15.1 × 11.7 (van Bemmel, in litt., 2-VIII-1950).

These measurements are rather large, though falling in the maxima of those given by Hoogerwerf, and would seem to confirm the surmise that the eggs of *melanura* average larger than those of *buxtoni*.

Like in *buxtoni*, the number of eggs is generally two.

Habits, etc. Entirely similar to those of the preceding subspecies. In the outskirts of Bandoeng, where the birds are common, I was struck by their confidence in man; at a distance of not over two meters, they would fearlessly carry on their investigations of the foliage of shrubs. Like the preceding subspecies they usually travel in flocks, under the constant uttering of a high chirp. This kind of behaviour, of course, is thoroughly typical of the whole genus.

A contribution to the biology of this form was made by van der Pijl (1936), who thought that his specimens belonged to *Z. palpebrosa buxtoni*. As his observations were made in Bandoeng, and as *melanura* is the only white-eye occurring there, it is evident that the latter subspecies is meant; unfortunately van der Pijl's paper has been included with the name *buxtoni* in the Zoological Record for 1937. Van der Pijl does not draw definite conclusions, though his investigations indicate that the flocks of birds visiting the flowers of *Elaeocarpus ganitrus* Roxb., did so both for obtaining nectar and small insects and mites.

H. Docters van Leeuwen (1928) found fruits of *Lantana camara* L. in some stomachs from Klèdoeng, Central Java; whereas Koningsberger (1908) writes that the white-eyes are to a much greater extent fruit eaters than he formerly believed. Van der Weele found "resten van een jonge *Mantis*" in the stomach of a specimen shot at Tirtasari (note on label of skin in RMNH). The note on the food as given by Hoogerwerf (1950), who quotes H. Docters van Leeuwen (1928) as his authority, is not correct. Hoogerwerf copied the particulars on *Zosterops palpebrosa* of Docters van Leeuwen, which, however, is not the present species, but *Zosterops montana*.

Voice. The constant high chirp uttered by flocks when moving about has already been mentioned. I am not aware that any song of this form has ever been described.

Discussion. Three specimens from Bali differ from the great majority of Java skins in having their rumps rather greener, less yellow. These three specimens, collected by von Plessen at Bratan, are very similar to each other; the Java specimens, of which fairly large series, from different sources, were available, are much more variable in this respect, and the difference between the birds with the greenest rumps and those with the most yellowish rumps from Java, and even from the same locality, is much greater than the difference between the greenest rumped Java birds and the Bali specimens.

As a matter of fact the difference between the latter two is negligeable, and for this reason it is fortunate that the Bali population has not been separately named. Even if the difference noted will be confirmed when larger series from Bali become available (and it is unlikely that, for many years to come, collecting in the interior of Bali will be possible at all), it seems inadvisable to name them on the strength of such a slight difference.

The reasons for replacing the name *gallio* of this form by *melanura* were given in a recent paper (Mees, 1954).

In the Residency of Buitenzorg this subspecies and the preceding (*buxtoni*) meet, and form hybrid populations, a matter that needs not be extensively discussed here as several papers have already appeared on the topic (Bartels Jr., 1937; Mees, 1951). It goes without saying that I have, in calculating the average measurements of the race *melanura*, left out of consideration all the more or less yellow-bellied *melanura*-like specimens from Buitenzorg Residency, but it is interesting to give here the measurements of these birds.

Wing length of 40 ♂, 49-53 (50.59).

Wing length of 25 ♀, 49-54 (50.54).

Wing length of 65 specimens, 49-54 (50.57).

When we compare these measurements with those of pure *melanura* (average of 53 specimens, 52.45) and with *buxtoni* (average of 114 specimens, 50.63), it is evident that these *melanura*-like birds from Buitenzorg Residency agree in size with *buxtoni*, and not with *melanura*, a fact that I have previously tried to explain (Mees, 1951, p. 204).

As nearly all existing evident hybrids are in the Bartels collection (now in RMNH), it may be useful to draw attention to the specimens USNM nrs. 218721 and 220045, collected in 1909 by O. Bryant on Mt. Gedeh, Tjibodas. The first of these two skins is the most perfect intermediate I have seen, and on its label its identification had several times been changed from "*gallio*" to *buxtoni* and vice versa.

This form has often been given the name *Z. parvula*, and the confusion between *Z. parvula* (a synonym of *Z. flava*) and *melanura* was already initiated by Hartlaub (1865), the describer of *melanura*, when he wrote: "Sehr wahrscheinlich gleichartig mit der unvollständig beschriebenen Art *Z. parvula* Hombr. et Jacquin. von Banjermassing auf Borneo". Apparently none of these authors has taken the trouble to examine Hombron & Jacquinot's excellent plate (1843), that clearly depicts a bird with yellow lores, as has *Z. flava*, and not black lores, as has *melanura*.

11. **Zosterops palpebrosa unica** Hartert

Zosterops unica Hartert, Nov. Zool. 4, 1897, p. 520 — Nanga Ramau, South Flores.
Zosterops parvula; (pt.) Finsch, Tierreich 15, 1901, p. 26 (Flores); (pt.) Dubois,

Syn. Av. I, 1902, p. 709 (Flores); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 9 (Flores); Rensch, Gesch. des Sundabogens, 1936, p. 141, 142, 143, 150 (Sumbawa, Flores).

Zosterops unica; Hartert, Nov. Zool. 27, 1920, p. 434.

Zosterops parvula unica; Mathews, Syst. Av. Australas. II, 1930, p. 701 (Flores); Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 623, 636 (Batoe Doelang).

Zosterops melanura unica; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 213; Mathews, Ibis (13) 2, 1932, p. 154; Kuroda, Birds Isl. Java II, 1936, p. 729, 734 (Sumbawa, Flores).

Zosterops palpebrosa unica; Bartels Jr., Orn. Monatsber. 45, 1937, p. 86; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Very close to the preceding subspecies (*melanura*), but differs by having the rump and upper tail coverts slightly more yellow, less greenish. In other characters it can be matched with specimens from *melanura*.

Unfeathered parts. Iris pale brown (3 times) or brown (once); bill black, mandible bluish grey or horn white; feet grey or leaden grey (Rensch).

Measurements of four specimens (3 ♂, 1 ♀): wing 51-54 (52.25), tail 29½-31 (30.38), tarsus 14½-15½ (15.06), entire culmen 11½-12 (11.83), exposed culmen 8½-9½ (8.94).

Weights. ♂, 8.4, 8.5, 8.7 g; ♀, 9.8 g (Rensch).

Distribution. Known from Soembawa: Batoe Doelang 800 m, and from Flores: Nanga Ramau. In Flores it is only known from the type specimen.

First collector. Alfred Everett or his native collectors in the last months of 1896 at the type locality.

Not figured.

Type. AMNH nr. 700075.

Moult. The four specimens examined, collected in May, do not show signs of moult.

Nidification. Not recorded.

Habits, etc. Not recorded. Rensch (1931) observed it at the edge of the mountain forest at Batoe Doelang.

Discussion. It is curious that Hartert (1920) still considers the type of the race, at the time the only known specimen, to represent a species without known close relatives, though Finsch (1901a) had already correctly placed it with *melanura*. In several other respects too, Hartert's paper is not quite up to the standard we are accustomed to from this author (cf. *Zosterops insularis*, and the introduction of the lapsus *Oreozosterops* for *Oreosterops*).

Dr. Amadon kindly compared two specimens from Soembawa with the type from Flores, as also with the two brightest specimens I could supply of *melanura* (from Garoet, West-Java); the results of his comparison are (Amadon, in litt., 24-I-1951): "The type of *unica* agrees quite well with your

two birds from Sumbawa but the rump is no more yellow than the Sumbawa birds and perhaps slightly less so. All three of these birds have the rump yellower than in the two Java birds. *Unica* is perhaps a little brighter above and below than the Sumbawa birds but this would probably not hold in a series... The type agrees quite well with your birds from Garoet, Java, but is perhaps very slightly brighter (and definitely more yellow on the rump)".

This comparison confirms my own conclusion that the difference between bright specimens of *melanura* and normal specimens of *unica* is confined to the difference in yellowness of the rump.

Species 3. **Zosterops erythropleura** Swinhoe

Zosterops erythropleurus Swinhoe, Ibis 5, 1863 (July), p. 294, footnote — N. China (= Shanghai and Tientsin, cf. Proc. Zool. Soc. London, 1863, p. 204).

Zosterops erythropleurus melanorhyncha La Touche, Bull. B. O. C. 42, 1921 (29 Nov.), p. 32 — Mengtz, S. E. Yunnan, 4000 ft.

Zosterops chloronotus; Schrenck, Reis. Forsch. im Amur-Lande I, (2), Vögel des Amurlandes, 1860, p. 365 (Dondon, 49° N); Radde, Reisen im Süden von Ost-Sibirien II, 1863, p. 16; von Homeyer, Journ. f. Orn. 18, 1870, p. 164; Elwes, Proc. Zool. Soc. London for 1873, 1874, p. 649.

Zosterops japonicus; Swinhoe, Ibis 3, 1861, p. 331 (cage bird in Tientsin); Swinhoe, Proc. Zool. Soc. London for 1862, 1863, p. 317 (neighbourhood of Tientsin).

Zosterops erythropleura; Swinhoe, Proc. Zool. Soc. London, 1863 (Oct.), p. 204, 298 (Shanghai and Tientsin); Hartlaub, Journ. f. Orn. 13, 1865, p. 13; G. R. Gray, Hand-List Birds 1, 1869, p. 163 (N. China); Gould, Birds Asia, pt. XXIII, 1871, plate; Swinhoe, Proc. Zool. Soc. London, 1871, p. 350 (Shanghai to Pekin); Taczanowski, Bull. Soc. Zool. France 1, 1876, p. 135; A. E. Brehm & Finsch, Gefangene Vögel I, 2, 1876, p. 285 (von Schanhai bis Peking); Giebel, Thes. Orn. III, 1877, p. 775 (China sept.); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 161 (Pekin); Tristram, Cat. Coll. Birds, 1889, p. 211 (Pekin); Seebohm, Birds Jap. Emp., 1890, p. 68 (valley of the Amoor); Deditius, Journ. f. Orn. 45, 1897, p. 66 (Prov. Gan-su); Hartlaub, Abh. Naturwiss. Ver. Bremen 14, 1898, p. 362 (Peking); Finsch, Tierreich 15, 1901, p. 12; Dubois, Syn. Av. I, 1902, p. 706; Dresser, Manual Palaearctic Birds I, 1902, p. 221; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 473; Blackwelder, Res. in China I, (2), Carnegie Inst., 1907, p. 503 (Tien-tsin bird market); Sharpe, Hand-List Birds 5, 1909, p. 2; Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (eggs from Thibet!?); Sowerby in Clark & Sowerby, Through Shên-kan, 1912, p. 99 (very common during the summer); Reichenow, Die Vögel II, 1914, p. 469 (China); La Touche, Ibis (11) 2, 1920, p. 642 (common at Peking, Newchang); Sowerby, Naturalist in Manchuria III, Birds, 1923, p. 133 (North China and Manchuria); Stresemann, Abh. Ber. Mus. Dresden 16, (2), 1924, p. 12 (Kwan, Kwanhsién in 800 m und am Oméi in 800-1200 m); Hampe, Avicult. Mag. (4) 6, 1928, p. 29 (Peking bird market, very common and the cheapest birds in the autumn); Delacour, Ibis (12) 5, 1929, p. 429 (Bokor); Delacour, Journ. f. Orn. Ergänzungsb. II, 1929, p. 82; Delacour, Ibis (12) 6, 1930, p. 596 (Chapa); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 206; Delacour & Jabouille, Ois. Indoch. Franç. IV, 1931, p. 179 (Indo-China); Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 132; de Schauensee, Proc. Ac. Nat. Sc. Philad. 86, 1934, p. 240 (Chieng Mai, Chieng Dao, Monglin); Meise, Abh. Ber. Mus. Dresden 18 (2), 1934, p. 29 (Mandschurei); Schäfer, Journ. f. Orn. 86, 1938, Sonderh., p. 286; Worobiev, Trans. Sikhote-Alin St. Res. 2, 1938, p. 45, 56 (lower course of Amur); Stresemann,

Journ. f. Orn. 87, 1939, p. 164; Delacour & Jabouille, Ois. & Rev. Fr. d'Orn. N. S. 10, 1940, p. 208 (Chapa, Bokor); Smith, Garthwaite, Smythies & Ticehurst, J. Bombay N. H. Soc. 41, 1940, p. 591; Smythies, Birds Burma, 1940, p. 221, 532 (Karen Hills (Thandaung), Karenni, Kengtung); Smith, Garthwaite, Smythies & Ticehurst, J. Bombay N. H. Soc. 44, 1943, p. 69 (Thandaung, Nattaung); Deignan, Zoologica 28, 1943, p. 201 (Doi Su: thep, Doi Chieng Dao, Phu Kha, 4500-5500 ft.); Deignan, Bull. U. S. Nat. Mus. 186, 1945, p. 551 (localities as in previous paper; very uncommon winter visitor in Northern Siam); de Schauensee, Proc. Ac. Nat. Sc. Philad. 98, 1946, p. 121 (Loi Mwe 5600 ft.); Smythies, Birds Burma, 2nd ed., 1953, p. 266 (Karen Hills (Thandaung) and Karenni, Kengtung); Wynne, North W. Nat. N. S. 2, 1954, p. 625 (China); Dorst, Migrations des Oiseaux, 1956, p. 396.

Zosterops erythropleurus; Swinhoe, Proc. Zool. Soc. London, 1863 (Oct.), p. 336 (Amoorland); Swinhoe, Proc. Zool. Soc. London, 1870, p. 428 (bird-shops of Shanghai); Severzow, Journ. f. Orn. 21, 1873, p. 350; Elwes, Proc. Zool. Soc. London for 1873, 1874, p. 650; David & Oustalet, Ois. de la Chine, 1877, Texte, p. 85, Atlas, pl. 12 (Pékin, Moupin); Styan, Ibis (6) 3, 1891, p. 323, 352 (Lower Yangtse Basin, never met with in a wild state); Isao, Nippon no Tori Mokuroku, Dobuts. Zasshi 3, 1891, p. 33; Hartlaub, Abh. naturwiss. Ver. Bremen 12, 1892, p. 298, 309 (Tientsin); Hartert, Vögel paläarkt. Fauna I, 1905, p. 315; Ogawa, Annot. Zool. Jap. 6, 1908, p. 405 (Japan); Ingram, Nov. Zool. 19, 1912, p. 303 ((Gyi-dzin Shan); *Buturlin, Journ. Nascha Ochota, 1910, p. ... (Chanka); *Buturlin, Journ. Nascha Ochata, 1913, p. ... (Garmachta); Moffett & Gee, J. North-China Br. R. As. Soc. 44, 1913, p. 123; Hampe, Avicult. Mag. (3) 6, 1914, p. 26 (Shanghai, in the bird market in September); Menegaux, Rev. Fr. d'Orn. 4, 1915, p. 141; Gee & Moffett, Key Birds Lower Yangtse Valley, 1917, p. 204 (passes on migration); Courtois, Mém. Hist. Nat. Emp. Chin. 5, 3, 1918, p. 112 (Péking, 22 Oct. 1916); Rothschild, Nov. Zool. 28, 1921, p. 57 (Lichiang Range, 10000 ft.); Mori, Cat. Exh. Nat. Hist. Chosen, 1923, p. 44; Wilder & Hubbard, J. North-China Br. R. As. Soc. 55, 1924, p. 181 (Peitaiho, Paotingfu); Bourret, Inv. Gén. Indochine, Faune, Vert., 1927, p. 126; Mori, Hand-List Manchur. Vert., 1927, p. 128; Delacour, Avicult. Mag. (4) 6, 1928, p. 29 (Peking, cage birds; very numerous, and the cheapest birds in the autumn); Shulpin, Journ. f. Orn. 78, 1930, p. 72-75 (distribution in Russian territory); Kuroda, Tori 6, 1930, Eng. col. p. 140 (Chin-kô-zan, S. Manchuria); Stachanow, Alauda (3) 7, 1935, p. 473 (Malmige-sur-l'Amour, Goldes-Bologne (lac Bologne), le long de la Houngari jusqu'au petit village des Oudé-hé-Sa, Habaroosk); Hampe, Avicult. Mag. (5) 2, 1937, p. 304 (China); Worobiev, Ois. & Rev. Fr. d'Orn. N. S. 7, 1937, p. 603 (Khungari 50° N, village du Kun et l'embouchure de cette rivière, particulars); Spangenberg, Proc. Moscow Zool. Park 1, 1940, p. 122 (lower Iman); Worobiev, Birds Ussuria (in Russ.), 1954, p. 202, 275, pl. 13 and fig. 47; Dementiev in Dementiev & Gladkov, Birds U. S. S. R. (in Russ.) 5, 1954, p. 694.

Zosterops erythropleura melanorhyncha; La Touche, Ibis (11) 5, 1923, p. 641; Rothschild, Nov. Zool. 33, 1926, p. 318 (suggests that *melanorhyncha* is either a freak, or a stray wanderer from a different area than that of the typical race); Wilder, Gee & Moffett, Chinese Birds, Bull. Peking Soc. Nat. Hist. 1, 1927, p. 317; Bangs, Bull. M. C. Z. 70, 1930, p. 354; La Touche, Handb. Birds Eastern China I, 1930, p. 460; Gee, Peking Nat. Hist. Bull. 5, 1931, p. 66.

Zosterops erythropleura erythropleura; La Touche, Ibis (11) 5, 1923, p. 641; Rothschild, Nov. Zool. 33, 1926, p. 317 (Yunnan); Wilder, Gee & Moffett, Chinese Birds, Bull. Peking Soc. Nat. Hist. 1, 1927, p. 316; La Touche, Handb. Birds Eastern China I, 1930, p. 459; Gee, Peking Nat. Hist. Bull. 5, 1931, p. 66; Yamashina, Tori 7, 1932, p. 227 (Riungapo, Corea); Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 29 (Korea); Yen, Quart. Journ. Sc. Wu-Han Univ. 5, 1934, p. 279; Shaw, Birds Hopei, Zool. Sinica 15, 1, 1936, p. 835 (particulars); Wilder, China Journal 27, 1937, p. 100 (Peiping); Shaw, Bull. Fan Mem. Inst. Zool. 8, 1938, p. 213 (Lingshantao, Tsingtao);

Okada, Cat. Vert. Japan, 1938, p. 37 (Tyosen (Corea), N. China); Garven, Peking Nat. Hist. Bull. 16, 1941, p. 115 (Moukden); Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 33 (Korea: Heianhokudô, Heiannandô); Sowerby, Musée Heude, Notes d'Orn. 1, 1943, p. 81; Austin, Bull. M. C. Z. 101, 1948, p. 249 (Pyongan Pukto, P. Namdo); Anonymus, Ill. Enc. Fauna Japan, rev. ed., 1949, p. 87; Hemmingsen, Spolia Zool. Mus. Haun. 11, 1951, p. 41 (Pei-tai-ho, possibly breeds not far away).

Zosterops erythropleurus erythropleurus; de Schauensee, Proc. Ac. Nat. Sc. Philad. 81, 1930, p. 562 (Doi Soutep 5500 ft.); Deignan, Journ. Siam Soc., Nat. Hist. Suppl. 8, 1931, p. 154 (Chiengmai); Dementiev, Ois. & Rev. Fr. d'Orn. N. S. 4, 1934, p. 618 (région du fleuve Khungari).

Zosterops erythropleurus melanorhyncha; Snouckaert, Alauda (2) 3, 1931, p. 18.

Zosterops erythorpleurus; Rothschild, Qua[r]t. Journ. Sc. Wu-Han Univ. 2, 1931, p. 175 (translation from Nov. Zool. 28, 1921).

Zosterops simplex simplex; Aylmer, Hong Kong Nat. 3, 1932, p. 167 (Wei-hai-wei); Robb, Hong Kong Nat. 6, 1935, p. 6 (Wei-hai-wei); Herklots, Hong Kong Nat. 6, 1935, p. 12 (Wei-hai-wei); Duncan, Hong Kong Nat. 8, 1937, p. 16 (Chefoo).

Zosterops erythropleura erythroplura; Mo, Ill. Birds II, 1936, repr. 1947, p. 212 (in Chin.).

Characters. An average sized species with greenish upper parts and grey under parts, with conspicuous brownish Russet flanks.

Upper parts generally Warbler Green, often slightly yellower on head, ear coverts, and rump, approaching to Pyrite Yellow especially on the rump; front and supra loral region of the same colour as remainder of upper parts; eye-ring well developed, of average width, interrupted in front by the blackish loral line; primaries, secondaries, and rectrices brownish black, broadly margined with Warbler Green.

Under parts. Throat and upper breast Lemon Yellow; under tail coverts Lemon Yellow to Pale Lemon Yellow; breast greyish white; flanks and thighs dark brownish Russet; belly almost pure white, sometimes very slightly tinged with yellowish; the basal parts of the white feathers of the belly are almost black, so that in skins that are not perfectly made the under parts show much greyer than here described.

Unfeathered parts. Iris dark brown, bill and feet horn colour (Schrenck, 1860); irides hazel brown, legs and feet very pale livid (Rippon); iris hazel, bill brown above, bluish below, legs and feet bluish grey (Shaw, 1936); iris dark brown, beak dull fleshy brown, legs and feet dark olive grey (G. Forrest); iris chestnut, bill black/bluish white, legs bluish grey (Delacour & Jabouille); iris male dark brown, female light brown, bill greyish horn, blackish red at tip of maxilla, whitish at base of mandibula, legs grey horn, nails pale horn colour (Dementiev in Dementiev & Gladkov, 1954).

Measurements. Wing 24 ♂, 59-64 (61.17); 8 ♀, 59-62 (60.63), 36 specimens, 59-64 (61.06); tail 24 ♂, 35-40½ (37.50), 8 ♀, 35-38 (36.38); 36 specimens, 35-40½ (37.10); tarsus 37 specimens, 14¾-16½ (15.69);

entire culmen 34 specimens, 11-13½ (12.53); exposed culmen 35 specimens, 8¾-11 (9.86); culmen from anterior point of nostril 35 specimens, 6-8 (7.17).

Structure. The length of the 2nd primary in this species is between that of the 4th and the 6th, rather longer than in the majority of species of the genus; tail comparatively short, tail: wing index of 36 specimens average 60.76 %; especially for a species with this length of wing this must be considered very short, though it is perhaps better to say that this strongly migratory species has a relatively long wing.

Weights, ♂, 10 and 12 g, ♀, 10 g (Shaw, 1938), one 10 g (Stresemann, 1924).

Distribution (fig. 5). As a breeding-bird positively known from Ussuria only. Most authors have suggested or claimed that it inhabits — that means breeds in — Manchuria (Sowerby, 1923; Stresemann, 1931; La Touche, 1930; Meise, 1934; Smythies, 1953, etc.). Dementiev in Dementiev & Gladkov (1954, map 122) gives as range Ussuria, Eastern Manchuria, and the whole of Korea, but the inclusion of Korea in its breeding range is almost certainly erroneous because, apart from a few records concerning migrants from the north-western provinces (cf. Yamashina, 1932; Austin, 1948), the species has never even been observed in that country (Austin, 1948).

The inclusion in the breeding range of any part of Manchuria is also not entirely justified on the evidence at present available. The more recent records of breeding in Manchuria (Stresemann, 1931; Meise, 1934) apparently go back on Shulpin (1930); Meise (l.c.) remarks: "Brutvogel am Westufer des Chankasees (Schulpin [!] '30) ... also sicher auch in der östlichen M.". However, Shulpin (1930) actually wrote: "Obgleich ich diese Art nistend im Weidengebüsch am Chanka-See nicht gefunden habe, lassen die weit nach Norden gehenden Funde annehmen, dass dieser Umstand durch ihre versteckte Lebensweise bedingt sein kann", and on the previous page he gave evidence of migration taking place at Turij Rog, so that these birds evidently had not yet reached their ultimate destination in this village, on the N. W. coast of Lake Chanka.

Shulpin only supposes that the species breeds in the Ussuri valley — it has not yet been found there in summer — and if it does, it is probable that it will be found on both sides of that river, that means also on the Manchurian side of the boundary formed by this river. As yet, however, it has not been proved that the species does breed there, and much further to the north, near Khabarovsk, it has been found migrating; whereas the character of its presence on the lower Iman on 28 May is uncertain (Spangenberg, 1940).

Fig. 5. The distribution of *Zosterops erythropleura*. As a breeding-bird known from Ussuria only; migration in south-westerly direction.

The evidence of the occurrence of this species in russian territory (Amur Valley) has repeatedly been summarized (Shulpin, 1930; Worobiev, 1954); original data were supplied by Buturlin (1910, 1912), Stachanov (1935), Worobiev (1937, 1938) and Spangenberg (1940).

Zosterops erythropleura is, in its breeding range, strictly a summer visitor; it arrives in its breeding quarters not before the last week of May (migration about Lake Chanka on 23 and 30 May) and leaves about the middle of September (Khabarovsk, 5-18 September; Turij Rog, 28 September 1914, cf. Worobiev, 1954; see also Stachanow, 1935).

Korea. From N. W. Korea the species has been recorded as follows: Riungapo in Pyongan Pukto, two specimens on 16 May 1929 (Yamashina, 1932), Pyongan Pukto, 8 July 1917 and Pyongan Namdo, 23 May 1933 (Austin, 1948). The record from 8 July is rather peculiar, the other dates fit in with those for southern Ussuria. The main migration evidently passes west of Korea.

Manchuria. Recorded from Chin-kô-zan in the South (Kuroda, 1930; neither Meise, 1934, nor I have been able to trace this locality) on 27 September 1929; St. Echo, 10 May 1935 (specimen examined, locality not traced); Moukden, flocks of ten to thirty or forty birds between 20 and 28 May 1935 (Garven, 1941); autumn migration in Manchuria takes place in the end of September (Worobiev, 1954, after A. S. Lukashkin); whereas Sowerby (1923) states that in spring it appears about March, and seeks its breeding haunt in some secluded spot in mountainous country, to appear again in September. The implication that its disappearance in summer is due to its seeking a secluded spot in the mountains of Manchuria remains for Sowerby's responsibility, and is probably incorrect, whereas Sowerby puts its reappearance in spring rather too early. La Touche (1930) mentions the species as quite common on passage at Newchang.

China. In northern China the birds make their appearance in September, particularly along the western coast of the Chihli Gulf they are common; La Touche (1930) observed flocks in September and October, and again in May, at Chinwangtao and Shanhaikuan, and in September and October they are plentiful on the bird markets of Peking and Tientsin. The most impressive observation of mass-migration I have found in literature is that by Wilder (1937), who saw hundreds and perhaps thousands of individuals at Lin-tsing on 23 May; he also noted both spring and autumn migration, but on a much smaller scale, at Hsiao-chan, Hopei, in October 1936. I have ventured to place the observations of Aylmer (1932), Robb (1935), and Duncan (1937) from Wei-hai-wei, and published under the name *Z. simplex*, with the present species, as it seems unlikely that *simplex* would appear on

passage in flocks on places very near, if not actually beyond, its northern boundary of distribution. Large numbers were reported by Robb, between 22 and 24 September 1934, whereas Aylmer (1932) saw a flock of about twenty on 24 August, a remarkably early date if it really concerns this species. Even in summer specimens have been taken in North-Eastern China, for Shaw (1938) records birds collected on 17 May and 24 July. Below I shall discuss these summer-data.

There is also evidence of migration through Shansi, Shensi, and Kansu (Sowerby in Clark & Sowerby, 1912), and many published records exist from Szechuan and Yunnan.

As regards the material personally examined, most data nicely fit in with the general picture of the migration. The specimens from Peking and Tientsin were doubtless all bought on bird markets and may, therefore, have been caught earlier than they were bought, so that their dates do not give a trustworthy impression of the times of migration. Many of the specimens examined from these two towns are in a much abraded plumage, confirming my suspicion of their having been kept in captivity for some time, and a large number of specimens have clipped wings. The many published records of the occurrence in Shanghai all pertain to cage-birds, and certainly the town lies outside the normal range of the species.

The fact that specimens were taken in Szechuan in November and December, and at Mengtsz in October, is in accordance with the general picture of the migration in the northern provinces. Unfortunately, however, Graham collected specimens on Mt. Omei, Szechuan, on 8 and 10 August, and took a specimen at Kwei Fuu Sai, Szechuan, on 12 June, whereas Stresemann (1924) mentions specimens from Mt. Omei, taken on 15 and 16 May. I am unable to give a definite opinion of what this means. Do specimens remain all summer in Szechuan, and if so, are they just summering or do they breed there in the mountains (as has been suggested by Sowerby, 1923, for Manchuria)? The latter possibility seems not a likely one, because of the great difference in biotope between the Szechuan mountains and the willow-growths along the Amur. Nevertheless, the collecting of specimens in summer in Szechuan is most remarkable, and demands further investigation on the spot. I have no doubt that the specimens collected by Graham were wild-shot and not purchased from villagers who might have kept them in captivity, as not only their plumage is fresh, but also because Graham used to indicate the fact on the labels if specimens were purchased.

Burma. Found at Thandaung and Nattaung (Karenni) from 2 November to April (Smythies, 1953), and reported from Monglin and Loi Mwe in February.

Siam. Only known from the north, where it is considered a very uncommon winter visitor by Deignan (1945). It is known only from Doi Su: thep, Doi Chiang Dao, and Phu Kha, between 4500 and 5500 ft. Extreme dates, as given by Deignan, are 7 November 1936 and 7 April 1936. The fairly large number of specimens taken by de Schauensee (1934) would suggest that the species is perhaps not every season as rare as Deignan surmised.

Indo-China. The only specimens known are two from Chapa in the north (Delacour, 1930, no dates given), and one from Bokor, taken on 12 December 1927 (specimen examined). The occurrence so far to the south is probably exceptional.

It seems likely that the normal winter range includes Szechuan, Yunnan, N. E. Burma, Northern Siam, and Tonkin. In its winter quarters the species seems to prefer the mountains.

First collector. Probably Maack on 8 August 1855 near Dondon (Schrenck, 1860).

Figures. Gould (1871), coloured plate on natural size; David & Oustalet (1877), pl. 12 (coloured, about ¾ × natural size, by Arnoul); Worobiev (1954), pl. 13 (coloured, fair), and fig. 47 (not coloured).

Types. Not traced; according to Sharpe (1906), one or more of the original cotypes would have come to the BM.

Moult. Specimens collected in March (1), April (3), June (1), August (5), September (2), October (8), November (3), and December (5), are not in moult; one specimen taken in August at Sa, Ussuria, is heavily moulting primaries; one specimen bought on 3 November at Tientsin is moulting rectrices, the specimen has obviously been kept in a cage for some time.

According to Dementiev (1954), birds obtained in the second half of August were moulting primaries and smaller feathers.

Nidification. Apparently unknown. Nehrkorn (1910) lists an egg from Thibet — a country where the species is not known to occur. Stresemann (in litt., 12-XI-1955) gave me the following information concerning this egg, which is now in the collection of the Berlin Museum: "Ich habe mir das Ei von "*Z. erythropleura* aus Thibet" in der Nehrkorn-Sammlung angesehen. Es ist rein-weiss und hat keinerlei Aufschrift. In der Färbung, annähernd auch in der Grösse, stimmt es mit einem Ei überein, bezeichnet als *Z. japonica*, Japan. In der Sammlung Nehrkorn befinden sich eine grosse Menge falsch bestimmter Eier. Nehrkorn hat sie kritiklos von Händlern gekauft, die bekanntlich ihre Fundorte gern frei erfunden haben. Auch in diesem Falle kann der Fundort nicht stimmen. Wahrscheinlich ist auch die Species falsch vermutet worden. — Nach der vorliegenden Literatur und

dem Belegstück der Weigold-Sammlung glaube ich allerdings, dass *Z. erythropleura* in Szetschwan brütet...".

Habits, etc. The species lives by preference — and presumably breeds — in the willow jungles along the river Amur and its tributaries, in country that is flooded in spring. The distribution of both this type of biotope and the bird-species inhabiting it seems rather patchy, especially further north (Worobiev, 1954). The first specimen of the species ever taken was collected in a similar place (cf. Schrenck, 1860). The birds usually live in flocks, sometimes mixed with other small passerines as *Aegithalos caudatus* (L.).

Shulpin (1930) gives some further interesting field observations.

Particulars about migration — and this species is by far the most migratory of the entire family — have been given under the heading distribution. The great numbers of these birds annually seen and caught in China indicate that the breeding ground of this species may be more extensive than is hitherto known.

Voice. The ordinary call-note of the species was described by Wilder (1937) and Garven (1941) as a loud lost-chick call, a piercing single-syllable cry. The song is loud (Hampe, 1914, 1928).

Discussion. The only species *Z. erythropleura* has ever been connected with in recent times (Schrenck's identification with *Zosterops chloronotus* Gould = *Z. gouldi* Bonaparte is obviously erroneous) is *Z. japonica,* which species Deignan (1943) suggested to be closely related. Though I see the points of similarity quite well, I do not see much evidence of real relation. By its reddish flanks, quite different from the buffy under surface of *Z. j. japonica,* and by its paler bill, the species is sharply distinguished; and speculation on its possible relations seems not very useful. Nevertheless, the geographical distribution of the species indicates that, if it has any living relatives (in the meaning of related species, not races!) these must be either *Z. palpebrosa* or *Z. japonica.*

Species 4. **Zosterops japonica** Temminck & Schlegel

Characters. In its various races a very small to large species, which does not deviate far from the ordinary *Zosterops*-type, though the brownish flanks of some races are peculiar.

Upper parts Warbler Green, in some races more yellowish; in several races forehead and supra loral region of the same colour as the mantle, in others these parts with a varying amount of yellow; a white eye-ring of average width, interrupted in front by a blackish spot (rarely absent); black loral line (less dark in *meyeni* and *hainana*), continued under the white eye-

ring; primaries, secondaries, and rectrices blackish brown, all broadly margined with the colour of the mantle.

Under parts. Throat and upper breast Lemon Yellow to Pale Lemon Yellow; under tail coverts Pale Lemon Yellow; the yellow streak over the centre of the abdomen, present in so many species of this type, generally is entirely absent, and never more than rather faint; remainder of under parts pale grey, in some races, especially in the nominate race, with the flanks and often the whole under surface except the centre of the belly (which is always whitish) buff, sometimes as dark as Tawny Olive.

Unfeathered parts. Iris in all forms brown or yellowish brown.

Measurements are given in table II. Remarkable is the great variation in size of the bill.

TABLE II

Zosterops japonica

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
japonica	33	58-62½	37-42	60.00	39.28	67.57 %
stejnegeri	11	61½-66	40-45	63.18	42.14	66.69 %
alani	6	61-64	43-45	62.92	43.75	69.54 %
insularis	9	58-62	36-43	60.06	39.72	66.14 %
insularis ("*ijimae*")	8	57½-63	37½-42	60.19	39.69	65.94 %
loochooensis	16 (18)	55-60	34½-40	57.63	37.78	65.44 %
iriomotensis [1])	12	54-58	36½-40½	54.25	38.38	69.77 %
yonakuni	2	56-56½	37-38	56.25	37.50	66.67 %
daitoensis [1])	11	56½-61	41½-46½	58.36	44.59	76.40 %
simplex (Burma, Siam, Indo-China)	15	55-58½	34-37½	56.67	35.87	63.29 %
simplex (Yunnan)	15	55-58½	35½-38½	57.03	36.63	64.23 %
simplex (Szechuan)	15	55½-60	34-38	57.23	35.82	62.65 %
simplex (S. E. China)	30	54-60	33-39	56.30	35.42	62.93 %
simplex (Formosa)	5	53-58	34-35½	55.00	34.70	63.09 %
hainana	7	51-55	31-36	52.64	34.00	64.59 %
batanis	3	55-60	35-36½	56.67	36.00	63.53 %
meyeni	13	52-56	32-38	53.81	33.92	63.31 %

1) Measurements after Kuroda (1925), no specimens of these races were personally examined. Kuroda's figures for the tails, and consequently the tail : wing index, are so much larger than mine, that they are probably not directly comparable.

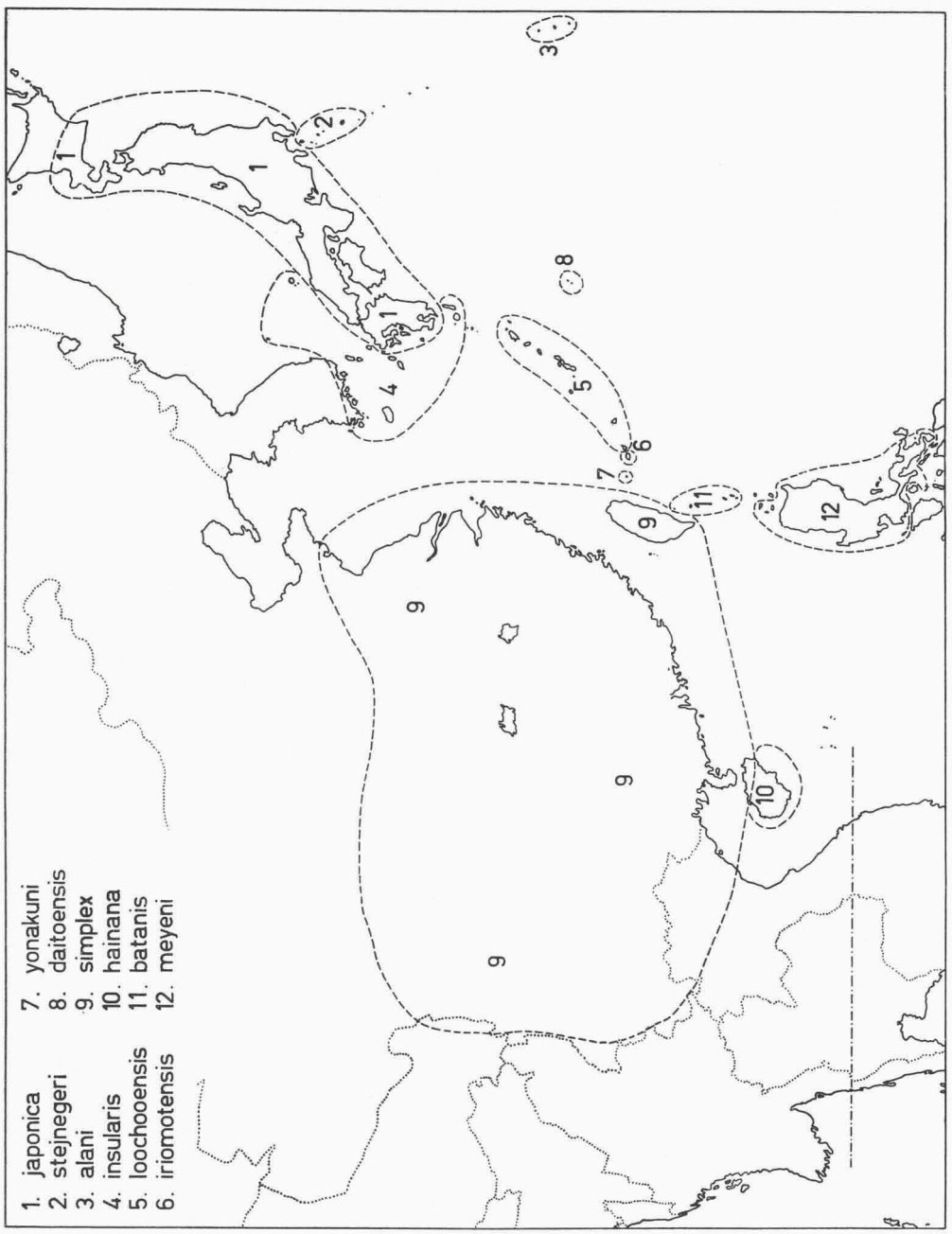

Fig. 6. The distribution of *Zosterops japonica* and races; -.-.- approximate southern limit of range of *simplex* as a migrant.

Distribution (fig. 6). The Japanese Islands, to the north as far as Central Hokkaido; Volcano Islands; Tsushima, Quelpart and Dagelet Island near Korea; southern Korea, where perhaps as a migrant only; all islands of the Riu Kiu group; Borodino Islands; Formosa; Hainan; the whole southern part of China, north to Kiangsu (Chinkiang) and Szechuan, where it seems to be fairly common; apparently absent from Hopei, though recorded from southern Shensi; Tonkin; northern Siam, and eastern Burma as far south as Moulmein; in the last-mentioned three countries perhaps as a migrant only; Paracel Islands (migrant); Batan Islands; Botel Tobago; Luzon. Introduced in the Bonin Islands and in several islands of the Hawaii group.

Ecology. As far as generalisation is possible in this widely distributed and variable species, it seems, as a species, to inhabit country of low and moderate altitude, wherever there are trees, gardens, forests, etc. Locally it has been taken at 10000 ft., so that the vertical range of some subspecies is very great; other races seem more or less confined to small islands.

Geographical variation. The northern races of this species are large, dark, and have somewhat brownish or buffy flanks; the size of the wing gradually diminishes towards the southeast, the smallest and most yellowish (brightest) forms being found in Luzon and Hainan.

Curious is the fact that, whereas the form of the Japanese main islands (nominate race) has a bill of average size, the forms occurring on the small islands surrounding Japan (*insularis*, *stejnegeri*, and *alani*) are all distinguished by their larger size, and particularly by their longer and broader bills, in *stejnegeri* excessively so, The fact that this same difference from the nominate form is found in all islands around Japan, and in various races, shows that it can hardly be dismissed as a random fact, but may have its base in some fundamental principle. This is not the place to fully discuss this problem, to which several authors, notably Murphy (1938) have already drawn attention.

Related species. The suggested affinity between this species and *Z. palpebrosa* has already been discussed under that species. How close *Z. erythropleura* is related to *Z. japonica* can be a matter of speculation, but certainly the two are not conspecific.

1. **Zosterops japonica japonica** Temminck & Schlegel

Zosterops japonicus Temminck & Schlegel, in Siebold, Fauna Japonica, Aves, 1847, p. 57, plate 22 — Le Japon, herewith restricted to Decima, Nagasaki.

Zosterops palpebrosa yesoensis Kuroda Jr., Bull. Biogeogr. Soc. Japan 15, 1951, p. 5 — Muroran, Hokkaido.

Zosterops japonica; Bonaparte, Consp. Gen. Av. I, 1850, p. 399; Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 92, pl. 461 fig. 3296 (Auf Kiefern in Japan); Cassin

in Perry, Narr. Exp. China Seas and Japan II, 1856 (= not before June 1857, cf. dating of foreword), p. 221 (Hakodadi); Hartlaub, Journ. f. Orn. 6, 1858, p. 446; Blakiston, Ibis 4, 1862, p. 318 (Hakodadi); Hartlaub, Journ. f. Orn. 13, 1865, p. 14; G. R. Gray, Hand-List Birds 1, 1869, p. 162 (Japan); A. E. Brehm & Finsch, Gefangene Vögel I, 2, 1876, p. 285 (Japan und Amurländer); Giebel, Thes. Orn. III, 1877, p. 776 (Japonia); Blakiston & Pryer, Ibis (4) 2, 1878, p. 230 (Yezo, Yokohama, Fujisan, Yamato, Hakodate); Seebohm, Ibis (4) 3, 1879, p. 29; Blakiston & Pryer, Trans. As. Soc. Japan 8, 1880, p. 210 (Main Island, Nagasaki, Yezo); Ridgway, Proc. U. S. Nat. Mus. 4, 1882, p. 320; Blakiston & Pryer, Trans. As. Soc. Japan 10, 1882, p. 138 (Main Island, Nagasaki, Yezo); Jouy, Proc. U. S. Nat. Mus. 6, 1883, p. 288 (Fuji-Yama, very common); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 160, 292 (Japan, Nagasaki, Hakodadi); Martin, Ill. Naturg. Thiere I, 2, Vögel, 1884, p. 321 (Japan und Amurländer); Russ, Handb. Vogelliebh. I, 1887, p. 314 (Japan); Tristram, Cat. Coll. Birds, 1889, p. 211 (Fuji); Seebohm, Birds Jap. Emp., 1890, p. 68 (Hakodadi, Yokohama, Fuji-yama, Nagasaki); Isao, Nippon no Tori Mokuroku, Dobuts. Zasshi 3, 1891, p. 3; Beddard, Ibis (6) 3, 1891, p. 512; Stejneger, Proc. U. S. Nat. Mus. 15, 1892, p. 342 (Hakodate); Nehrkorn, Kat. Eiersamml., 1899, p. 79 (Japan); Evans, Cambridge Nat. Hist., Birds, 1900, p. 568; Jacobi, Zool. Jahrb. 13, 1900, p. 470, 472; Finsch, Tierreich 15, 1901, p. 11; S. Ogawa, Dobuts. Zasshi 14, 1902, p. 317 (foot of Mt. Fuji); Dresser, Manual Palaearctic Birds, 1902, p. 221 (Japan); Dubois, Syn. Av. I, 1902, p. 706; M. Ogawa, Annot. Zool. Jap. 5, 1905, p. 190 (Subashiri n. Fuji, Tokyo); Hatta & Murata, Trans. Sapporo Nat. Hist. Soc. 1, 1905, p. 54 (Hokkaido); Ingram, Ibis (9) 2, 1908, p. 141 (Subashiri, particulars); Ingram, Avicult. Mag. N. S. 6, 1908, p. 112 (most popular cage bird of Japan); (pt.) M. Ogawa, Annot. Zool. Jap. 6, 1908, p. 405 (Hokkaido, Hondo, Oshima (Izu), Tsushima); Sharpe, Hand-List Birds 5, 1909, p. 1; Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (eggs); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 1 (eggs: Fujiyama, Hondo, 11 July; Subashiri, Fujiyama, 5 July); Reichenow, Die Vögel II, 1914, p. 469 (Japan); Fujita, Tori 3, 1922, p. 93 (Shikoku); Gardner, Proc. U. S. Nat. Mus. 67, art. 19, 1925, p. 5 (tongue); Gardner, Ibis (12) 3, 1927, p. 195 (tongue).

Zosterops japonicus; Swinhoe, Proc. Zool. Soc. London, 1863, p. 336; S. Ogawa, Dobuts. Zasshi 14, 1902, p. 280 (Mt. Fuji); Doflein, Ostasienfahrt, 1906, p. 164 (Washinokami, Prov. Rikuzen); Hampe, Avicult. Mag. (5) 2, 1937, p. 305 (kept in Japan).

Zosterops Japonicus; von Martens, Die Preuss. Exp. nach Ost-Asien, Zool. I, 1876, p. 89, 96, 368 (Yokohama).

Zosterops Japonica; M. Ogawa, Dobuts. Zasshi 8, 1896, p. 304 (Abe, Shidzu-Oka); M. Ogawa, Dobuts. Zasshi 16, 1904, p. 286 (Suruga); M. Ogawa, Dobuts. Zasshi 17, 1905, p. 54 (South-Eastern Base of Fuji).

Zolerops japonica; Murata, Dobuts. Zasshi 13, 1901, p. 19 (Hokkaido).

Zosterops palpebrosa japonicus; Hartert, Vögel paläarkt. Fauna I, 1905, p. 315; Momiyama, Tori 1, 1917, p. 35 (Sangami); Orii, Tori 1, 1917, p. 88; Nakao, Tori 3, 1921, p. 22 (Hiroshima City); Kuroda, Tori 3, 1923, p. 178 (Shizuura, Suruga); Kuroda, Tori 4, 1924, p. 79 (Shinano); Kuroda, Birds Fujiyama, 1926, p. 68-70, phot.; Kuroda, Tori 5, 1927, Eng. col. p. 14 (Tokyo City); Kuroda, Sc. Rep. Tôhoku Imp. Univ. (4) 3, 1928, p. 355 (Mutsu Bay, Aomori Prefecture); Yamashina, Tori 6, 1930, p. 250 (Hokkaido); Yamashina, Journ. f. Orn. 79, 1931, p. 537 (Hokkaido),

Zosterops japonicus japonicus; Momiyama, Tori 3, 1923, p. 208 (Oshima, Prov. Izu: migrant); Momiyama, Tori 4, 1924, p. 106 (Hachijojima: migrant); Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 171; Momiyama, Tori 7, 1932, p. 305 (Ponafidin Island, Southernmost Seven Islands); Momiyama, Annot. Orn. Or. 2, 1933, p. 62.

Zosterops palpebrosa japonica; Kuroda, Birds Riu Kiu Isl., 1925, p. 34 (Tanegashima, Zamamishima, Kumeshima, Yakushima, Okinawashima: migrant from Japan

proper); Kumagai & Momiyama, Annot. Orn. Or. 1, 1928, p. 247, 250, 273 (Miyagi, Hondo); Momiyama & Ikoma, Annot. Orn. Or. 1, 1928, p. 406 (Prov. Inaba, W. Hondo); Yamashina & Natori, Trans. Sapporo Nat. Hist. Soc. 12, 1932, p. 223 (Tokyo, Yezo); Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 27; Miyazaki, Sc. Rep. Tôhoku Univ. (4) 9, 1934, p. 183-203; Yamashina & Inoue, Tori 8, 1934, p. 407-409 (breeding in southern Hokkaido); Ohfuchi, Saito Ho-on Kai Mus. Res. Bull. 3, 1934, p. 22, pl. 6 fig. 4 (N. E. Hondo: Akita, Iwate, Miyagi, Sendai); Miyazaki, Sc. Rep. Tôhoku Univ. (4) 9, 1935, p. 427-429; Taka-Tsukasa & Ikeda, Tori 9, 1936, p, 128, 130, 135, 138 (Sado, Oki, and other islands on the Coasts of the Sea of Japan); Kobayashi & Ishizawa, Eggs Jap. Birds I, 1938, p. 37; II, pl. 12 fig. 1 and 2; III, pl. 7; Jahn, Tori 10, 1938, p. 178 (Yamanaka (Fuji)); Okada, Cat. Vert. Japan, 1938, p. 37; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 31; Yamashina, Tori 11, 1942, p. 210 (Seven Islands of Izu); Kuno, Tori 11, 1942, p. 397, 398 (Mt. Echigo Koma); Kiyosu, Tori 12, 1949, p. 149 (Tsurugi and Ishizuchi Mts. in Shikoku); Uchida, Monogr. Jap. Birds (in Jap.), new ed., 1949, p. 71, 261, fig. 55; Anonymus, in Ill. Enc. Fauna Jap., rev. ed., 1949, p. 87; Benoit, in Grassé: Traité de Zoologie XV, 1950, p. 462; Okada et al., Annot. List Anim. Pl. Mie Prefecture, 1951, p. 5 (Mie Pref.); Takada, Misc. Rep. Res. Inst. Nat. Res. 28, 1952, p. 30 (Mt. Fuji; deciduous forest); Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 6, 1953, p. 176 (north and middle islands of the Ryukyus during the coldest months of the year); Udagawa, Dobuts. Zasshi 64, 1955, p. 120-121 (Sapporo, Muroran, Hakodate, Aomori, Kagoshima); Kobayashi, Birds Jap. Nat. Col., 1956, p. 20, pl. 9 fig. 67.

Zosterops palpetrosa; Molisch, Pflanzenbiol. in Japan, 1926, p. 176 (fertilization of flowers).

Zosterops palpetrosa japonicus; Molisch, Pflanzenbiol. in Japan, 1926, p. 178.

Zosterops palpetrosa japonica; Molisch, Pflanzenbiol. in Japan, 1926, p. 185.

Zosterops japonica japonica; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Jahn, Journ. f. Orn. 90, 1942, p. 112-114, 223 (particulars); Austin & Kuroda Jr., Bull. M. C. Z. 109, 1953, p. 577; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosteropd palpebrosa japonica; Kuroda, Tori 7, 1931, p. 158 (migration in Japan).

Zosterops palpebrosus japonicus; Caum, Occ. Pap. B. P. Bishop Mus. 10, (9), 1933, p. 44 (Hawaii, imported from Japan on Oahu and possibly on Kauai); Munro in Gregory, Bull. B. P. Bishop Mus. 133, 1935, p. 17 (Makiki Terrace and Round Top, Oahu or Lanai, Hawaii); Richardson, Pacific Sc. 3, 1949, p. 227 (Molokai, Hawaiian Islands).

Zosterops palpebrosus; Fisher, Condor 53, 1951, p. 34, 39 (Hawaii Isl.: Niihau and Kauai. From Oahu it has spread unaided to the other large islands).

Zosterops palpebeberosa japonica; Takada, Misc. Rep. Res. Inst. Nat. Res. 27, 1952, p. 24 (Mt. Fuji 400-1000 m, resident).

Zosterops japonica yesoensis; Austin & Kuroda Jr., Bull. M. C. Z. 109, 1953, p. 577; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops palpebrosa yesoensis; Kuroda Jr., Dobuts. Zasshi 64, 1955, p. 342-343.

Note. Unfortunately none of the handbooks on Japanese birds, written by Uchida, Kuroda, and Yamashina, is available in the Netherlands; Japanese magazines also are, at most, present in incomplete series. These facts have caused that the Japanese literature could not be used to the extent it should have been. Especially the section on nidification and habits would doubtless have gained much from a complete survey of Japanese literature.

Subspecific characters. A fairly large, dull race, Warbler Green above, without yellow on forehead or over the lores, and with brownish flanks.

Under parts, as indicated in the description of the species, always with some buff on the flanks, and sometimes very dark; as regards the amount of buff there exists a great individual variation, and though this variation may partly be due to age of the skins, old specimens almost invariably having Tawny Olive flanks, other factors too seem to have influence, for many recently taken skins also show deep brownish flanks, whereas material collected about 50 years ago on Mt. Fuji shows remarkably little brownish on the under surface. In this connection attention may be drawn to Ingram's (1908) observation that the colour of the flanks becomes darker in captivity. If this is caused by a different diet, as he suggests, or merely by a stronger abrasion of these feathers in captivity, or by some other cause, remains to be determined.

Unfeathered parts. Iris cream colour, or drab; bill slate colour, or slate grey, or upper mandible slaty black; lower mandible grey; feet smoky grey, or slaty grey (Kuroda, 1925).

Measurements. Wing 13 ♂, 58-62½ (60.23); 12 ♀, 58-61 (59.63); 33 specimens, 58½-62½ (60.00); tail 13 ♂, 37-41½ (39.23); 12 ♀, 37-42 (38.92); 33 specimens, 37-42 (39.28); tarsus 30 specimens, 16¾-18¾ (17.62); entire culmen 31 specimens, 13¼-15 (14.29); exposed culmen 32 specimens, 9¼-12¼ (10.97); culmen from anterior point of nostril 32 specimens, 7-9 (7.98).

Structure. In all specimens where this was examined, the wing formula was 6>2>7. The tail index is given in table II.

Distribution. Southern Hokkaido, north at least to Sapporo and Muroran, whereas it has been reported on migration on Yagishiri Island (Udagawa, 1953), but this is second hand information and therefore perhaps not infallible; the whole of Hondo (Honshu); Kiushiu. As a migrant it is known from the Seven Islands of Izu, Tanegashima, Yakushima, Zamamishima, Kumeshima, and Amami-Oshima (the latter localities after Uchida, 1921, and Kuroda, 1925, no material from the Riu Kiu Islands was examined by me).

In the northern part of its range the race is a summer visitor only, but the migrations are not yet well understood.

First collector. P. F. von Siebold, probably at or near Nagasaki, between 11 August 1823 and 2 January 1830.

Figures. Temminck & Schlegel (1847), plate 22 (coloured, natural size); Molisch (1926), fig. 43 (biologically important photograph of a bird attending the flower of *Camellia japonica* L.); Kuroda (1926), photographs of bird and nest; Miyazaki (1934), coloured plate showing difference

between freshly moulted specimens and specimens in abraded plumage; Ohfuchi (1934), plate 6 fig. 4 (photograph of stuffed bird); Uchida (1949), fig. 55 (coloured); Kobayashi (1956), plate 9 fig. 67 (coloured, small but quite useful).

Type. Lectotype, here chosen out of a fairly large series, RMNH cat. nr. 1. As several races have now been described from Japan, it seems appropriate to restrict the type locality, and to designate a lectotype for the form. Unfortunately all von Siebold's specimens are labelled "Japan" only; the lectotype has a small bill, as this race should have (pl. I fig. 1).

Moult. Some specimens taken in October and November are undergoing their main moult, though others are not, or have evidently already completed it. An important contribution to the moulting physiology of the form is that of Miyazaki (1934, 1935).

Nidification. The breeding season of this subspecies extends from April (12 April near Kobe, cf. Jahn, 1942) to July (5 and 11 July, Fujiyama, cf. Ogilvie-Grant, 1912), and according to Jahn, there are probably two breeds in the subtropical part of its range.

The nest, as described by Kobayashi & Ishizawa (1938) and Jahn (l. c.), is quite typical, though, perhaps, a slightly more solid structure than is usual in the genus. Jouy (1883) describes a nest that, according to him, was evidently a ground nest, though normally the nests are, of course, suspended in the fork of a twig, generally fairly low, between one and five meters from the ground. Ingram (1908) has already expressed as his opinion that Jouy made a mistake when he mentioned a ground nest.

The clutch size varies, according to Kobayashi & Ishizawa, from four to five; as they examined 15 clutches, these figures seem fairly conclusive, and possibly reports of three eggs (Jouy, 1883) refer to incomplete clutches.

The colour of the eggs in this form is either pale greenish blue, or pure white. Measurements of eggs are given by Ogilvie-Grant (1912) and by Kobayashi & Ishizawa (1938). The last-mentioned authors also give a good photograph of a nest with eggs, and a coloured plate, depicting several sets of eggs.

Habits, etc. Molisch (1926) has presented many important details of the nectar-feeding habits of the race, particularly on the flowers of *Prunus mume* Sieb. & Zucc. and *Camellia japonica* L. A most interesting account of this bird's habits is that by Jahn (1942); his description indicates that its behaviour is typical of the group. The flocks in which it wanders about often associate with tits of various species, goldcrests, and *Dryobates kizuki* (Temminck). It inhabits both deciduous forests, up to about 1000 m altitude (Takada, 1952a and 1952b), and gardens (Jahn, l. c.).

Jahn reports this form as a foster parent of *Cuculus saturatus horsfieldi* Horsfield & Moore in central Hondo.

Discussion. Kuroda Jr. (1951) described, on the base of a single specimen, an allegedly new subspecies from Muroran, Hokkaido, *Z. palpebrosa yesoensis*. The validity of this form was strongly doubted by Udagawa (1955), who, having ten specimens from Hokkaido to base his conclusions on, was of the opinion that Kuroda Jr.'s type was an aberrant specimen. Kuroda Jr. (1955) subsequently maintained the validity of his race against Udagawa's arguments, and gave a rediagnosis of *yesoensis*. Kuroda Jr., in defending his case, also states that Austin (in Austin & Kuroda, 1953) recognised *yesoensis* as he found that the old specimens from Hakodate (or Hakodadi) in the USNM collection distinctly show the diagnostic characters of the race. As I have had these same specimens out on loan here, and could not detect any differences from cotypes of *japonica* and from other material in the same condition of age and wear, I feel justified to place *yesoensis* into the synonymy of *japonica*. Admittedly Kuroda Jr. (1951) suggests that the specimens from Hakodate may belong to the nominate race, whereas his new form might be restricted to the more northern regions in Hokkaido, but this seems most unlikely in the light of the knowledge that the species is evidently extending its range in Hokkaido, and presumably has started to breed there regularly in fairly recent times.

2. **Zosterops japonica stejnegeri** Seebohm

Zosterops stejnegeri Seebohm, Ibis (6) 5, 1891, p. 273 — Fatsizio or Hatchinow-sima, one of the Seven Islands south of Yokohama.

Zosterops palpebrosa boninsimae (pt.) Momiyama, Bull. B. O. C. 47, 1927, p. 145 — Ohmura, Titi-sima, Bonin Islands (= *stejnegeri* × *alani*, cf. Kuroda, 1932).

Zosterops japonicus ohsimensis Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930 (20 July), p. 172, footnote * — Moto-mura, Oh-sima, northernmost Seven Islands.

Zosterops —?; Blakiston & Pryer, Trans. As. Soc. Japan 10, 1882, p. 138 (no locality).

Zosterops japonica; Seebohm, Ibis (5) 2, 1884, p. 36 (no locality); Stejneger, Proc. U. S. Nat. Mus. 10, 1887, p. 486 (Okadamura, Oshima, Seven Islands).

Zosterops stejnegeri; Isao, Nippon no Tori Mokuroku, Dobuts. Zasshi 3, 1891, p. 33; Nehrkorn, Kat. Eiersamml., 1899, p. 80 (Insel Myiake, eggs); Jacobi, Zool. Jahrb. 13, 1900, p. 470, 472, 473 (Mijako-schima); Finsch, Tierreich 15, 1901, p. 20; Dubois, Syn. Av. I, 1902, p. 707; Sharpe, Hand-List Birds 5, 1909, p. 5; Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Insel Myiake, eggs); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 5 (Fatsizio, Seven Islands).

Zosterops japonica stejnegeri; Stejneger, Proc. U. S. Nat. Mus. 16, 1893, p. 636 (Oshima); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel Paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Momiyama, Annot. Orn. Or. 2, 1933, p. 62; Austin & Kuroda Jr., Bull. M. C. Z. 109, 1953, p. 577; Wynne, North W. Nat. N. S. 2, 1954, p. 624; Moyer, Auk 74, 1957, p. 215, 228 (Miyake Jima).

Zosterops palpebrosa stejnegeri; Hartert, Vögel paläarkt. Fauna I, 1905, p. 315;

Uchida, Dobuts. Zasshi 23, 1911, p. 537; Momiyama, Tori 1, 1917, p. 35; Hartert, Vögel paläarkt. Fauna III, 1921, p. 2100; Kuroda, Proc. fourth Pacific Sc. Congr. III, 1930, p. 473 (Seven Islands of Izu); Kuroda, Nov. Zool. 37, 1932, p. 389; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 27; Kobayashi & Ishizawa, Eggs Jap. Birds I, 1938, p. 38; II, pl. 12 fig. 3, 4, 5; III, pl. 7 (Myiake-shima, notes on nidification); Okada, Cat. Vert. Japan, 1938, p. 37 (Seven Is., Izu); Yamashina, Tori 11, 1941, p. 12 (stomach contents); Yamashina, Tori 11, 1942, p. 194, 209 (Seven Islands of Izu); Hachisuka, Tori 11, 1942, p. 332; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 31; Uchida, Monogr. Jap. Birds, new ed. (in Jap.), 1949, p. 261; Kobayashi, Misc. Rep. Res. Inst. Nat. Res. 38, 1955, p. 134, 136 (Aogashima, Izu Islands); Kobayashi, Birds Jap. Nat. Col., 1956, p. 20.

Zosterops palpebrosa stejirsgeri; Uchida, Dobuts. Zasshi 23, 1911, p. 537.

Zosterops Palpebrosa stejnegeri; Uchida, Dobuts. Zasshi 23, 1911, p. 538.

Zosterops palpebrosa iwojimaensis; (pt.) *Toyoshima, Ogas. Gaits. Sinr., 1914, p. 109 (Titi-dima).

Zosterops dalpebrosa stejnegeri; Momiyama, Tori 3, 1922, p. 68 (Hachijo Island).

Zosterops japonicus stejnegeri; Momiyama, Tori 3, 1923, p. 208 (Oshima, Prov. Izu); Momiyama, Tori 4, 1924, p. 106 (Hachijojima in the Seven Islands of Izu, permanent resident); Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172; Momiyama, Annot. Orn. Or. 2, suppl., 1930, p. 172 (reprint of preceding paper); Momiyama, Annot. Orn. Or. 2, 1933, p. 62.

Zosterops palpebrosa boninsimae; Momiyama, Annot. Orn. Or. 1, 1927, p. 1, 18-21 (Oki-mura, Coffin Is.; Kuwano-kiyama, Coffin Is.; Oh-mura, Peel Is.; Ogi-mura, Peel Is.; Kita-mura, Coffin Is.); Snouckaert, Alauda (2) 3, 1931, p. 17; Kobayashi & Ishizawa, Eggs Jap. Birds I, 1938, p. 40 (nidification on Bonin Islands).

Zosterops; Hachisuka, Variations among Birds, 1928, p. 18 (Bonin Isl.).

Zosterops japonicus var. *boninsimae*; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 106, 172.

Zosterops japonica boninsimae; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207.

Zosterops japonicus ohsimensis = *Z. palpebrosa stejnegeri*; Kuroda, Nov. Zool. 37, 1932, p. 389.

Zosterops palpebrosa boninsimae = *Z. palpebrosa stejnegeri* × *Z. palpebrosa alani*; Kuroda, Nov. Zool. 37, 1932, p. 389.

Zosterops japonicus boninsimae; *Momiyama, Ogasawara Sôran, pt. 6, ch. 1, 1929, p. 269 (Titi-dima and Haha-dima); Momiyama, Annot. Orn. Or. 2, 1933, p. 62.

Zosterops japonicus ohsimensis; Momiyama, Annot. Orn. Or. 2, 1933, p. 62.

Zosterops palpebrosa alani; Austin, Pacific Sc. 3, 1949, p. 290 (Muko-shima, Bonin Isl.).

Note. In the bibliography of this race references to the introduced hybrid population *stejnegeri* × *alani* from the Bonin Islands have been incorporated.

Subspecific characters. Similar to the nominate race, but generally slightly larger, and bill very much larger (pl. I fig. 2).

Unfeathered parts. Irides light brown; bill dusky, except fork and sides of fork of lower mandible, which are light grey; tarsi light bluish grey (Holst).

Measurements of 11 specimens (7 ♂, 3 ♀, 1 ○): wing 61½-66 (63.18), tail 40-45 (42.14), tarsus 19-21 (19.91), entire culmen 16¾-19¼ (18.11), exposed culmen 12¾-15½ (14.11), culmen from anterior point of nostril 9¼-11 (10.09).

Structure. The large size and the very large beak has already been commented upon; in wing-formula this race agrees with the nominate form.

Distribution. Endemic and resident in the Seven Islands of Izu, south of Yokohama, and at least in the northern islands of the Nanpo Archipelago. I have seen material from Oshima, Niijima, Miyakejima, Mikura-shima, Hadiijo = Hachinojima, and Aogashima.

In the Bonin Islands this form has been introduced; the name *boninsimae* was given by Momiyama to the hybrid population between *alani* and *stejnegeri*, both introduced in the Bonin Islands, where originally no white-eye occurred.

First collector. When M. Namiye, on 19 April 1887, at Okadamura, Oshima, collected the first specimen of this race of certain provenance, he suggested to Stejneger (cf. Stejneger, 1887) that this form was identical with the one recorded by Blakiston & Pryer (1882) as no. 180½. Whereas the description of the bird at the above-mentioned place, where a culmen of 13 mm is mentioned, could perhaps pertain to some other large-billed race (*insularis*), Seebohm's (1884) later description of the same skin leaves no doubt that it actually belongs to *stejnegeri*, no other race attaining this excessive length of bill: "A skin ... bought from a native bird-dealer, and said to have been caught in the interior of the main island, is very large. It measures — wing 2.5 inches, tail 1.8, culmen .77, tarsus .76..."

Of course it was Namiye who could prove that this form is a true subspecies, and not just an aberrant individual of the nominate race.

Figure. Apparently not figured. Kobayashi & Ishizawa (1938) give plates of the eggs and of a nest.

Type. Here chosen as lectotype BM nr. 98.9.30.176, one out of three original cotypes; a second one, BM nr. 98.9.30.175, is in bad condition; the third specimen was not traced. Both specimens examined.

Moult. Specimens collected in May (5), November (4), and December (1) are not in moult. Some May specimens are in a rather abraded plumage, those from November and December are in fresh plumage. One specimen collected in January does not show moult in its wings, but is moulting rectrices.

Nidification. Eggs of this race were already recorded by Nehrkorn (1899), who gives as measurements 19 × 15.5 mm, which seems rather large (compare the figures of Kobayashi & Ishizawa, 1938); Ogilvie-Grant mentions two eggs taken on Fatsizio on 13 April, whereas Hartert (1905) gives a short description of nest and eggs. Many important particulars are given by Kobayashi & Ishizawa; the breeding season is recorded to be from April to July; clutch size 3 or 4; eggs, according to clutch, either white, or light greenish-blue.

The same authors report upon the nidification of *Zosterops palpebrosa boninsimae*, which they rightly call a hybrid between *stejnegeri* and *alani*, and it is interesting to note that the size of the eggs of the hybrid population is intermediate between that of *stejnegeri* and *alani*, as might be expected, and as far as can be deduced from the small number of eggs belonging to *alani* that could be measured by them. In the hybrid population too, the eggs may be either blue or white.

Habits, etc. Yamashina (1942) has examined the stomach contents of a whole series of specimens, and according to Hachisuka (1928) the specimens on the Bonin Islands feed largely on *Camellia*.

3. **Zosterops japonica alani** Hartert

Zosterops palpebrosa alani Hartert, Bull. B. O. C. 15, 1905 (24 Febr.), p. 45 — S. Dicnisio, Volcano Islands.

Zosterops palpebrosa iwojimaensis Uchida, Dobuts. Zasshi 23, 1911, p. 537 — Minami Iwojima or the Sulphur Islands.

Zosterops palpebrosa boninsimae (pt.) Momiyama, Bull. B. O. C. 47, 1927, p. 145 — Ohmura, Titi-sima, Bonin Islands (= *stejnegeri* × *alani*, cf. Kuroda, 1932).

Zosterops japonicus?; Seebohm, Ibis (6) 3, 1891, p. 189 (Sulphur Island, Volcano Islands).

Zosterops alani; Sharpe, Hand-List Birds 5, 1909, p. 5.

Zosterops palpebrosa iwojimaensis; (pt.) *Toyoshima, Ogas. Gaik. Sinr., 1914, p. 109 (Iwô-to).

Zosterops palpebrosa alani; Hartert, Nov. Zool. 27, 1920, p. 435; Hartert, Vögel paläarkt. Fauna III, 1921, p. 2100; Kubaraki, Scientific Japan, 1926, p. 122; Kuroda, Proc. fourth Pacific Sc. Congr. III, 1930, p. 474 (Volcano Islands); Snouckaert, Alauda (2) 3, 1931, p. 17; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 28; Kobayashi & Ishizawa, Eggs Jap. Birds I, 1938, p. 39 (eggs); Okada, Cat. Vert. Japan, 1938, p. 37 (Iwozima); Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 31; Hachisuka, Tori 11, 1942, p. 344; R. H. Baker, Smith. Misc. Coll. 107, (15), 1948, p. 35 (Iwo Jima).

Zosterops japonicus alani; *Momiyama, Ogas. Soran, pt. 6, ch. 1, 1929, p. 269 (Iwô Rettô); Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 108, 172, 183.

Zosterops japonica alani; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Momiyama, Annot. Orn. Or. 2, 1933, p. 62; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Note. References to the hybrid population *stejnegeri* × *alani* from the Bonin Islands should be sought under the first-mentioned form.

Subspecific characters. In the original diagnosis this race was stated to be: "Similar to *Z. palpebrosa stejnegeri* ... but having the bill slightly smaller (about 11.5 to 13 instead of 14 to 15 mm.), the sides of the body not isabel-line-brown, but dirty white with merely a brownish tinge, and the yellow of the throat apparently less extended".

Whereas this form distinctly differs from *stejnegeri* in the characters enumerated by Hartert, it is evidently very close to *insularis* (a form not

yet described at that time) from which it only differs in having the bill slightly broader, in the somewhat less brownish flanks, and in the slightly larger other measurements. The difference in extension of yellow on the throat, as noted by Hartert, is in my opinion inconsequential. From the nominate race this form differs in having less brownish flanks, in its larger and broader bill (pl. I fig. 3), and in its slightly larger other dimensions.

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

Measurements of 6 specimens (4 ♂, 2 ♀); wing 61-64 (62.92), tail 43-45 (43.75), tarsus 19-20 (19.46), entire culmen 14-15¾ (14.67), exposed culmen 11-12½ (11.67), culmen from anterior point of nostril 8-8½ (8.17).

Distribution. Volcano Islands, whence it has been recorded from S. Dionisio or Iwo Jima (material examined), and Minami Iwojima or Sulphur Island (cf. Uchida, 1911, and R. H. Baker, 1948).

Introduced this subspecies occurs in the Bonin Islands, where it has hybridized with *stejnegeri*, as fully discussed under that form.

First collector. P. A. Holst in 1890 (cf. Seebohm, 1891).

Not figured.

Type. AMNH nr. 699737.

Moult. Specimens collected in March (2), May (3), and June (1) are not in moult; the May and June specimens are in somewhat abraded plumage.

Nidification. According to Kobayashi & Ishizawa (1938), laying season, nest, and nest-site are unknown, as is the clutch size. They give as measurements for two eggs 16.3 × 13 mm and 16.2 × 13.5 mm, they describe the eggs as oval or pyriform oval in shape, with weak gloss and light blue colour.

Habits, etc. Not recorded. A photograph of Iwo Jima, where the form occurs, is given by R. H. Baker (1948, pl. 1).

4. **Zosterops japonica insularis** Ogawa

Zosterops japonica insularis Ogawa, Annot. Zool. Jap. 5, 1905 (July), p. 186 — Tanegashima and Yakushima, type locality fixed as Tanegashima through selection of a lectotype by Hartert (1920).

Zosterops palpebrosa ijimae Kuroda, Tori 1, 1917, Eng. col. p. 4, pl. 6 fig. 2 & 3 — Izuhara, Tsushima.

Zosterops japonicus dageleticus Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930 (June), p. 172, footnote § — Dôdô, Nan-men, Dagelet Island.

Zosterops japonica; Ijima, Journ. Coll. Sc. Imp. Univ. 5, 1892, p. 109 (Tsushima) [1]); Seebohm, Ibis (6) 4, 1892, p. 90 (Tsu-sima); Stejneger, Proc. U. S. Nat. Mus. 16, 1893, p. 636 (Tsushima); (pt.) Ogawa, Annot. Zool. Jap. 6, 1908, p. 405 (Tsushima).

Zosterops japonica insularis; Ogawa, Annot. Zool. Jap. 6, 1908, p. 405 (Tanegashima,

1) According to the "Zoological Record" and to Taka-Tsukasa (1937), this paper has been published in 1892. Kuroda (1917) refers to it as from 1891, whereas the title page of the volume, which, however, appeared in parts, has the year 1893.

Yakushima); Kuroda, Tori 2, 1917, Eng. col. p. 4; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Momiyama, Annot. Orn. Or. 2, 1933, p. 62; Austin & Kuroda Jr., Bull. M. C. Z. 109, 1953, p. 577; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops stejnegeri; A. H. Clark, Proc. U. S. Nat. Mus. 38, 1910, p. 62 (Matsushima); A. H. Clark, Proc. U. S. Nat. Mus. 38, 1910, p. 168 (Tsushima; Fusan, Korea).

Zosterops palpebrosa insularis; Kuroda, Tori 1, 1917, Eng. col. p. 5-6, fig. 2; Hartert, Vögel paläarkt. Fauna III, 1921, p. 2100; Kuroda, Avifauna Riu Kiu Isl., 1925, p. 35; Kuroda, Proc. fourth Pacific Sc. Congr. III, 1930, p. 474 (Satsunan Group); Snouckaert, Alauda (2) 3, 1931, p. 16; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 28; Okada, Cat. Vert. Japan, 1938, p. 37 (Tanegasima, Yakusima, Kumezima); Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 32; Hachisuka, Tori 11, 1942, p. 341; Uchida, Monogr. Jap. Birds, new ed. (in Jap.), 1949, p. 261; Kobayashi, Birds Jap. Nat. Col., 1956, p. 20.

Zosterops palpebrosa ijimae; Kuroda, Annot. Zool. Jap. 9, 1918, p. 553 (Tsushima, Quelpart Island, Mok-po, Fusan); Kuroda & Mori, Tori 2, 1920, p. 273, 275 (Dagelet Island); Anonymus, Tori 3, 1921, p. 6; Hartert, Vögel paläarkt. Fauna III, 1921, p. 2100; Kuroda, Ibis (11) 4, 1922, p. 103 (Tsushima, Iki, Kiusiu, Quelpart, Dagelet, southern parts of Corea); Mori, Cat. Exh. Nat. Hist. Chosen, 1923, p. 44; Kuroda, Ibis (12) 3, 1927, p. 695 (distribution); Momiyama, Annot. Orn. Or. 1, 1927, p. 119, 138 (Sin-u-men, Quelpart Island); Snouckaert, Alauda (2) 3, 1931, p. 15; Yamashina, Tori 7, 1932, p. 227 (Quelpart I.); Kuroda, Nov. Zool. 37, 1932, p. 389; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 28; Kuroda, Tori 9, 1936, p. 187 (Pref. Nagasaki); Okada, Cat. Vert. Japan, 1938, p. 37 (Kyusyu, Tusima, Saisyotu (Quelpart I.), Tyosen (Korea), Uturyoto (Dagelet I.)); Hachisuka, Tori 11, 1942, p. 319, 332; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 32; Austin, Bull. M. C. Z. 101, 1948, p. 248 (status in Korea); Uchida, Monogr. Jap. Birds (in Jap.), new ed., 1949, p. 261; Kobayashi, Birds Japan Nat. Col., 1956, p. 20.

Zosterops insularis; Hartert, Nov. Zool. 27, 1920, p. 436 (lectotype).

Zosterops japonicus insularis; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterops japonicus ijimae; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterps palpebrosa insularis; Kobayashi, Tori 6, 1930, p. 350.

Zosterops japonica ijimae; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 154; Momiyama, Annot. Orn. Or. 2, 1933, p. 62; Austin & Kuroda Jr., Bull. M. C. Z. 109, 1953, p. 577; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops japonicus dageleticus = *Z. palpebrosa ijimae*; Kuroda, Nov. Zool. 37, 1932, p. 389.

Zosterops japonicus dageleticus; Momiyama, Annot. Orn. Or. 2, 1933, p. 62.

Zosterops palpebrosa; Fennell, Condor 54, 1952, p. 109 (Agasaki near Pusan).

Subspecific characters. Similar to the nominate race, but bill distinctly larger; throat, as already noted by Ogawa (1905), often slightly deeper yellow, a difference probably caused by *insularis* very often having a slight rusty tinge over the yellow. In this race, and especially in the birds from Tanegashima and Yakushima, rusty patches are often found on head, nape, and throat.

Unfeathered parts. Iris wood brown; upper mandible black, lower mandible slaty grey; feet grey or olive grey (Kuroda, 1923); irides light brown; bill black, paler at the base of the lower mandible; legs greyish blue (Seebohm, 1892).

Measurements of 9 specimens from Yakushima and Tanegashima (5 ♂, 4 ♀): wing 58-62 (60.06), tail 36-43 (39.72), tarsus 17½-19 (17.92), entire culmen 14¾-16 (15.67), exposed culmen 11-12½ (11.78), culmen from anterior point of nostril 8-9 (8.47).

Measurements of 8 specimens (5 ♂, 3 ♀) from Korea, Quelpart Island, and Tsushima: wing 57½-63 (60.19), tail 37½-42 (39.69), tarsus 17-18¾ (18.25), entire culmen 14½-16 (15.31), exposed culmen 11-12¾ (11.63), culmen from anterior point of nostril 8-9 (8.34).

Structure. Generally 2nd primary in length between 5th and 7th; tail index is given in table II.

Distribution. Tanegashima and Yakushima south of Kiushiu, Tsushima between Japan and Korea, Quelpart Island, South Korea in the coastal region. The subspecies has also been recorded from Iki and Dagelet Island, whence I have not seen material.

Korean specimens from the following localities were examined: Ulnugao, Ullungdo, Fusan (= Pusan); whereas there are also records for Agasaki near Pusan (Fennell, 1952), and Mok-po (Kuroda, 1918).

This race has also been recorded from northern Kiushiu, apparently first by the committee of the first Hand-List of Japanese Birds (1922) and by Kuroda (1922), and later by Kuroda (1927) who more specifically mentioned it from Prov. Chikuzen, but I do not know on what evidence, and anyhow it is likely to be a visitor only to the island, and not a resident.

A single specimen, presumably a straggler (or a genuine migrant?), was recorded from Kumeshima, central group of the Riu Kiu Islands, by Kuroda (1925). Its status in some of these localities, particularly in Korea, will be discussed below.

First collector. Perhaps P. A. Holst in 1891 or earlier on Tsushima (cf. Seebohm, 1892).

Figure. Kuroda (1917), plate 6 figs. 2 & 3.

Type. AMNH nr. 699774. No type specimen was designated in the original description, which was based on a large series, but the specimen listed by Hartert (1920) has become a lectotype by his designation.

The type of *ijimae*, a form not recognised here, is probably still present in the Zoological Institute, Science College, Tokyo.

Moult. Out of 9 specimens from Tanegashima and Yakushima, collected in October (8) and November (1), 4 October-specimens are in advanced stages of moult (of primaries and rectrices), a fifth specimen has completed its moult as far as primaries are concerned, but is moulting secondaries. In these populations the main moult evidently takes place in September and October.

Specimens from Tsushima, Quelpart Island, and Korea, collected in March (1), April (1), June (1), August (2), October (1), and December (1) are not in moult.

Nidification. Strange as it may seem for a form on which so much has been published, nothing seems to have been recorded on its nidification; not anything, at least, in the literature available to me.

Habits, etc. According to Ijima (1892) the form frequents *Camellia japonica* L. on Tsushima. Further nothing has been recorded apart from the fact that at least on Tanegashima and Yakushima it is common.

This race is supposed to be migratory, the scanty knowledge on this subject will be discussed below.

Discussion. The name *ijimae* is here, as far as I am aware for the first time, synonymized with *insularis*. In the diagnosis of *ijimae*, Kuroda (1917) gave the following remarks: "Similar to *Z. japonica insularis* ... but on the average longer in bill, wing, tail and tarsus... The single male example from Kanrasan shows rufous patches on head, nape, back and lower rump very much as in Ogawa's *insularis*... As in *insularis* the colour of chin and throat is bright yellow in the male, paler in the female".

Thus the only difference claimed by Kuroda is the average larger size. Kuroda's table of measurements however, hardly brings out a significant difference between *insularis* and *ijimae*, his figures standing as follows:

	Exp. cul. mm	Wing mm	Tail mm	Tar. mm	Loc.
Z. p. ijimae					
	12.5-13	59-62	44-46	18-19	Tsushima, South Corea and Quelpart Is.
Z. p. insularis					
	11-13	56-62	42-45.5	17.5-18	Tanegashima and Yakushima

On the base of Kuroda's own figures, there seems little reason to maintain *ijimae*, the only measurements in which there is not a considerable overlap being those of the tarsus. However, the individual measurements of six specimens of *ijimae*, as given by Kuroda, show that four birds have a tarsus of 18 mm, and two only one of 19 mm.

My own measurements as given above under the heading "subspecific characters" indicate that, as regards size and proportions, *ijimae* and *insularis* are identical. As in *ijimae* the rusty patches, so conspicuous in some specimens of *insularis*, are also frequently found (cf. Kuroda, quoted above), and as no differences in coloration do exist in the material examined, or

have ever been claimed to exist, it is evident that the form *ijimae* cannot possibly be upheld.

Ijima (1892) already correctly observed the diagnostic characters of this form on the base of two specimens from Tsushima. He noted that: "Both have the bill perceptibly stouter and longer than average Hondo-specimens, in which the culmen measures 10-11 mm [as against 12½ and 13 mm in the two from Tsushima]... Whether the latter represent a local race, perhaps intermediate between typical *Z. japonica* and *Z. stejnegeri*, I am not prepared to say".

A curious statement about the subspecies is that by Hartert (1920), who wrote: "I cannot consider this very distinct form to be a subspecies of *japonica...*". From an ornithologist with so broad a species-concept, this statement is hard to understand, *insularis* only differing from *japonica* by its larger bill and in some specimens by the rusty patches. It must be added that in 1921 Hartert, without comment, made *insularis* a subspecies again, so that his earlier remark was probably but a slip, written down in a moment of absentmindedness.

Austin (1948) comments on the status in Korea. Contrary to Hachisuka et al. (1942), who suggest breeding, he considers it likely that the form occurs only as a casual spring and autumn transient. The number of observations and collected specimens, however, indicates that this form is certainly more than a casual visitor, and though, of course, all observations might be supposed to concern migrants, it is difficult to visualize whence migrants in some numbers would have come. Generally speaking, migration in this part of the world would imply the presence of a breeding population somewhere to the north; but apart from Dagelet Island, there seems to be none. On the other hand, *insularis* is a subspecies found on quite a number of islands between Japan and Korea, and therefore the occurrence, as a breeding bird, on some of the many small islands off the southern coast of Korea seems not at all unlikely. Nearly all records for Korea are near the southern coast or from the islands (Mok-po), whereas the months in which some observations were made (May, 17 August), though not impossible for migrants, are also indicative of breeding.

5. **Zosterops japonica loochooensis** Tristram

Z[osterops] simplex var. *loochooensis* Tristram, Ibis (6) 1, 1889, p. 229 — Loo Choo Islands (= Okinawa).

Zosterops palpebrosa amami Momiyama, Trans. Nat. Hist. Soc. Formosa 18, 1928, p. 11 — Amami-oshima.

Zosterops japonica; Seebohm, Ibis (5) 5, 1887, p. 176 (Okinawa); Stejneger, Zeitschr. ges. Orn. 4, 1888, p. 176 (Okinawa).

Zosterops simplex; Seebohm, Ibis (5) 6, 1888, p. 234 (Loo Choo Islands); (pt.) Finsch, Tierreich 15, 1901, p. 20 (Lutschu-Inseln); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 5 (Liu Kiu Is.); (pt.) Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Ishigaki-Inseln).

Zosterops loochooensis; Tristram, Cat. Coll. Birds, 1889, p. 211 (Loochoo Islands); Seebohm, Ibis (6) 3, 1891, p. 273; Bangs, Bull. M. C. Z. 36, 1901, p. 268 (abundant on Ishigaki and Kuroshima; careful redescription); Bangs, Proc. New England Zoöl. Club 3, 1903, p. 97 (Liu Kiu Islands); Ogawa, Annot. Zool. Jap. 5, 1905, p. 190 (distribution).

Zosterops palpebrosa nicobarica; Seebohm, Birds Jap. Emp., 1890, p. 67; Isao, Nippon no Tori Mokuroku, Dobuts. Zasshi 3, 1891, p. 3; Fritze, Zool. Jahrb. 7, 1894, p. 856, 859 (Okinawa).

Zosterops palpebrosa; Seebohm, Ibis (6) 5, 1893, p. 48 (Okinawa-sima).

Zosterops palpebrosa loochooensis; Hartert, Vögel paläarkt. Fauna I, 1905, p. 315; Ogawa, Annot. Zool. Jap. 6, 1908, p. 405; Uchida, Rep. Ass. pres. Scenery, Hist. and Nat. Mon. nr. 23, (1920) 1921, p. 46 (Nase, Amami-oshima; in Jap.); Hartert, Vögel paläarkt. Fauna III, 1921, p. 2100; Kuroda, Avifauna Riu Kiu Isl., 1925, p. 32, pl. 2 fig. 1 (particulars); Momiyama, Trans. Nat. Hist. Soc. Formosa 18, 1928, p. 7; Kobayashi, Tori 6, 1930, p. 349; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 28; Kobayashi & Ishizawa, Eggs Jap. Birds I, 1938, p. 41; II, pl. 12 fig. 6 (Okinawa-jima); Okada, Cat. Vert. Japan, 1938, p. 37 (range); Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 32; R. H. Baker, Smith. Misc. Coll. 107, (15), 1948, p. 34 (Okinawa: Hedo, Kadena); Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 6, 1953, p. 176 (particulars); Kobayashi, Birds Japan Nat. Col., 1956, p. 20.

Zosterops nicobarica; Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Ishigaki-Inseln).

Zosterops loochoocnsis loochooensis; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172; Momiyama, Annot. Orn. Or. 2, 1930, p. 172 (reprint of preceding).

Zosterops japonica loochooensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops meyeni loochooensis; Momiyama, Annot. Orn. Or. 2, 1933, p. 62.

Zosterops palpebrosa loochovensis; Anonymus, Civil Affairs Handb. Ryukyu (Loochoo) Islands, Office Chief Naval Operations, Navy Department, 1944, p. 34.

Zosterops palpebrosus; Cogswell, Condor 50, 1948, p. 25 (Okinawa).

Subspecific characters. Close to the nominate race, with which it agrees in coloration of upper parts and in shape and size of the bill. Differs from *japonica*, however, in having no or hardly any buff on the flanks, the under parts being more or less pure pale grey. Moreover on the average slightly smaller than *japonica*.

From *insularis* it differs in the same characters as from *japonica*, and moreover in having a smaller bill. It is very close to *simplex*, the differential characters being given under that form.

Unfeathered parts. Iris amber or brown; bill black or brown; feet slate (N.C. Rothschild, F. Gayner & A. W. Waters); iris olive buff; bill slaty black; feet lavender grey...; iris drab; bill black; feet grey...; iris burnt umber; upper mandible black, lower mandible grey; feet grey (Kuroda, 1925).

Measurements of 12 specimens (5 ♂, 6 ♀, 1 ○) from Okinawa: wing (10 specimens only) 55-59 (57.30), tail 34½-40 (37.50), tarsus 17-19 (17.75) entire culmen 13-15½ (14.08), exposed culmen 10-11 (10.81); culmen from anterior point of nostril 7¾-8¼ (8.04).

Amami, 2 ♂: wing 58-60, tail 39-40, tarsus 18¼-19, entire culmen 14¾-15, exposed culmen 10¾-11¼, culmen from anterior point of nostril 7½-8.

Ishigaki, 4 specimens (2 ♂, 2 ♀): wing 57-58½ (57.75), tail 36-39 (37.75), tarsus (2 specimens only) 17-17¼, entire culmen 14½-15 (14.63), exposed culmen 11-12 (11.44), culmen from anterior point of nostril 7¾-8½ (8.00).

Figures for the islands combined (18 specimens, wing and tarsus 16 only): wing 55-60 (57.63), tail 34½-40 (37.78), tarsus 17-19 (17.78), entire culmen 13-15½ (14.29), exposed culmen 10-12 (10.97), culmen from anterior point of nostril 7½-8¼ (8.00).

Structure. As regards wing formula, the 2nd primary is generally in length between the 6th and 7th, sometimes, however, slightly larger, between the 5th and the 6th. Average tail index 65.44 %.

Distribution. Riu Kiu Islands, with the exception of the islands on the extreme southern end of the chain (Iriomotesjima and Yonakunishima), where replaced by closely related forms. In the Riu Kiu Islands it has been recorded as follows: Amami-Oshima, Kikaigashima, Tokunoshima, Okino-Erabujima, Yuronshima, Okinowashima, Zamamishima, Kumeshima, Myiakojima, Ishigakijima (Kuroda, 1925), and Kuroshima (Bangs, 1901). On those islands whence information is available, it is said to be common.

First collector. Probably Pryer in 1886 on Okinawa; the same island was visited by Tegima and Namiye a few months previous to Pryer's stay. Though Namiye has observed the birds (cf. Stejneger, 1888, p. 176), it seems not certain that he has collected any during his first stay, so that the first formal record is that by Pryer and his Japanese collector.

Figure. Kuroda (1925), plate 2 fig. 1 (coloured, $^3/_5$ natural size, by Jūzō Kobayashi).

Type. This form was described on the base of 14 specimens in the collections of Tristram and Seebohm; though some of Tristram's specimens may have been destroyed in the Liverpool Museum during the war, the specimens from Seebohm still exist. I could examine a number of early specimens, doubtless cotypes, in the BM.

Moult. Specimens taken in February (1), March (6), April (3), May (2), June (1), August (2), and December (1) are not in moult. Of two September specimens from Okinawa, one is not in moult, the other is heavily

moulting its primaries (this specimen was already mentioned by R. H. Baker, 1948). The single December skin is in very fresh plumage. It seems possible that the main moult takes place in the period from September to November.

Nidification. As far as I am aware the first to record eggs of this subspecies was Nehrkorn (1910), whose eggs were perhaps taken by Owston's collectors; he only gives measurements, and no description, date of collecting, or clutch size. Kuroda (1925) examined a clutch of four eggs taken at Wanmura, Kikaigashima, on 22-V-1922; he describes the colour as uniform pale bluish, and gives measurements. Kobayashi (1930) records five nests from Okinawa, collected from 18 April to 18 May. Only one of the clutches was complete, it contained four eggs.

About the nest structure, Kobayashi & Ishizawa (1938) give particulars, the nest does not seem to deviate from that of other races and species.

Cogswell (1948) during his stay on Okinawa in 1945-1946 observed fully grown young begging food from adults "as early as" 24 May, and two fledglings, being fed by adults, on 30 July.

A pullus from Shuri, Okinawa, 29 March 1892 (BM nr. 98.9.30.126) bears a note on its label: "one of four young in nest". Compared with published data as summarized above, this is rather early; considering the size of the young, the full clutch must have been present and incubation must have begun about 12 March.

From the scanty evidence available it would appear that reproduction takes place from March to July, and that normally the clutch size is four.

Habits. Pryer (cf. Seebohm, 1887) already found this bird to be, next to the Sparrow, the commonest bird of Okinawa, and Cogswell (1948) still found it common.

Voice. According to Cogswell (1948), songs were frequent through late May and June, especially in early morning and in the late afternoon. In the autumn no song was heard. He does not mention what the song sounds like.

Discussion. This form, in accordance with its geographical range, is somewhat intermediate between *simplex* and *japonica*, though it is well differentiated from both. Within its range there is little or no geographical variation, though Kuroda (1925) believed that specimens from Okinawajima, Yuronshima, Tokunoshima, and Okino-Erabujima have on an average a trifle shorter bills than those from the other islands.

6. **Zosterops japonica iriomotensis** Kuroda

Zosterops palpebrosa iriomotensis Kuroda, Bull. B. O. C. 43, 1923, p, 88 — Sonai, Iriomote Island, Yeyeyama Islands, S. Riu Kiu Group.

Zosterops japonica; Stejneger, Proc. U. S. Nat. Mus. 10, 1887, p. 413 (Yeyeyama Island) [1]).

Zosterops loochooensis; (pt.) Ogawa, Annot. Zool. Jap. 5, 1905, p. 190 (Iriomote, at Urauchi).

Zosterops palpebrosa iriomotensis; Kuroda, Tori 4, 1924, p. 243; Kuroda, Avifauna Riu Kiu Isl., 1925, p. 31, pl. 2 fig. 4; Kuroda, Ibis (12) 3, 1927, p. 695; Momiyama, Trans. Nat. Hist. Soc. Formosa 17, 1927, p. 305, 306; Momiyama, Trans. Nat. Hist. Soc. Formosa 18, 1928, p. 5; Snouckaert, Alauda (2) 3, 1931, p. 16; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 28; Okada, Cat. Vert. Japan, 1938, p. 37; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 32; Hachisuka, Tori 11, 1942, p. 319; Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 3, 1950, p. 269; Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 6, 1953, p. 176.

Zosterops loochooensis iriomotensis; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterops japonica iriomotensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops meyeni iriomotensis; Momiyama, Annot. Orn. Or. 2, 1933, p. 63.

Subspecific characters. No material of this subspecies was examined by me; according to Kuroda (1923), it is: "Similar to *Z. palpebrosa loochooensis* Tristram, but the length of the tail on an average shorter, 36.5-39 mm (only two examples having the tail attaining 40.5 mm) instead of 39-43.5 mm as in *Z. p. loochooensis* (only four examples have it 39 mm and only two females 36.5 and 37.5 mm). The upper parts are generally patched or sometimes uniformly washed with rusty ... the under tail-coverts and the longitudinal line extending on the lower breast to abdomen are of cinnamon-yellow colour; the flanks vinous-grey colour, only the middle of breast being whitish (12 specimens examined)".

Unfeathered parts. Iris vandyke brown; upper mandible black, lower mandible slaty colour; feet slaty colour (Kuroda, 1925).

Measurements according to Kuroda (1925): wing 8 ♂, 54½-58 (55.38); 4 ♀, 54-54½ (54.25); 12 specimens, 54-58 (55.00); tail 8 ♂, 36½-40½ (38.69); 4 ♀, 37-39 (37.75); 12 specimens, 36½-40½ (38.38); tarsus 12 specimens, 16½-17½ (16.86); entire culmen 12 specimens, 14-15 (14.50); exposed culmen 12 specimens, 11-12 (11.46).

Distribution. Confined to Iriomotejima and Hatomajima in the southern Riu Kiu Islands (Kuroda, 1925; Hachisuka & Udagawa, 1953), where it appears to be common.

First collector. Probably J. Nishi on Yayeyama Island [1]).

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1) Nishi collected a single specimen on Yayeyama Island, which, however, is not the name of a single island, but that of a group of islands in the southern Riu Kiu's, of which Iriomotejima and Ishigakijima are the most important ones. Stejneger (1887, p. 391-392) thought that his specimens probably came from Iriomote, whereas Kuroda (1925, p. 34) favoured Ishigaki.

Figure. Kuroda (1925), plate 2 fig. 4 (coloured, $^3/_5$ natural size, by Jūzō Kobayashi).

Type. Was in the Kuroda collection, destroyed in 1945.

Moult. Not recorded.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Not having examined material, I am not in a position to judge the validity of this race. Whereas the differences in size as given by Kuroda (1923) are in my opinion scarcely sufficient to uphold the race, the fact that it almost always shows rusty patches in the plumage, probably justifies recognition.

7. **Zosterops japonica yonakuni** Kuroda

Zosterops palpebrosa yonakuni Kuroda, Bull. B. O. C. 43, 1923, p. 87 — Yonakuni Island, southernmost island of Yayeyama Islands, S. Riu Kiu Group.

Zosterops palpebrosa yonakuni; Hartert, Vögel paläarkt. Fauna, Nachtr. I, 1923, p. 33; Kuroda, Tori 4, 1924, p. 243; Kuroda, Avifauna Riu Kiu Isl. 1925, p. 30; Kuroda, Ibis (12) 3, 1927, p. 695; Momiyama, Trans. Nat. Hist. Soc. Formosa 17, 1927, p. 305, 306; Momiyama, Trans. Nat. Hist. Soc. Formosa 18, 1928, p. 2; Snouckaert, Alauda (2) 3, 1931, p. 16; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 29; Okada, Cat. Vert. Japan, 1938, p. 37; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 32 (Miyako, Ishigaki, Yonakuni); Hachisuka, Tori 11, 1942, p. 319; Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 6, 1953, p. 177.

Zosterops loochooensis yonakuni; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterops japonica yonakuni; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. Very near to *loochooensis*, but may differ in having the upper parts very slightly greener and duller.

This subspecies is rare in collections; in the British Museum are two specimens which I compared with a series of 7 specimens of certain provenance from Okinawa, the type locality of *loochooensis* (the many specimens only labelled "Loochoo Islands", though probably also originating from Okinawajima, were neglected). In this small number of specimens a difference was found to exist as mentioned above, though comparison of larger series will not be superfluous.

Contrary to Kuroda's diagnosis, I do not find that they have heavier beaks than *loochooensis*, nor are their flanks darker. They show traces of yellow on the foreheads, which, however, is also found in some specimens from Okinawa, hence has no importance for subspecific distinction.

From *simplex*, with which form Kuroda ought to have compared his specimens, as it occurs in Formosa close to Yonakuni, the two skins differ

also in being greener above, and moreover in having rather less yellow on their foreheads and by their definitely larger beaks.

Unfeathered parts. Iris chestnut colour; bill slaty colour; feet slaty grey (Kuroda, 1925).

Measurements of two specimens (♂, ♀): wing 56-56½, tail 37-38, tarsus 17½-18, entire culmen 14-14½, culmen 10-11, culmen from anterior point of nostril 7½, 7½.

Distribution. Confined to Yonakunijima, where it appears to be a common resident (Kuroda, 1925). See further the discussion.

First collector. Probably Alan Owston or his Japanese collectors in June, 1904 (specimens in BM).

Not figured.

Type. Was in the Kuroda collection, destroyed in 1945.

Moult. The two specimens examined, collected in June, are not in moult.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. That this is a subspecies of which the validity needs confirmation, though it is provisionally accepted here, is perhaps best demonstrated by the fact that Kuroda (1925) and Hachisuka et al. (1932) included Miyakojima and Ishigakijima in the range of *loochooensis* (Kuroda had 7 specimens from Miyakojima and 3 from Ishigakijima at his disposal to base this conclusion on), whereas Hachisuka et al. (1942) and Hachisuka & Udagawa (1953) include these islands, with Taketomijima, into the range of the present subspecies. Perhaps this has only been done to make the range of *loochooensis* more acceptable from a geographic point of view (note the "Hachisuka Line" drawn in Hachisuka & Udagawa's map). My impression is that the specimens from Ishigakijima agree with those from Okinawa, but the material examined was old, and the very poor diagnostic characters of *yonakuni* may be more apparent in fresh skins. Provisionally, however, I follow Kuroda (1925) in limiting the range of *yonakuni* to Yonakunijima.

8. **Zosterops japonica daitoensis** Kuroda

Zosterops palpebrosa daitoensis Kuroda, Bull. B. O. C. 43, 1923, p. 120 — Minami-Daitojima, Borodino Islands.

Zosterops palpebrosa daitoensis; Kuroda, Tori 4, 1924, p. 243; Kuroda, Avifauna Riu Kiu Isl., 1925, p. 31, pl. 2 fig. 3; Kuroda, Ibis (12) 3, 1927, p. 696; Momiyama, Trans. Nat. Hist. Soc. Formosa 18, 1928, p. 4; Snouckaert, Alauda (2) 3, 1931, p. 17; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 28; Kobayashi & Ishizawa, Eggs Jap. Birds I, 1938, p. 42; II, pl. 12 fig. 7 (South Borodino Island); Okada, Cat. Vert. Japan, 1938, p. 37; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 32; Hachisuka, Tori 11, 1942, p. 319; Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 6, 1953, p. 177.

Zosterops loochooensis daitoensis; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterops japonica daitoensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 207; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops meyeni daitoensis; Momiyama, Annot. Orn. Or. 2, 1933, p. 63.

Subspecific characters. No specimens of this race were available to me for examination. According to Kuroda (1923) it differs from neighbouring subspecies as follows:

"Near to *Z. palpebrosa batanis* McGregor of Batan I., Philippine Islands, and Botel Tobago, S. Formosa, but it differs from the latter by having a distinct black patch in front and below the eye, the upper parts not so light olive-yellow, the yellow band of middle front replaced by a yellow patch on either side of the forehead, and in having the tarsus on an average a trifle longer. It also differs from *Z. palpebrosa yonakuni* Kuroda..., by having the tail on an average longer 41.5-46.5 mm. instead of 39-41.5 mm.), the tarsus also a trifle longer, a distinct yellow patch on both sides of the forehead, the throat brighter yellow, and in having the upper parts, especially the head, paler and more yellowish in tinge. It further differs from *Z. palpebrosa loochooensis* in being larger and in the existence of a yellow patch on either side of the eye".

Unfeathered parts. Iris wood brown, or drab, or vandyke brown; upper mandible slate colour, lower mandible grey; feet grey (Kuroda, 1925).

The measurements as given by Kuroda (1925) are: wing 7 ♂, 57-61 (58.93); 4 ♀, 56½-58½ (57.38); 11 specimens, 56½-61 (58.66); tail 7 ♂, 43-46½ (44.86); 4 ♀, 41½-45½ (44.13); 11 specimens, 41½-46½ (44.59); tarsus 11 specimens, 18-19 (18.50); entire culmen 11 specimens, 14½-15 (14.32); exposed culmen 11 specimens, 10½-11½ (11.23).

Not having examined material, I am of course not in a position to judge the validity of this subspecies, but it seems likely, on geographical grounds, that it is closest to *loochooensis*, from which according to Kuroda (1923) it can only be distinguished by its slightly larger size and by the yellow patches above the lores.

The measurements, however, make it evident that the difference in size of wing, if it really exists, is negligeable (compare with Kuroda's measurements of *loochooensis*, given in the same volume!). Tarsus and especially tail would, however, seem to average slightly larger. As far as the yellow patches above the lores are concerned, at least traces of these are sometimes present in specimens of *loochooensis*.

These facts, in my opinion, justify the conclusion that the subspecies is very near to *loochooensis*, from which it is perhaps not satisfactorily separable.

Distribution. Only known from Mīnami-Daitōjima, Borodino Islands, where it is a common resident.

First collector. Probably H. Orii, Kuroda's collector, on 26 September, 1922.

Figure. Kuroda (1925), plate 2 fig. 3 (coloured, $^3/_5$ natural size, by Jūzō Kobayashi).

Type. Was in the Kuroda collection, destroyed in 1945 (cf. Hachisuka & Udagawa, 1953).

Moult. Not recorded.

Nidification. Kuroda (1925) records a nest taken at the end of April 1924. It contained two eggs, white tinged with pale bluish. They measured 18 × 13.9 and 18 × 13.5 mm.

Habits, etc. Not recorded.

Discussion. For remarks on the validity of this form, see under the heading "subspecific characters".

9. **Zosterops japonica simplex** Swinhoe

Z[osterops] simplex Swinhoe, Ibis 3, 1861 (October), p. 331 — the Southern-Chinese species, herewith restricted to Hong Kong.

Zosterops subroseus Swinhoe, Proc. Zool. Soc. London, 1870 (June), p. 132 — Hankow.

Zosterops Mussoti Oustalet, Ann. Sc. Nat., Zool. 12, 1891, p. 289 — Setchuan.

Zosterops setschuana Reichenow, Journ. f. Orn. 63, 1915, p. 125 — Ta-tsien-lu-ting in Setschuan.

Zosterops palpebrosa peguensis Stuart Baker, Ibis (11) 4, 1922, p. 144 — Moulmein.

Zosterops palpebrosa harterti Hachisuka, Bull. B. O. C. 47, 1926 (27 Nov.), p. 56 — Nanto Distr., Central Formosa.

Zosterops palpebrosa taivaniana Momiyama, Trans. Nat. Hist. Soc. Formosa 17, 1927, p. 301 — nomen novum for *Zosterops palpebrosa harterti* Hachisuka, nec *Zosterops palpebrosa harterti* Stresemann, 1912.

Zosterops japonica sinensis "Swinhoe" Riley, Bull. U. S. Nat. Mus. 172, 1938, p. 524 — Chiengmai, Lampang, Doi Nangka.

Zosterops japonicus; Swinhoe, Ibis 2, 1860, p. 55 (Amoy); Swinhoe, J. As. Soc. Bengal 29, 1860, p. 251 (Amoy); Swinhoe, Ibis 3, 1861, p. 35 (Hongkong).

Zosterops simplex; Swinhoe, Ibis 5, 1863, p. 294 (Formosa); Swinhoe, Zoologist 21, 1863, p. 8755 (Formosa, reprint from preceding); Swinhoe, Proc. Zool. Soc. London, 1863, p. 203, 297, 336 (Hong Kong, Macao, Canton, Amoy, Foochow, and Formosa); Hartlaub, Journ. f. Orn. 13, 1865, p. 13; von Pelzeln, Novara Exp., Zool. I, 1865, p. 67 (Wong-Nei-Tschung, Hongkong); Swinhoe, Ibis N. S. 2, 1866, p. 121 (Formosa); G. R. Gray, Hand-List Birds 1, 1869, p. 163 (China, I. of Formosa); Swinhoe, Ibis N. S. 6, 1870, p. 78 (Naochow); Swinhoe, Ibis N. S. 6, 1870, p. 348 (all parts of Hainan; this race?); Gould, Birds Asia, pt. XXIII, 1871, pl.; Swinhoe, Proc. Zool. Soc. London, 1871, p. 349 (Hainan to Wanchow, and in Formosa); A. E. Brehm & Finsch, Gefangene Vögel I, 2, 1876, p. 285 (Südchina von Kanton bis Futschau, sowie die Insel Formosa); David & Oustalet, Ois. de la Chine, 1877, Texte, p. 85 (distribution); Giebel, Thes. Orn. III, 1877, p. 777 (China, Formosa); J. Anderson, Anat. Zool. Res. Exp. Yunnan I, 1878, p. 631 (Ponsee); Ridgway, Proc. U. S. Nat.

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Zosterops pallida simplex; C. H. B. Grant & Mackworth-Pread, Bull. B. O. C. 63, 1943, p. 70.

Subspecific characters. Close to *loochooensis*, from which this subspecies differs in having a distinctly yellow forehead and supra loral region; moreover the present form is smaller, a difference that appears especially in the length of tarsus and bill. Sometimes there are traces of buffish on the flanks, but generally the under parts are pure pale grey.

Unfeathered parts. Iris brown to ash grey or, once, yellowish red (J. F. Rock); iris brown, bill dark brown, lower base lighter, feet greyish (Forrest); iris pale yellow, bill black or dark brown, lower base lighter or brownish, feet dark olive or black olive (Forrest).

Measurements. Burma, Siam, and Indo-China: wing 9 ♂, 55-58½ (56.61); 5 ♀, 56-58 (56.70); 15 specimens, 55-58½ (56.67); tail 9 ♂, 34-37 (35.80); 5 ♀, 34½-37 (35.70); 15 specimens, 34-37½ (35.87); tarsus 15 specimens,

15-16½ (15.70); entire culmen 15 specimens, 12¼-13½ (12.80); exposed culmen 15 specimens, 9-10½ (9.75); culmen from anterior point of nostril 15 specimens, 6¾-8 (6.70).

Yunnan: wing 10 ♂, 55-58½ (56.85); 3 ♀, 56-58½ (57.17); 15 specimens, 55-58½ (57.03); tail 10 ♂, 35½-38 (36.70); 3 ♀, 35½-38½ (36.50); 15 specimens, 35½-38½ (36.63); tarsus 15 specimens, 15-16¼ (15.73); entire culmen 15 specimens, 12-13¼ (12.72); exposed culmen 15 specimens, 8¾-10 (9.45); culmen from anterior point of nostril 6½-7¼ (6.99).

Szechuan: wing 9 ♂, 56-60 (57.56); 5 ♀, 55½-57 (56.50); 15 specimens, 55½-60 (57.23); tail 8 ♂, 34-38 (35.94); 5 ♀, 34-38 (35.30); 14 specimens, 34-38 (35.82); tarsus 14 specimens, 14½-16¾ (15.66); entire culmen 15 specimens, 10, 11½-13 (12.37); exposed culmen 15 specimens, 7, 8½-10 (9.13); culmen from anterior point of nostril 14 specimens, 5, 6-7½ (6.68).

S. E. China: wing 11 ♂, 55-60 (56.55); 6 ♀, 54-58 (55.58); 30 specimens, 54-60 (56.30); tail 11 ♂, 34½-37 (35.73); 33-36 (35.08); 30 specimens, 33-39 (35.42); tarsus 27 specimens, 15-17 (16.06); entire culmen 27 specimens, 12-14 (13.05); exposed culmen 28 specimens 9-10½ (10.00); culmen from anterior point of nostril 28 specimens, 6½-8 (7.37).

Formosa: measurements of 5 specimens (3 ♂, 2 ♀): wing 53-58 (55.00), tail 34-35½ (34.70), tarsus 16-17 (16.20), entire culmen 12-13½ (12.90), exposed culmen 9¼-10 (9.75), culmen from anterior point of nostril 7-7½ (7.20).

Structure. 2nd primary in length between 5th and 7th, generally between 5th and 6th or about equal in length to the 6th.

Distribution. The whole southern part of China, as far north as Kiangsu and Chekiang (David & Oustalet, 1877; Gayot, 1922), and the southern part of Shensi where it has been recorded from the mountains of Tsin-ling (David & Oustalet, 1877) and from along the tributaries of the river Han (Blackwelder, 1907), whereas it has been reported to inhabit the lower Yangtse Valley from Shasi (La Touche, 1922) and Hankow to the sea (Styan, 1899). La Touche (1906) found it a common summer visitor at Chinkiang, and Shaw (1938) even mentions it as a summer visitor to Lingshantao.

To the west, the form extends over the whole of Szechuan and Yunnan, apparently being common in both provinces and having been obtained by numerous collectors, and into eastern Thibet where it was recorded at Su-wa-tong by Greenway (1933).

Its southern limits are less easy to define, as the form is partly migatory and therefore has been regularly collected in southern localities where it probably occurs as a winter visitor only. Moreover confusion with the very

similar *Z. p. palpebrosa* has often taken place, especially in Burma. Therefore Smythies (1953), correctly in my opinion, rejects all published records of breeding in Burma, though it would not be unlikely for the form to occur as a breeding bird in North-East Burma and in the Northern Shan States.

According to Deignan (1945), *simplex* is found as a winter visitor only in northern Thailand. In Indo-China it seems to occur the whole year in Tonkin, Laos and northern Annam (Boutan, 1906; Delacour & Jabouille, 1931), but less common, and presumably as a winter visitor only, in the southern part of the country. Moreover, as far as I am aware, no nest has been found in Indo-China as yet.

On the Paracel Islands this subspecies was found in some numbers by Delacour & Jabouille (1930), who suppose that it occurs as a migrant only on these islands, though the possibility of its being a resident is not entirely to be excluded as a male specimen was taken on July 4th.

To the east the range includes, apart from the whole of southern China, northern Hainan (Hartert, 1923; I have not seen specimens), and Formosa.

The non-breeding range includes eastern Burma as far south as Moulmein (type of *peguensis*), northern Siam, and the central part of Indo-China, southwards at least to Vientiane (H. Smith coll.), and Hué (Delacour & Jabouille, 1931).

As regards occurrences outside the territory as delimited above, the locality Tientsin, given by Sharpe (1884), was attached to a purchased specimen and is therefore not trustworthy. Kleinschmidt (1913) was not at all sure about the identification of the birds from Kiautschau and his record may have concerned a different species (*erythropleura*). The sole base for the alleged occurrence of this form in Chihli (Wilder & Hubbard, 1924 & 1926; Shaw, 1936) is the appearance of an occasional specimen in the Peking bird market, certainly a somewhat doubtful base for extending the known range of this form some 500 miles to the north.

Chasen (1935) reports the occurrence of *Zosterops japonica simplex* in a feral state on Singapore Island. Gibson-Hill (in litt., 14 & 15-VI-1950), at my request for information, wrote to me that only one skin present in the Raffles Museum is not marked directly as coming from local bird shops (which formerly stocked this form as a cage bird). This specimen was brought in by a local man who could not be considered entirely trustworthy. Gibson-Hill strongly suspects that this man is the sole source of Chasen's statement that the form occurred in the Botanic Gardens, in which case the story can be discounted completely. Chasen did not much field observing in later years, even in the Botanic Gardens; he tended to rely very much on information and material brought to him.

First collector. Probably R. Swinhoe, not before 1855, at Amoy (cf. Swinhoe, 1860). The oldest dated specimen from the Swinhoe collection I have seen was taken at Amoy in March, 1858 (RMNH cat. nr. 3).

Figures. Gould (1871), excellent coloured plate on natural size, showing two birds and a nest; Boutan (1906), coloured plate, primitive but attractive; Courtois (1916), pl. 29 fig. 76 (coloured photograph of a stuffed bird); Delacour & Jabouille (1930), pl. III (coloured, about $^4/_5$ × natural size, by Delacour, good); Herklots (1935), pl. 12 (coloured).

Type. When Swinhoe (1861) named this form, he only called it "the Southern-Chinese species" without an exact indication of localities, but his previous publications show that he found it at Amoy and at Hong Kong. As the locality Hong Kong is given in the same volume in which the race is named, and particularly as Hong Kong is at the moment a more accessible place, I prefer to restrict the type-locality to Hong Kong. As lectotype I choose a female, collected at Hong Kong by Swinhoe in February, 1860, RMNH cat. nr. 2. The Leiden Museum, incidentally, has a larger number of specimens belonging to this form, collected by Swinhoe, than any other museum I know of.

Moult. Specimens collected in January (2), February (6), March (6), April (1), May (4), June (6), July (3), August (7), October (3), November (15), and December (6) are not in moult. The skins from November, December, and January are in fresh plumage, the June and July specimens are in abraded plumage.

One specimen collected in February is moulting rectrices; four specimens collected in August are moulting primaries, and one of these also rectrices; one specimen taken in October is moulting primaries; two specimens taken in November are moulting primaries, one of these has nearly completed its moult.

The main moult evidently takes place in the autumn from August till November.

Nidification. The breeding season is reported to extend from March to August in Hong Kong (Herklots, 1935), though the actual dates I found in literature (Swinhoe, 1861; Courtois, 1912; Reiser, 1927; Hutson, 1930; Hutson, 1931; Herklots, 1932; Taylor, 1933, Pereira, 1935, for continental China, and Ogilvie-Grant, 1912; Hachisuka & Udagawa, 1951; Yamashina & Yamada, 1937, for Formosa) range from 2 April to 22 June only. According to Herklots (1935) several broods are reared every season.

Good descriptions of the nest, which is typically of the genus, were given by Swinhoe (1861), Hutson (1931), Yamashina & Yamada (1937) and others. Plates of the nest were given by Gould (1871) and by Courtois

(1914, pl. I nr. 76). The altitudes at which nests have been found vary from very low to about 8 m high.

The clutch size is generally 4 in Hong Kong (according to the various authors quoted above), 2 to 4 in Szechuan, the smaller numbers perhaps of incomplete clutches (Reiser, 1927). From Formosa I found only clutches of 2 and 3 recorded (Yamashina & Yamada, 1937), but these may have been incomplete.

The colour of the eggs is either pure white (apparently the dominating type in Szechuan) (Swinhoe, 1861; Reiser, 1927), or bluish, being described as very pale milkblue, spotless, glossless, by Yamashina & Yamada (1937). Coloured plates of the eggs were given by Courtois (1914, pl. 7 nr. 76) and Taylor (1933, pl. I nr. 12). Several authors record measurements of the eggs and it is instructive to note that eggs from Fou-kien, as measured by Courtois (1912), are not larger than those from Formosa, measured by Yamashina and Yamada (1937). The eggs from Szechuan, described by Reiser (1927), seem to average slightly larger, but no conclusions can be drawn from these small series.

Full particulars about nidification and rearing of the young were contributed by Schmitt (1931), whose paper, unfortunately, has not been available to me. According to Nice (1953), Schmitt found an incubation period of 11 days.

Habits, etc. In behaviour and habits various authors report this subspecies to be identical with other members of the genus. It belongs to the most popular cage birds in China, and has also found its way to European aviaries, where breeding successes have been attained as shown by Schmitt's (1931) paper. Perhaps Pereira's (1935) is the most valuable paper on this form as a cage bird in China; he mentions both albinos and lutinos, the latter being a trifle cheaper than the former.

The evidence concerning the migration of the subspecies is somewhat conflicting; Swinhoe (1860) found it as a winter visitor only on Amoy, whereas Cheng (1948) noted that it occurs at Shaowu, Fukien, 27° 16′ N, 117° 29′ E, at an elevation of 300 m, from November to April only, apparently ascending the mountains later in the season. Here the possibility of vertical and local movements comes also in question to complicate the picture. Styan (1891) found it to be a common summer bird in the Lower Yangtse Basin; he met with large flocks during the last days of October, and suggests that these were preparing to move south. In Hong Kong it is apparently a resident, and the same is reported for Kwantung and Kwangsi by Yen (1934), who found it in these provinces even more common in winter than in summer. Jabouille (1935) on the other hand noted that the form does not hibernate

in Kouang-tschéou, though it appears in spring and breeds in fairly large numbers.

Voice. Butler (1916)wrote that the subspecies sings a Cicada-like trill, whereas the call note is a tiny staccato chirp, which he rendered tsip-tsip-tsip; the latter noise reminded him somewhat of the note of a gold-crest. Fok (1936) calls the notes "Chi-i, chi-i", or simply "jeet, jeet". Yamashina & Yamada (1937) stated that in Formosa its song is not as attractive as that of the Japanese race (*Z. j. japonica*), but that it can be heard singing fairly nicely from the top of a tall tree early in the morning. Cage birds in Canton come in full song in January (Pereira, 1935).

Discussion. Within its large range this subspecies apparently shows a slight geographical variation, which is obscured, however, by its complicated migrations. As is shown by the measurements given under the heading subspecific characters, specimens from Szechuan may have slightly longer wings than specimens from Kwangtung and Hong Kong, but shorter and finer bills. Moreover the latter are on an average a trifle more yellowish on the upper parts. Formosa birds are probably smaller again than those from S. E. China.

From Formosa, unfortunately, only five skins were at my disposal, their wings measure 53, 53 (type of *harterti* Hach.), 55, 56, 58 mm. Obviously the slight difference in size, even if it would be confirmed by large series, is insufficient to hold up a separate race for Formosa (S. E. China, wing 54-60 mm; Formosa, wing 53-58 mm). There is no difference in coloration between birds from Formosa and continental specimens.

The name *sinensis* as published by Swinhoe (1861): "It will not do to call the other bird *Z. sinensis*, as it is only a Southern-Chinese form, being generally resident in the places where it is found. Let it stand, then, as *Z. simplex*", has no status in zoological nomenclature (cf. Copenhagen Decisions on Zoological Nomenclature, 1953, p. 63, § 114 sub 1). Therefore Riley (1938) was wrong when he replaced *simplex* by *sinensis*, basing this change on the argument of line priority, and only through his description has the name *sinensis* been made available for zoological nomenclature.

Deignan (1945) rejected Swinhoe's (1861) description as a nomen nudum, but there is no reason to do so as differential characters between "*Zosterops japonicus*" (= *Z. erythropleura*), and *Z. simplex* were given at the place mentioned.

10. **Zosterops japonica hainana** Hartert

Z[osterops] palp[ebrosa] hainana Hartert, Vögel paläarkt. Fauna, Nachtrag I, 1923 (Sept.), p. 33 — No Tai, Hainan.

Zosterops simplex; Swinhoe, Ibis N. S. 6, 1870, p. 348 (all parts of Hainan).

Zosterops palpebrosa; Ogilvie-Grant, Proc. Zool. Soc. London, 1900, p. 469 (Hainan).

Zosterops palpebrosa harterti; (pt.) Hachisuka, Bull. B. O. C. 47, 1926, p. 56 (Hainan).

Zosterops palpebrosa hainana; Momiyama, Trans. Nat. Hist. Soc. Formosa 17, 1927, p. 304; Snouckaert, Alauda (2) 3, 1931, p. 17; Gee, Peking Nat. Hist. Bull. 5, (3), 1931, p. 66.

Zosterops japonica hainana; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 208; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops simplex hainanus; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterops simplex hainana; Momiyama, Annot. Orn. Or. 2, 1933, p. 63.

Zosterops palpebrosa hainanus; Hachisuka, Contrib. Birds Hainan, 1939, p. 98.

Subspecific characters. Similar to *simplex*, but mantle and especially head slightly more yellowish; moreover definitely smaller.

Unfeathered parts. Iris light brown; bill black, base of lower mandible pale blue; feet greyish green (Ogilvie-Grant, 1900, ex J. Whitehead).

Measurements of 7 specimens (5 ♂, 2 ♀): wing 51-55 (52.64), tail 31-36 (34.00), tarsus 15-15¾ (15.54), entire culmen 12¾-13½ (13.00), exposed culmen 9¼-10¼ (9.79), culmen from anterior point of nostril 7-7¼ (7.14).

A fuller discussion of the characters of this form is given below.

Distribution. Confined to Hainan, where it has been collected in the Five Finger Mountains (Whitehead), No Tai (type locality), Secha and Liudon (Katsumata).

According to Hartert (1923) specimens from northern Hainan (Hoihau and Kiungtschau) are larger and agree with *simplex*. Not having seen material from this part of the island, I am not able to give a personal opinion on the matter, but I take the opportunity to point out that in the season of migration individuals of *simplex* are to be expected in all parts of Hainan.

First collector. Probably Swinhoe (1870), in the spring of 1868, as he states to have procured "several examples, which do not differ from the South-China bird". I have not seen any of Swinhoe's specimens, and there is a possibility that they all belong to *simplex*, in which case the honour of the discovery would go to John Whitehead.

Not figured.

Type. AMNH nr. 699896.

Moult. Specimens collected in March (1) and April (6) are not in moult.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Of the seven specimens examined, the six taken by Katsumata (which presumably agree with the type of the form) are all uniform, being only very slightly yellower than typical *simplex*, and having black loral lines. The loral lines may show slightly darker than they really are because the lores are somewhat sticky.

The single specimen collected by Whitehead, however, is much yellower above than any other specimen, being strikingly more yellow, especially on the head, and approaching *palpebrosa* in this character. Moreover the lores are not at all blackish, but pale dusky, with some whitish above the lores. It has a yellow median line over the under parts. As a matter of fact I fail to find characters that would differentiate this specimen from *meyeni*.

Obviously the status of the form *hainana* needs reconsideration; it may be that the specimen from the Five Finger Mountains represents the end of a geographical gradient present in Hainan, which runs from typical *simplex* (green, large size) in the north, over intermediates (slightly more yellow, small size, black lores) in No Tai, Secha, and Liudon, to the Five Finger Mountains (small, very yellow, pale lores). Without additional material it will be impossible to verify this hypothesis, nor is it possible, on the base of the scanty evidence available, to judge if this yellow extreme should be united with *meyeni*, or shows enough points of difference from that race to maintain the name *hainana* for it. If the suppositions expressed above prove to be correct, it would seem that the name *hainana* is based on more or less intermediate specimens.

11. **Zosterops japonica batanis** McGregor

Zosterops batanis McGregor, Phil. Journ. Sc. 2, sect. A, 1907 (Oct.), p. 434 — Batan Island, Batanes, P. I.

Zosterops palpebrosa kikutii Momiyama, Trans. Nat. Hist. Soc. Formosa 17, 1927 (Oct.), p. 304 — Botel Tobago.

Zosterops batanis; McGregor, Phil. Journ. Sc. 2, sect. A, 1907 (Oct.), p. 349 (Y'Ami); McGregor, Manual Phil. Birds, 1910, p. 616; McGregor, Phil. Journ. Sc. 16, 1920, p. 427; McGregor in Dickerson, Distrib. Life Phil., 1928, p. 211 (Batan); Kano, Bull. Biogeogr. Soc. Japan 2, 1932, p. 241, 242 (Kôtôsho: very abundant, forest region).

Zosterops palpebrosa batanis; Kuroda, Dobuts. Zasshi 28, 1916, p. 265, 268 (Kôtôsyo); Oshima & Kuroda, Dobuts. Zasshi 28, 1916, p. 299 (Kôtôsyo); Oshima, Journ. Nat. Hist. Soc. Taiwan (= Trans. Nat. Hist. Soc. Formosa) 6, 1916, p. 162; *Kuroda, Taiwantô no Tyôkai, 1916, p. 40 (Kôtôsyo); *Kikuti, Taiwantô no Tyôkai, 1916, p. 66 (Kôtôsyo); Kuroda, Annot. Zool. Jap. 9, 1917, p. 294 (Botel Tobago = Kōtōshō); Kuroda & Horikawa, Trans. Nat. Hist. Soc. Formosa 11, suppl., 1921, p. 14; *Uchida et al., Hand List Jap. Birds, 1922, p. 170; Momiyama, Trans. Nat. Hist. Soc. Formosa 17, 1927, p. 305, 306; Horikawa, Trans. Nat. Hist. Soc. Formosa 19, 1929, p. 461; Snouckaert, Alauda (2) 3, 1931, p. 17; Horikawa, Trans. Nat. Hist. Soc. Formosa 22, 1931, p. 252; Hachisuka et al., Hand-List Jap. Birds, rev., 1932, p. 29 (Botel Tobago, Kashôtô); Taka-Tsukasa & Kano, Tori 8, 1934, p. 196, 215 (Kotosho: Iratai, Mt. Amisan, Hasshabi); Yamashina, Tori 9, 1937, p. 387; Okada, Cat. Vert. Japan, 1938, p. 37 (Kotosyo (Botel Tobago), Kasyoto); Hachisuka, Tori 11, 1942, p. 333; Hachisuka et al., Hand-List Jap. Birds, 3rd ed., 1942, p. 33 (Botel Tobago, Kashôtô); Hachisuka & Udagawa, Quart. Journ. Taiwan Mus. 4, 1951, p. 22 (Botel Tobago, nidification); Dien, Quart. Journ. Taiwan Mus. 8, 1955, p. 69 (Botel Tobago).

Zosterops meyeni batanis; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Annot. Orn. Or. 2, 1933, p. 63, 113 (Batan).

Zosterops loochooensis kikutii; Momiyama, Amoeba 2, (1), 1930, p. 25 (Botel Tobago); Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172; Momiyama, Annot. Orn. Or. 2, suppl., 1930, p. 172 (reprint of preceding); *Kano, Amoeba 2, (2), 1931, p. 21.

Zosterops loochooensis batanis; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172.

Zosterops japonica kikutii; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 208.

Zosterops japonica batanis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 208; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Delacour & Mayr, Birds Philippines, 1946, p. 236; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops meyeni kikutii; Momiyama, Bull. Biogeogr. Soc. Japan 2, 1932, p. 263, 340 (Botel Tobago: Imourod); Momiyama, Annot. Orn. Or. 2, 1933, p. 13, 63.

Zosterops palpebrosa kikutii = *Zosterops palpebrosa batanis*; Kuroda, Nov. Zool. 37, 1932, p. 389.

Zosterops simplex batanis; Taka-Tsukasa & Kano, Tori 10, 1938, p. 105 (Botel Tobago).

Zosterops joponica batanis; Manuel, Phil. Journ. Sc. 85, (1956), 1957, p. 320 (Batan Is.).

Subspecific characters. Nearest to *meyeni*, but differs from that form by its distinctly larger size (in all dimensions), and in having even more yellow on its forehead. Like *meyeni* it differs from *loochooensis* and *simplex* in being brighter above, more yellowish green, and in the extent of yellow on the forehead, which is much more limited in extension in *simplex*, and hardly, if at all, present in *loochooensis*. A rather faint yellow longitudinal streak over the centre of the under parts is present.

Unfeathered parts. Iris light brown or pale brown; upper mandible black, lower mandible lead-blue; legs lead-blue (McGregor, 1919).

Measurements of three specimens (2 ♂, 1 ♀): wing 55-60 (56.67), tail 35-36½ (36.00), tarsus 17¼-18 (17.58), entire culmen 13-15 (14.17), exposed culmen 10½-11¼ (10.92), culmen from anterior point of nostril 7¾-8½ (8.17).

Distribution. Batan Islands between Luzon and Formosa, where probably occurring on all the islands, though hitherto only recorded from Batan Island and tiny Y'Ami; Botel Tobago, and Kashôtô.

First collector. Either Mearns in May, 1907, or McGregor in 1907, on Batan Island.

Not figured.

Type. Was in the Bureau of Science in Manila, destroyed in 1945. Manuel (1957) proposed as neotype the specimen Phil. Nat. Mus. nr. 0-1793. As the identity of *batanis* has never been in doubt, the necessity of designating a neotype is problematic. See also the discussion on the same topic on p. 152.

Moult. Two specimens collected in May are not in moult; they are in abraded plumage.

Nidification. McGregor (1910) describes a nest containing four fresh eggs, found on Batan Island on 1 June 1907, and two nests containing young birds, found on the 5th of June. The eggs were pale blue.

On Botel Tobago they breed from April to June, and three to five eggs is the usual number (Hachisuka & Udagawa, 1951).

Habits, etc. On Botel Tobago and on Koshôtô, the form prefers open woodland.

Discussion. I have not examined specimens from Botel Tobago and Kashôtô, and follow Kuroda (1932) in considering them identical with *batanis*.

12. **Zosterops japonica meyeni** Bonaparte

Zosterops meyeni Bonaparte, Consp. Gen. Av. I, 1850, p. 398 — nomen novum for *Dicaeum flavum* Kittlitz, nec *Dicaeum flavum* Horsfield [1]).

D[icaeum] flavum Kittlitz, Kupfert. Naturg. Vögel, 1833, p. 15, pl. 19 fig. 2 — Luzon.

Sylvia flava Meyen, Acta Ac. Caes.-Leop. Nat. Cur. 16, suppl., 1834, p. 79 — Manila.

Dicaeum flavum; Kittlitz, Mém. Ac. Imp. Sc. Saint-Pétersbourg 2, 1835, p. 3, pl. 3 (Luzon...an den Ufern des Flusses Passik).

Z. .....; G. R. Gray, Gen. Birds I, 1848, p. 198.

Zosterops Meyeni; Reichenbach, Handb. spec. Orn. Text, Meropinae, 1852, p. 91, pl 461 fig. 3295 (Manilla); Hartlaub, Journ. f. Orn. 13, 1865, p. 16; von Mertens, Journ. f. Orn. 14, 1866, p. 14 (häufig um Manila); G. R. Grey, Hand-List Birds 1, 1869, p. 162 (Luzon); Giebel, Thes. Orn. III, 1877, p. 776.

Zosterops flava; Lichtenstein, Nomencl. Av. Mus. Berol., 1854, p. 33 (Manila).

Zosterops meyeni; Walden, Trans. Zool. Soc. London 9, 1875, p. 199 (Luzon); Sharpe, Trans. Linn. Soc. London, Zool. (2) 1, 1877, p. 352 (Luzon); Tristram, Cat. Coll. Birds, 1889, p. 211 (Manilla); Hartert, Kat. Vogelsamml. Mus. Senckenb., 1891, p. 31 (Luzon); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 165 (Luzon, Manila, Cagáyan, Alcalá); Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560 (Luzon); Worcester, Proc. U. S. Nat. Mus. 20, 1898, p. 588 (Luzon); Finsch, Tierreich 15, 1901, p. 22; Dubois, Syn. Av. I, 1902, p. 708; McGregor, Bull. Phil. Mus. 3, 1904, p. 4, 14, 15, 16 (Lubang, Verde, Irisan); McGregor, Bull. Phil. Mus. 4, 1904, p. 6, 26 (Calayan); *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Mc Gregor, Phil. Journ. Sc. 2, sect. A, 1907, p. 343; Mearns, Proc. U. S. Nat. Mus. 36, 1909, p. 473 (Taal Volcano, Luzon); Sharpe, Hand-List Birds 5, 1909, p. 7; McGregor, Manual Phil. Birds, 1910, p. 615; McGregor, Phil. Journ. Sc. 16, 1920, p. 408, 427.

Zosterops meyeni meyeni; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 204; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 172; Momiyama, Annot. Orn. Or. 2, 1933, p. 63.

Zosterops japonica meyeni; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 208; Hartert & Steinbacher, Vögel paläarkt. Fauna, Ergänzungsb., 1933, p. 153; Peters, Bull. M. C. Z. 86, 1939, p. 118 (Luzon: Baguio); Delacour & Mayr, Birds Philippines, 1946, p. 236; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops mayeni; Wolfe, Auk 55, 1938, p. 222 (Ft. McKinley, Rizal Prov., P. I.).

Subspecific characters. Differs from all other forms, with the exception of *hainana*, by its smaller size. Differential characters from *batanis* are

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1) Bonaparte evidently makes a mistake when he writes: "*Dicaeum flavum*? Meyen (*Zosterops meyeni*, Bp.) Kittl. Kupf. Vög. t. 19. 2. ex Ins. Philipp.", for it is either *Dicaeum flavum* Kittlitz, or *Sylvia flava* Meyen.

given under that form. The yellow forehead and the yellowish upper surface suffice to distinguish this bright subspecies from all other forms with the exception of some specimens of *hainana* as has been fully explained in the discussion of that form.

Unfeathered parts. Iris golden brown, or yellowish brown, or brownish white; bill black, bluish on tomia, or maxilla black, mandible bluish horn, tomia pale, or bill horn brown, bluish at base; feet slaty, or slaty brown, or slaty blue (J. T. Zimmer).

Measurements of 13 specimens (8 ♂, 5 ♀): wing 52-56 (53.81), tail 32-38 (33.92), tarsus 15-17 (15.79), entire culmen 12½-14 (13.10), exposed culmen 9-11 (10.21), culmen from anterior point of nostril 7-8 (7.31).

Distribution: Confined to Luzon and a few neighbouring islets: Banton, Calayan, Lubang, Verde. I have seen specimens from Luzon only, from the following localities: Taal Volcano, Bagambang, Quisad, Lueban (Tayabas Province), Tiaong (Tayabas), Antipolo (Rizal), Manila, Calauan.

First collector. F. J. von Kittlitz in January 1829, near Manila. The expedition of the "Prinzess Louise", during which Meyen obtained his specimens, lasted from 1830 to 1832, and was therefore slightly later (cf. Ruhland in Korschelt et al., 1912); I mention this fact as Meyen's visit to Luzon is, curiously, not recorded by Hachisuka (1931), and the year of his stay is not given in any ornithological publication I have seen.

Moult. Specimens collected in July (1), August (1), and December (1), are not in moult. The August specimen is in strongly abraded plumage.

Nidification. Wolfe (1938) found two nests, containing three eggs each, in April 1928, in Central Luzon. The nests, as he describes them, are typical. As regards the eggs, he writes that they are pale sky blue with shells that show a slight amount of gloss. He also gives measurements, an average of 15.0 × 12.1 mm for six eggs.

Habits, etc. Interesting notes were already given by Kittlitz (1835) and Meyen (1834). According to these authors, the birds frequent bamboo thickets and other places near open country.

Voice. According to Wolfe (1938), the male is an excellent songster that, during the breeding season, sings frequently in the vicinity of the nest.

Species 5. **Zosterops salvadorii** Meyer & Wiglesworth

Z[osterops] salvadorii Meyer & Wiglesworth, Journ. f. Orn. 42, 1894, p. 115 — nomen novum for *Zosterops incerta* Salvadori, nec *Zosterops incerta* Meyer, 1884.

Zosterops incerta Salvadori, Ann. Mus. Civ. Genova 32, 1892, p. 133 — Engano: Kifa-juc, Bua Bua.

Zosterops incerta; Modigliani, L'Isola delle Donne, 1894, p. 88; Modigliani, Viaggio in Malesia, Rias. Gen. Ris. Zool., 1909, p. 17 (Engano).

Zosterops salvadorii; Finsch, Tierreich 15, 1901, p. 18; Dubois, Syn. Av. I, 1902, p. 707; Sharpe, Hand-List Birds 5, 1909, p. 4; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 252; Stresemann, Journ. f. Orn. 87, 1939, p. 164.

Zosterops palpebrosa salvadorii; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 210; Chasen, Bull. Raffl. Mus. 11, 1935, p. 264; de Jong, Nat. Tijdschr. Ned. Ind. 98, 1938, p. 36; Hoogerwerf, Nat. Tijdschr. Ned. Ind. 98, 1938, p. 45; Delacour, Birds Malaysia, 1947, p. 319.

Zosterops palpebrosa; Rensch, Gesch. des Sundabogens, 1936, p. 71 (Engano).

Zosterops aureiventer salvadorii; Junge, Treubia 16, 1938, p. 333; Ripley, Bull. M. C. Z. 94, 1944, p. 414.

Zosterops palpebrosa salvadori; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Characters. An average sized species of the ordinary *Zosterops*-pattern. For an enumeration of characters that serve to distinguish it from neighbouring species, see the discussion.

Upper parts, including rump, forehead, supra loral region, Warbler Green, with a slight approach to Yellowish Citrine; eye-ring fairly wide, white, interrupted in front by a blackish spot; wide lores and streak continued backwards under and to behind the eye, dark grey to black; primaries and rectrices blackish brown, the primaries edged with the colour of the upper parts, as usual; the rectrices very narrowly margined with the same colour.

Under parts. Throat, upper breast, and under tail coverts Lemon Yellow, an indistinct streak of the same colour over the centre of the belly; remainder of under parts pale grey, almost white on the belly, darker on the flanks (basal parts of the feathers, as usual in the genus, much darker grey than the outer edges, hence in badly skinned specimens the under parts show much darker grey).

Unfeathered parts. Iris yellowish brown; bill black; legs bluish (Saän); iris reddish brown; feet leaden (Ripley, 1944).

Measurements of 9 specimens (7 ♂, 2 ♀): wing 57-59 (57.72), tail 36-38 (37.33), tarsus 16¼-17½ (16.78), entire culmen 14-15¼ (14.42), exposed culmen 10½-12½ (11.56), culmen from anterior point of nostril 8-9¼ (8.64).

Structure. Wing formula normal, 2nd primary in length between 6th and 8th; average tail index of the 9 above-mentioned specimens, 64.68 %.

Distribution. Confined to Engano Island and tiny Pulu Dua very close to it. It is common.

First collector. Elio Modigliani in March, 1891.

Not figured.

Type. The cotypes are in Genova; one cotype is preserved as "the type" in the BM.

Moult. A male from 13 June shows the last traces of primary moult, the 2nd primary on the left side being some 10 mm too short and having a sheath

round its base; a female from 3 June shows strong moult in the tail. Three other specimens collected in June and July are not in moult.

Nidification. Unknown.

Habits, etc. Very little has been recorded concerning this interesting species, which seems to be plentiful, for de Jong (1938) writes: "... in de kruinen der cocospalmen de tallooze brilvogeltjes...".

Discussion. This species has been associated with *Z. palpebrosa* by Stresemann (1931) and several subsequent authors, whereas Junge (1938) and Ripley (1944) placed it with "*aureiventer*" (= *Z. everetti tahanensis* in this revision). Stresemann originally had not seen specimens, but as he much emphasised the presence or the absence of a yellow supra loral stripe as a distinguishing character between *Z. palpebrosa* and *Z. "aureiventer"*, and as *Z. salvadorii* does not have yellow above the lores, Junge was quite justified in placing it with "*aureiventer*". In 1939 Stresemann had obtained material of the species, and concluded that it had to be considered a separate species, a conclusion with which I fully agree.

As the recorded occurrence of *tahanensis* (*aureiventer* auct.) in Sumatra is erroneous (the specimen recorded by Stresemann, 1931, was examined by me, and turned out to be *Z. palpebrosa buxtoni*), it seems, for purely geographical reasons, most unlikely that *Z. salvadorii* has any close connection with that species. Nevertheless one is inclined to regard Sumatra as its place of origin; the only species coming into consideration in this way being *Z. montana* and *Z. atricapilla*. From all these species it differs in such an array of characters that a close relationship is unlikely. It is larger than *palpebrosa buxtoni*, with a longer, green-edged tail (greenish edges are absent in *buxtoni*), and without yellow above the lores; it differs from *atricapilla* by lacking black on the forehead, by a longer bill, by a different hue of the back; from *montana* in lacking yellow on the forehead, by its longer bill, and the greener, duller upper parts.

I have also compared it with *natalis* and *lutea*, but these species are even more remote.

Species 6. **Zosterops atricapilla** Salvadori

Characters. A fairly small to average-sized species, characterized by its rather dark green mantle, black forehead, and comparatively dark grey under parts with a broad yellow median line. The only species west of Celebes with a black forehead.

Upper parts. Mantle Warbler Green with a definite inclination to Dark Citrine; rump much yellower, Pyrite Yellow; forehead, anterior half of crown, lores, sides of throat, and all round the eye-ring black; eye-ring of

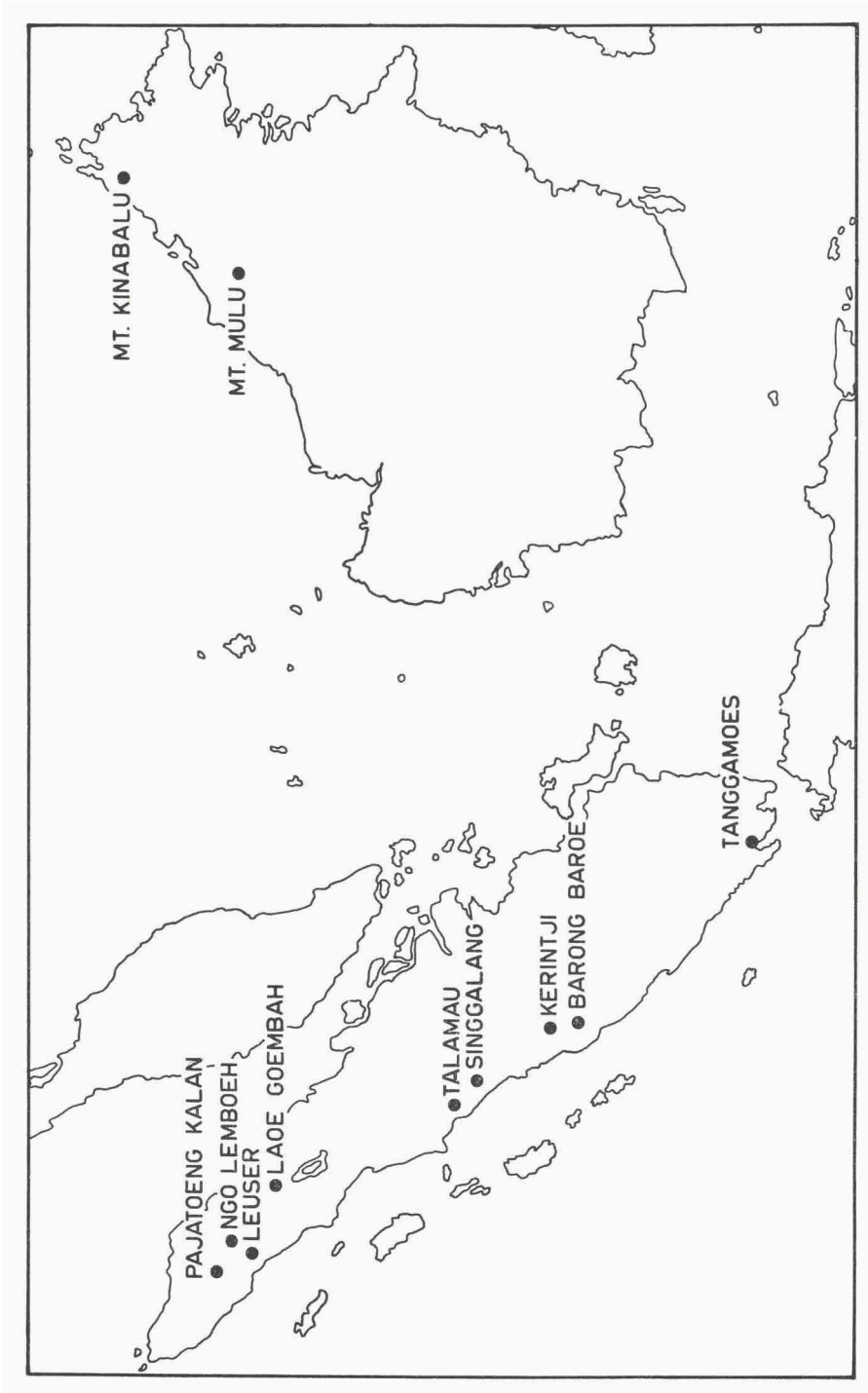

Fig. 7. The distribution of *Zosterops atricapilla*; the four localities in northern Sumatra refer to the race *viridicata*, all other localities to the nominate race.

average width, white, interrupted in front by a black spot; primaries, secondaries, and rectrices blackish brown; primaries and secondaries edged with a colour between Pyrite Yellow and Warbler Green, rather brighter than the mantle; rectrices narrowly and rather inconspicuously edged with the same colour, sometimes these edges almost obsolete.

Under parts. Chin Lemon Chrome, throat more greenish yellow; under tail coverts and a broad streak up to the lower breast (not continuous with the yellow of the throat) Lemon Chrome; remainder of under parts, including breast and flanks, a rather dark grey.

Unfeathered parts. Iris brown, yellow-brown, or orange; bill black, base of mandible grey; legs grey.

Structurally this species agrees with most species of the genus in having a 2nd primary that is in length between the 6th and the 8th; the tail index is about 62-63 %.

Distribution (fig. 7). Mountains of Sumatra above 1000 m; Mt. Kinabalu and Mt. Mulu in Borneo.

Apparently a forest inhabiting species, not found in cultivated country, but also absent from the barren mountain tops, though the evidence in this respect is somewhat controversial, as explained in the discussion of the races.

Geographical variation. Slight. The isolated population from Mt. Kinabalu in Borneo measures somewhat smaller than the Sumatran populations. In Atjeh there is a distinct, though slight race, the characters of which are indicated in its description.

Related species. This species was united with *Z. everetti tahanensis* by Stresemann (1939); recently I have given my reasons for not following him (Mees, 1954).

On the other hand, I was forced to admit that: "The similarity of the species *Z. atricapilla* and the races *basilanica* and *tahanensis* of the species *Z. everetti*, indicates that *atricapilla* may also have originated in the Philippines in an earlier period". Though this supposed affinity remains hypothetical, I am still inclined to consider *Z. everetti* the closest relative of *Z. atricapilla*.

1. **Zosterops atricapilla atricapilla** Salvadori

Zosterops atricapilla Salvadori, Ann. Mus. Civ. Genova 14, 1879, p. 215 — M. Singalan, Sumatra.

Zosterops clara Sharpe, Ibis (5) 6, 1888, p. 479 — Mt. Kina Balu, Borneo.

Zosterops atricapilla; Reichenow & Schalow, Journ. f. Orn. 27, 1879, p. 317; Bock, Unter den Kannibalen auf Borneo, 1882, p. 389 (Hochländer der Westküste von Sumatra); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 176; Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1890, p. 401; Meyer & Wiglesworth, Birds Celebes, 1898, p. 488; Finsch,

Tierreich 15, 1901, p. 35 (Sumatra, Borneo); Dubois, Syn. Av. I, 1902, p. 710; Sharpe, Hand-List Birds 5, 1909, p. 14; van Balen, Dierenw. Insulinde II, 1915, p. 483; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 250, 258 (Korinchi Peak 7300 ft., Barong Bharu, Barisan Range, 4000 ft.); Hartert, Nov. Zool. 27, 1920, p. 435; Robinson & Kloss, Journ. F. M. S. Mus. 18, add., 1923, p. 354; Robinson & Kloss, Journ. F. M. S. Mus. 11, 1924, p. 339 (Mt. Talamau, Ophir Districts, 2200 m; Sarasah, Mt. Talamau, Ophir Districts 1850 m); (pt.) Kloss, Treubia 13, 1931, p. 370 (Kinabalu); Banks, Sarawak Mus. Journ. 4, 1935, p. 340 (Mt. Mulu 4500 ft.); Chasen, Bull. Raffl. Mus. 11, 1935, p. 265; Banks, Sarawak Mus. Journ. 4, 1937, p. 487; Lack, Ibis 86, 1944, p. 277 (North Borneo).

Zosterops clara; Everett, J. Straits Br. R. As. Soc. 20, 1889, p. 141; Sharpe, Ibis (6) 1, 1889, p. 427 (Mt. Kina Balu); Sharpe, Ibis (6) 2, 1890, p. 286, 287, 291, pl. 8 fig. 3 (Mt. Kina Balu); Wallace, Island Life, 2nd ed., 1892, p. 379 (Borneo); Whitehead, Expl. Kina Balu, 1893, p. 54, 179, 234; Sharpe in Whitehead, Expl. Kina Balu, 1893, p. 234; Meyer & Wiglesworth, Birds Celebes, 1898, p. 488; W. Blasius, Journ. f. Orn. 49, 1901, p. 69 (Kina-Balu); Sharpe, Hand-List Birds 5, 1909, p. 14; Moulton, Ninth Rep. Sarawak Mus. 1910, 1911, p. 41; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 250; Robinson & Kloss, J. Straits Br. R. As. Soc. 80, 1919, p. 133 (Kinabalu).

Zosterops atrifrons clara; Moulton, J. Straits Br. R. As. Soc. 67, 1914, p. 171.

Zosterops atricapilla atricapilla; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 212; Stresemann, Journ. f. Orn. 87, 1939, p. 160; Delacour, Birds Malaysia, 1947, p. 320; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Mees, Sarawak Mus. Journ. 6, 1954, p. 142.

Zosterops atricapilla clara; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 212; de Schauensee & Ripley, Proc. Ac. Nat. Sc. Philad. 91, 1940, p. 361; Peters, Bull. M. C. Z. 87, 1940, p. 207 (Mt. Kinabalu 4750 and 5500 ft.).

Zosterops atricapillus; Banks, Twenty-fifth Ann. Rep. Sarawak Mus. 1934, 1935, p. 4, 14 (Mt. Mulu).

Subspecific characters. As those of the species.

Unfeathered parts. Eyes yellowish brown; bill, maxilla brownish black or horny black, mandible grey with a black tip; legs grey or leaden grey (Talamau, Jacobson); in a fledgling from the same locality it was, eyes greyish brown, bill pinkish grey, legs grey (Jacobson); iris yellowish white or dirty white, bill dark horn or dark grey, feet grey or bluish grey (Waterstradt: Kinabalu).

A fledgling is similar to the adult birds, but rather duller, more Dark Citrine, above. It has the black of the forehead somewhat reduced, not extending over the anterior part of the crown, nevertheless definitely present on the forehead. Plumage fluffy, tail very short, bill short and weak, yellow of under parts much paler and more diffuse than in adults, Citrine Yellow.

Measurements of 6 specimens (4 ♂, 2 ♀) from Sumatra: wing 56½-59 (57.68), tail 34½-38½ (36.00), tarsus 15-17 (15.79), entire culmen 12½-13¾ (13.15), exposed culmen 9-11 (10.21), culmen from anterior point of nostril 6-7¾ (7.10).

Measurements of 18 specimens (9 ♂, 7 ♀, 2 ○) from Mt. Kinabalu: wing 53-57½ (54.83), tail 31-37 (34.14), tarsus 14-17 (15.58), entire culmen

12-14 (13.47), exposed culmen 9¼-11½ (10.53), culmen from anterior point of nostril 6½-9 (7.79).

Distribution. Central and South Sumatra, where it has been recorded from the following localities: Goenoeng Talamau, Ophir Districts; Korintji Peak; Barong Baroe, Barisan Range; Gng. Tanggamoes, S. Sumatra (specimens examined); Mt. Singgalan (type locality); and Borneo, where it occurs on Mt. Kinabalu, and is known from a single specimen from Mt. Mulu.

First collector. O. Beccari on 20 June, 1878, on Mt. Singgalan, Padang Highlands.

Figure. Sharpe (1890), plate 8 fig. 3 (coloured, natural size, by Keulemans).

Type. The description of the species was based on three specimens, of which one came in the collection of Tristram (cf. Tristram, 1889) and is probably destroyed now, whereas the other two probably remain in Genova (not checked).

Moult. A male from Mt. Tanggamoes, collected on 2 January 1935, is moulting heavily; one specimen collected in January, and another collected in March on Mt. Kinabalu, are moulting primaries and rectrices; specimens collected in April and June in Sumatra and Borneo are not in moult, several specimens from the last mentioned month are already in a somewhat abraded plumage. It seems justified to conclude that the main moult takes place in the period from about December to March.

Nidification. Whitehead (1893) records the finding of a nest, apparently containing two young, on Mt. Kinabalu at an elevation of 5000 ft., probably in early March, 1892, so that eggs must have been laid in February. The nest was found in dense jungle. Jacobson collected a fledgling, together with the attending adult female, on 12 June 1917 at Air Sarasah, G. Talamau; two other birds which I take to be juvenile, though older than the forementioned specimen, were taken in April and July respectively on Mt. Kinabalu.

Habits, etc. As far as known, this form seems to be partial to true forest (Robinson & Kloss, 1918), though Jacobson (in Robinson & Kloss, 1924) found it especially numerous in the areas where the jungle is thinning out and merging into alpine bush. The specimens collected by Dr. Lieftinck on and near the summit of Mt. Tanggamoes were taken in forest that covers the summit of this mountain (oral communication). The vertical range, as far as can be deduced from notes on the labels of collected specimens, is from 1000 to 2200 m. Of course its vertical range may be greater.

Discussion. In a former publication (Mees, 1954) I stated, on the base of information supplied to me by Mr. Harrisson, that the specimen from Mt. Mulu recorded by Bangs (1935) under the name of *Zosterops atricapilla*

in reality is a *tahanensis*, but recently Mr. Smythies (oral communication) informed me that he has carefully re-examined the critical specimen, and that it does have a black forehead, and therefore undoubtedly belongs to *atricapilla*. The fact that *Z. atricapilla* exists in Borneo not only on Mt. Kinabalu but also on Mt. Mulu, rather strengthens than weakens my argument for considering *tahanensis* and *atricapilla* different species.

The population from Mt. Kinabalu has intermittently been accepted and rejected as a separate form by various authors. Recently I gave my opinion in this matter (Mees, 1954), and showed that, though there exists a difference in average size between Sumatran and Bornean birds, there is no justification in nomenclatorially separating the latter.

2. **Zosterops atricapilla viridicata** Chasen

Zosterops atricapilla viridicata Chasen in Chasen & Hoogerwerf, Treubia 18, suppl., 1941, p. 105 — Mt. Leuser, Atjeh.

Zosterops atricapilla; Robinson & Kloss, J. Straits Br. R. As. Soc. 80, 1919, p. 133 (Laoe Goembah near Brastagi 1390 m); Kloss, Treubia 13, 1931, p. 370 (Pajatoengkalan, Pangmoh, Acheen 2000 m); Hoogerwerf in 3 Jaren Indisch Natuurleven, 1939, p. 257 (Poetjoek-Agoesan boven 2000 m).

Zosterops atricapilla atricapilla; de Schauensee & Ripley, Proc. Ac. Nat. Sc. Philad. 91, 1940, p. 361 (Löser).

Zosterops atricapilla viridicata; Delacour, Birds Malaysia, 1947, p. 320; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Mees, Sarawak Mus. Journ. 6, 1954, p. 143, 144.

Subspecific characters. Very close to the nominate race, from which, however, it can be distinguished by its slightly more greenish, less yellow throat. I doubt if the other characters hesitatingly claimed for this race by Chasen (1941) are tenable if larger series are compared.

Unfeathered parts. Iris dark orange, once brown, once orange; bill black; legs grey (Hoogerwerf).

Measurements. Wing 14 ♂, 54-59 (56.89); 12 ♀, 55-59½ (57.25); 26 specimens, 54-59½ (57.06); tail 13 ♂, 33-38 (35.88); 12 ♀, 33-39 (35.83); 25 specimens, 33-39 (35.86); tarsus 26 specimens, 14-16 (15.54); entire culmen 2 specimens, 13, 13; exposed culmen 24 specimens, 9, 10-12 (10.93); culmen from anterior point of nostril 24 specimens, 6, 7-8¾ (7.90).

Weights 8½-11 g (de Schauensee & Ripley, 1940).

Distribution. Confined to northern Sumatra, where it is known from Pajatoengkalan, Pangmoh, 2000 m; Blangbeké 7000 ft., Blangbeké Dua 7500 ft., Gajoe Loëss, and other localities on and near the Leuser Mountains; Ngo Lemboeh 500-750 m; Laoe Goembah near Brastagi 1390 m.

The specimens from Ngo Lemboeh are of interest as I am not aware that the species elsewhere has ever been taken at less than about 1000 m altitude. The paper of Chasen & Hoogerwerf (1941) shows that no exact altitudes

were noted at Ngo Lemboeh, and perhaps it is justified to consider even the higher figure (750 m) an underestimate. I am therefore not inclined to consider it likely that the form normally inhabits country below 1000 m. As regards its upper limits, Hoogerwerf (in Chasen & Hoogerwerf, 1941) observed it up to about 3000 m; he suggested that it might even occur on the barren summits, but this presumption seems to need confirmation, as the species is generally believed to be an inhabitant of forest.

First collector. A. F. C. A. van Heyst on 30 June 1918 near Brastagi.

Not figured.

Type. RMNH nr. 14062 (type examined).

Moult. One specimen collected in February (type) is not in moult; one specimen collected in June near Brastagi is not in moult; a second specimen from the same date and locality is moulting both primaries and rectrices. Other specimens not checked.

Nidification. Not recorded.

Habits, etc. Some notes on this bird's habitat have already been given under the heading distribution. The notes given by Ripley and Hoogerwerf suggest that in habits this form agrees with other Zosteropidae. It is remarkable that both Hoogerwerf and Ripley found this form common high up in the alpine meadows in rather open country, a habitat apparently not occupied by this species in the Padang Highlands, where it is more restricted to the forest. I wonder if the apparent absence of *Zosterops montana* from Atjeh makes the open mountain tops more accessible to the present species; evidently much more must be known about the exact vertical range and the habitat preference of the species, both in Atjeh and in the remainder of Sumatra, before such a question could be answered with any degree of certainty.

Voice. According to de Schauensee & Ripley (1940), a loud, twinkling series of calls, hard to separate from those of *Carduelis estherae* (Finsch), are made.

Discussion. The two specimens from Brastagi, reported upon by Robinson & Kloss, are not in a particularly good condition, and one has the throat much greener and paler than the other. Nevertheless, after comparison of these skins with specimens from Atjeh and from Central Sumatra and Borneo, I consider it justified to place them with the present race. The geographical position of Brastagi, of course, supports this view. As it seems not generally known where the collection worked out by Robinson & Kloss (1919) is now (cf. Gibson-Hill, 1949), it may be useful to draw attention to the fact that it went to the Tring Museum, and from there to the AMNH. Van Heyst's later collections are in Amsterdam.

Species 7. **Zosterops everetti** Tweeddale

Characters. A very small to fairly large species, size differing according to race, of the ordinary *Zosterops*-pattern, characterized by its definitely grey, though sometimes rather pale grey, but never whitish, flanks, and by a distinct and often broad yellow longitudinal streak over the centre of the under parts.

Upper parts. Mantle in the darker races about Warbler Green, in the brighter races definitely more yellowish, though never as bright as Pyrite Yellow; rump hardly brighter than remainder of upper parts; forehead and supra loral region either of the same colour as the mantle, or more or less extensively yellow; lores, according to race, blackish, dusky, or pale yellow; eye-ring white, of average width (perhaps little developed in *babelo*), in some races entire, in the dark lored races interrupted in front by the usual dark spot; primaries, secondaries, and rectrices brownish black; the primaries and secondaries always margined with the colour of the mantle, the rectrices similarly edged in the Philippine races, but without or with only the faintest trace of such edges in the Malaysian races.

Under parts. Chin, throat, upper breast, and a broad mesial longitudinal streak connecting throat and crissum, yellow, varying in different races from greenish yellow to pure Lemon Chrome; remainder of under parts pure grey without any admixture of buff or brownish in fresh skins.

Unfeathered parts. Iris generally brown or yellowish brown.

Measurements are given in table III.

TABLE III

Zosterops everetti

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
everetti	3	52-54	33-35½	53.00	34.17	64.47 %
basilanica (Leyte)	2	54-57	33-37	55.50	35.00	63.06 %
basilanica (Samar)	7	52½-55	32½-36	53.36	34.43	64.52 %
basilanica (E. Mindanao & Dinagat)	8	56-58	34-38	56.94	36.06	63.34 %
basilanica (W. Mindanao)	12	52-56	32-38	54.38	35.63	65.52 %
basilanica (Basilan)	6	50-55	34½-38	52.67	35.67	67.72 %
forbesi	1	56	39	56.—	39.—	69.64 %
boholensis	29	51-58	34-40½	54.90	36.05	65.67 %
siquijorensis	18	54-57	34½-39	55.36	36.21	65.37 %
mandibularis	7	51½-54	31½-35	52.93	33.21	62.75 %
babelo	1	61	41	61.—	41.—	67.21 %
tahanensis (Borneo)	9	49-56	28-34½	50.78	30.06	59.19 %
tahanensis (Malaya)	7	50-55	27½-33	52.50	31.42	59.68 %
wetmorei	10	51-55	30-34	53.10	32.15	60.55 %

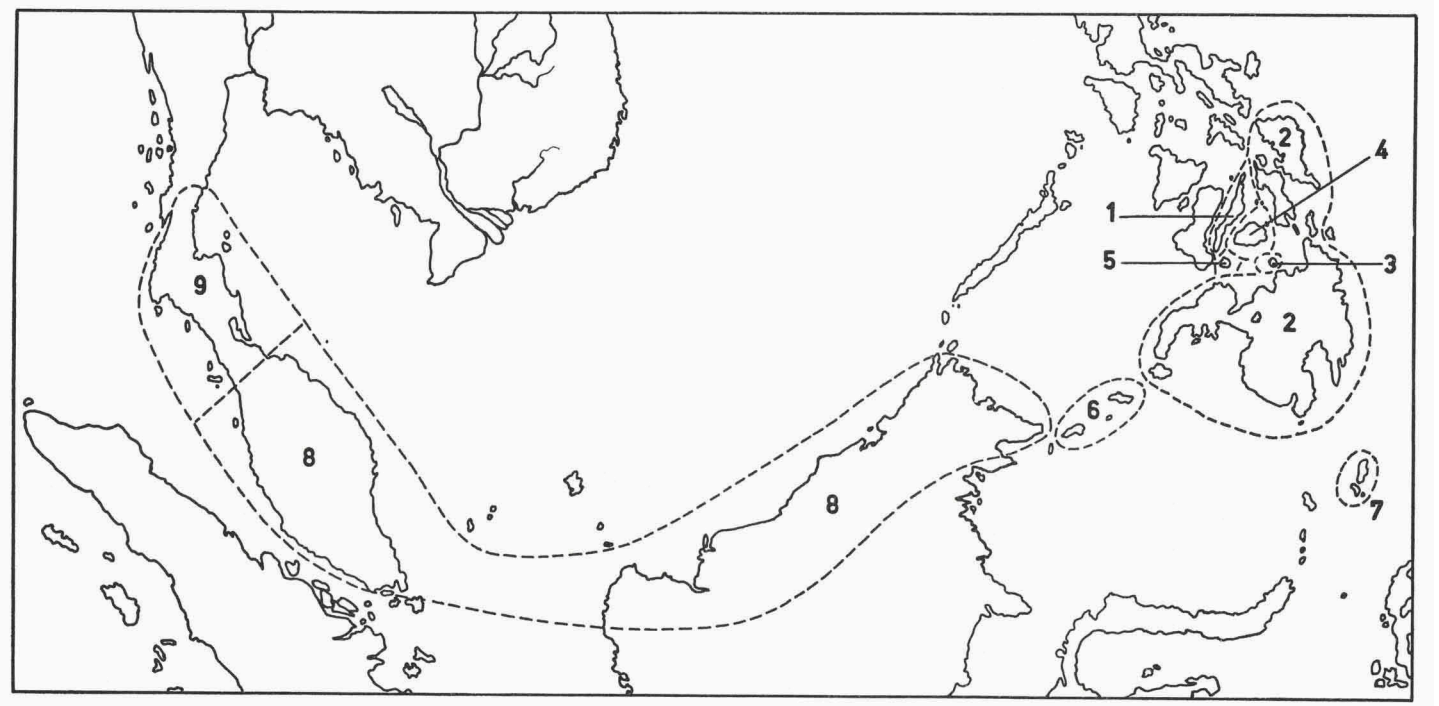

Fig. 8. The distribution of *Zosterops everetti* and races; 1, *everetti*; 2, *basilanica*; 3, *forbesi*; 4, *boholensis*; 5, *siquijorensis*; 6, *mandibularis*; 7, *babelo*; 8, *tahanensis*; 9, *wetmorei*.

Structure. Generally the 2nd primary is in length between the 7th and the 8th in all races, though in some individuals it may be between the 6th and the 7th or between the 8th and the 9th. The variation in tail : wing index is shown in table III.

Distribution (fig. 8). Southeastern Philippines, where known from Cebu, Leyte, Samar, Dinagat, Mindanao, Basilan, Camiguin, Bohol, Siquijor, and the Sulu Archipelago; Talaut Islands; British North Borneo; Sarawak; and the Malay Peninsula north at least to the Isthmus of Kra. A species from low and moderate altitudes, locally up to at least 5000 ft., and as far as information goes, more or less confined to forests, both secondary and virgin.

Geographical variation. Apart from the usual variation in size existing between various populations, which are sufficiently indicated in table III, there is variation in coloration of upper parts as follows: birds from southeastern Mindanao are dark, very greenish; over Camiguin and Bohol to Siquijor this colour gradually becomes more yellowish; the grey belly becomes, in the same direction, paler. Rather pale flanks are also found in birds of the Sulu Islands and the Talaut Islands. The subspecies from Borneo and the Malay Peninsula, however, are dark flanked again. Further variation exists in the amount of yellow over the lores, in the colour of the lores, and of the streak under the eye, inasmuch as the dark races tend to have these parts dark, the bright races yellowish; in the tail feathers, which are either edged with greenish, or without that colour; and in the relative length of the tail. There is also variation in colour of bill and legs.

Notwithstanding the considerable number of points in which variation may occur, the races are not too dissimilar from each other, and with the exception of the Malaysian races, a point that will be discussed below, there is little doubt that they form a natural species.

Related species. Under the previous species, *Z. atricapilla*, I have already indicated that that species might be derived from *Z. everetti*. The fact that *Z. everetti* and *Z. nigrorum* geographically represent each other will be discussed under the last-mentioned species. I have tried to find connections between *Z. everetti* and *Z. atrifrons*, whose ranges, through the Talaut Islands (*Z. everetti babelo*) and Sanghir (*Z. atrifrons nehrkorni*), are contiguous. This would be especially gratifying because in this way a link would be created between the black-fronted *Z. atricapilla* and the black-fronted *Z. atrifrons*, but I have come to the conclusion that the differences between *atrifrons* and the *everetti*-group are so great — the first-mentioned species has very pale under parts, without any trace of a yellow longitudinal streak — that a close relation is extremely unlikely.

1. **Zosterops everetti everetti** Tweeddale

Zosterops everetti Tweeddale, Proc. Zool. Soc. London for 1877, 1878 (March), p. 762 — Cebu.

Zosterops everetti; Nicholson, Ibis (5) 1, 1883, p. 253; (pt.) Bourns & Worcester, Occ. Pap. Minnesota Ac. 1, 1894, p. 57; Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 164; Ogilvie-Grant, Ibis (7) 2, 1896, p. 552, 553; Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560; Finsch, Tierreich 15, 1901, p. 19; Dubois, Syn. Av. I, 1902, p. 707; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 446; *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; McGregor, Phil. Journ. Sc. 2, sect. A, 1907, p. 307; Sharpe, Hand-List Birds 5, 1909, p. 5; McGregor, Manual Phil. Birds, 1910, p. 618; McGregor, Phil. Journ. Sc. 16, 1920, p. 427; Bangs, Bull. M. C. Z. 65, 1922, p. 83; McGregor in Dickerson, Distrib. Life Phil., 1928, p. 210.

Zosterops Everetti; Oustalet, Nouv. Arch. Mus. Paris (3) 5, 1893, p. 142.

Zosterops everetti everetti; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173; Momiyama, Annot. Orn. Or. 2, 1933, p. 63; Mees, Sarawak Mus. Journ. 6, 1954, p. 152.

Zosterops palpebrosa everetti; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211; Delacour & Mayr, Birds Philippines, 1946, p. 236; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. The insufficient material available of this form made it difficult to properly evaluate its characters. In general appearance it is doubtless rather close to *basilanica*, but it differs from that race by the black instead of dusky line under the eye-ring. It also differs in skins by its rather paler bill and its conspicuously pale legs. Unfortunately no colours of unfeathered parts are indicated on the labels of the specimens examined. The brownish bill brings this form close to *mandibularis*, but the latter has the subocular stripe dusky and little extended, and shows a still paler bill.

Measurements of three specimens (1 ♂, 2 ♀): wing 52-54 (53.00), tail 33-35½ (34.17), tarsus 15-16 (15.67), entire culmen 12¾-13¾ (13.00), exposed culmen 10-11 (10.50), culmen from anterior point of nostril 7½-8 (7.83).

Distribution. Confined to Cebu, Central Philippines.

First collector. A. H. Everett in April, 1877.

Not figured.

Type. The two cotypes are BM nrs. 88.7.1.700 and 88.7.1.701 (types examined).

Moult. The cotypes, taken in April, are not in moult.

Nidification. Apparently unrecorded.

Habits, etc. Apparently unrecorded.

2. **Zosterops everetti basilanica** Steere

Zosterops Basilanica Steere, A List of the Birds and Mammals collected by the Steere Expedition to the Philippines, 1890 (14 July), p. 21 — Basilan, Samar, Leyte, herewith restricted to Basilan.

Zosterops everetti; Tweeddale, Proc. Zool. Soc. London for 1877, 1878, p. 829 (Surigao); Tweeddale, Proc. Zool. Soc. London, 1878, p. 111 (Dinagat); Tweeddale, Proc. Zool. Soc. London for 1878, 1879, p. 950 (Zamboanga); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 163 (Dinagat); Bourns & Worcester, Occ. Pap. Minnesota Ac. 1, 1894, p. 57 (Samar, Mindanao, Basilan); (pt.) Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 164 (Dinagat, Mindanao).

Zosterops Everetti; Kutter, Journ. f. Orn. 31, 1883, p. 312 (no locality indicated, but probably Mindanao).

Zosterops basilanica; Steere, Ibis (6) 3, 1891, p. 314 (Basilan, Samar, Leyte); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 166 (Samar, Paric; Basilan); Ogilvie-Grant, Ibis (7) 2, 1896, p. 552, 553 (Samar, Leyte, Dinagat, North and South Mindanao, Basilan); Ogilvie-Grant, Ibis (7) 3, 1897, p. 238 (Samar, Leite); (pt.) Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560 (Samar, Leyte, Dinagat, Mindanao, Basilan); J. Whitehead, Ibis (7) 5, 1899, p. 232 (Samar and Leyte); (pt.) Finsch, Tierreich 15, 1901, p. 19; *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Ogilvie-Grant, Ibis (8) 6, 1906, p. 473 (Taudaya 5000 ft.); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 489; McGregor, Phil. Journ. Sc. 2, sect. A, 1907, p. 290; Sharpe, Hand-List Birds 5, 1909, p. 5; McGregor, Manual Phil. Birds, 1910, p. 618; (pt.) McGregor, Phil. Journ. Sc. 16, 1920, p. 427; (pt.) Bangs, Bull. M. C. Z. 65, 1922, p. 83 (Basilan, Dinagat, Leyte, Mindanao, Samar).

Zosterops everetti Var. *Basilanica*; Dubois, Syn. Av. I, 1902, p. 707.

Zosterops everetti basilanica; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Annot. Orn. Or. 2, 1933, p. 63; Mees, Sarawak Mus. Journ. 6, 1954, p. 142, 147.

Zosterops everetti basilanicus; (pt.) Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173 (Samar, Leyte, Dinagat, Mindanao, Basilan).

Zosterops palpebrosa basilanica; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211; Peters, Bull. M. C. Z. 86, 1939, p. 118 (near Maluso, Basilan); Delacour & Mayr, Birds Philippines, 1946, p. 236; Potter, Wilson Bull. 65, 1953, p. 266 (Caticoan, islet on the south coast of Samar); Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. A generally dark form with Warbler Green upper parts, dark grey flanks, and a broad yellow longitudinal streak over the middle of the under parts. Lores dusky. It is, in different parts of its range, rather variable in size, comprising some of the largest and some of the smallest populations found in the species.

Unfeathered parts. Iris brown (Platen, Mindanao); yellowish brown (Moseley, Mindanao); yellowish brown (Everett, Dinagat and Surigao); pale brownish yellow or pale reddish gold (Goodfellow, Mindanao). Bill entirely black.

Measurements. Leyte, two males: wing 54-57 (55.50), tail 33-37 (35.00), tarsus 15¼-16 (15.63), entire culmen 12½-13½ (13.00), exposed culmen 10-10½ (10.25), culmen from anterior point of nostril 7¾-8 (7.88).

Samar, 7 specimens (4 ♂, 3 ♀): wing 52½-55 (53.36), tail 32½-36 (34.43), tarsus 14-15¾ (14.91), entire culmen 12½-13 (12.67), exposed culmen 9-10 (9.43), culmen from anterior point of nostril 7-8 (7.50).

Eastern Mindanao and Dinagat, 8 specimens (5 ♂, 3 ♀); wing 56-58 (56.94), tail 34-38 (36.06), tarsus 14-16 (15.19), entire culmen 12½-14

(13.14), exposed culmen 9½-10 (9.93), culmen from anterior point of nostril 7-8 (7.79).

Western Mindanao, 12 specimens (5 ♂, 3 ♀, 4 ○): wing 52-56 (54.38), tail 32-38 (35.63), tarsus 14-16 (15.15), entire culmen 12-13½ (12.53), exposed culmen 9-10½ (9.71), culmen from anterior point of nostril 6½-8 (7.23).

Basilan, 6 specimens (2 ♂, 2 ♀, 1 ♀?, 1 ?): wing 50-55 (52.67), tail 34½-38 (35.67), tarsus 14½-15½ (15.04), entire culmen 12-13½ (12.75), exposed culmen 9-10 (9.75), culmen from anterior point of nostril 7-8 (7.63).

Distribution. Samar, Leyte, Dinagat, Mindanao and Basilan. In Mindanao it has been recorded from all parts, and from altitudes ranging from sea level to 5000 feet.

First collector. A. H. Everett in June, 1877 at Surigao, Mindanao.

Not figured.

Type. In accordance with the restriction of the type locality of this race to Basilan, it is desirable to have a lectotype. No cotypes, either from Basilan or from Samar and Leyte, remain in the Museum of Zoology at Ann Arbor, Michigan (Storer, in litt., 24-VI-1957). In the British Museum there is one cotype from Basilan (specimen examined, see also Sharpe, 1906), whereas two cotypes from Basilan are present in the American Museum, one male and one female, collected on the same date. As lectotype I choose the male specimen AMNH nr. 700019, collected on Basilan on November 16, 1887. The year of collecting is not indicated on the label of the specimen, but it is given as 1887 in the catalogue of the American Museum (O'Brien, in litt., 10-VII-1957).

Moult. Specimens collected in January (1), May (2), July (1), and September (1) are not in moult. One specimen collected in August is moulting primaries, one specimen collected in December has nearly completed its primary moult.

Nidification. Apparently unrecorded.

Habits, etc. Not recorded apart from the fact that the form is, at least locally, fairly common.

Voice. Potter (1953) describes the song as a clear, pleasant, though rather weak, whistle.

Discussion. Within its comparatively extensive range this subspecies is rather variable in both size and coloration. As the figures show (table III), birds from Eastern Mindanao and Dinagat are large, whereas specimens from Basilan are definitely smaller, and the populations from Western Mindanao, from Samar, and apparently also those from Leyte, whence I have

not seen enough material, are intermediate in size.

As regards coloration, two specimens taken at Taudaya, Mt. Apo, 5000 ft. (Goodfellow leg., BM) are particularly dark, and generally specimens from Basilan and Western Mindanao seem slightly more yellowish than those from Eastern Mindanao. There is, however, a considerable amount of individual (non-geographical) variation. Generally there is a distinct yellow area above the lores and on the forehead, but in some individuals this yellow is almost absent, and these birds are very close to the Malaysian forms provisionally placed in the same species here.

Though the high-altitude specimens from Mt. Apo referred to above are large (wings 58 and 58 mm) it is interesting to note that birds from Dinagat also reach this size, so that their large size is not due to Bergmann's rule but finds its origin in true geographical variation.

At a time I have thought that it might be justified to nomenclatorially separate the Eastern Mindanao and Dinagat birds from true *basilanica* (with the type locality restricted to Basilan), but clearly no good purpose would be served by such an action, as the greater part of the total range of the form would then be occupied by intermediates, with all the nomenclatorial inconveniences caused by such specimens.

3. **Zosterops everetti forbesi** Bangs

Zosterops forbesi Bangs, Bull. M. C. Z. 65, 1922 (April), p. 83 — Camiguin (near the north coast of Mindanao).

Zosterops forbesi; Bangs, Bull. M. C. Z. 70, 1930, p. 355; Snouckaert, Alauda (2) 3, 1931, p. 21; Hachisuka, Birds Phil. Isl. I, 1931, p. 50.

Zosterops palpebrosa forbesi; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211; Delacour & Mayr, Birds Philippines, 1946, p. 236; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops everetti forbesi; Momiyama, Annot. Orn. Or. 2, 1933, p. 63; Mees, Sarawak Mus. Journ. 6, 1954, p. 142.

Subspecific characters. Very close to *basilanica* from which it will perhaps be found to be not satisfactorily separable when adequate series become available, but differs by its slightly more yellowish (less green) upper parts.

Unfeathered parts. Not recorded.

Measurements of one male (type): wing 56, tail 39, tarsus 16, exposed culmen 11, culmen from anterior point of nostril 8.

Distribution. Confined to Camiguin Island north of Mindanao, not to be confused, as Bangs did when diagnosing this subspecies, with Camiguin Island north of Luzon.

First collector. W. Cameron Forbes on 2 August, 1921.

Not figured.

Type. MCZ nr. 86369 (type examined, see discussion below).

Moult. Not checked.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. With the late Mr. J. L. Peters I have had some correspondence about the type of this race. As will be seen from the original diagnosis, this form was based on two males with exactly the same data, one bearing the number MCZ nr. 86369, the other being MCZ nr. 86368. The former number is the one given for the type in the diagnosis, but the type label was affixed to the other specimen, MCZ nr. 86368, and this is the specimen subsequently listed as holotype (Bangs, 1930).

Peters's conclusion (in litt., 9-VIII-1951) was the following:

"The question now arises which really is the holotype. Did Bangs tie the type label on to the wrong specimen or did he copy down the wrong number? I don't see how we can ever really tell. Bangs was a most meticulous curator. In describing new birds he always affixed a red label to the holotype but did not place any name upon it until the description had actually appeared, and he was always very careful with his figures because, as he frequently said, it was impossible to detect an error in a number as opposed to detecting a mis-spelling of a word.

The situation comes down to this: there are two paratypes number 86368 and 86369, the latter was listed as the holotype in the original description and was published, and I am inclined to think that this specimen will have to stand as the holotype and we must assume that the type label was later affixed to the wrong specimen and it is this that has caused the confusion. Perhaps not really confusing because the data for the two specimens are exactly alike".

There is another (?) mistake in the figures as published by Bangs in the original description. The lengths of the tails of the two specimens are given there as 49 and 47 mm, remarkably long. For the first I did not measure 49, but 39 mm (40 at most), and the second, measured for me by Peters, has not a tail of 47, but of 37 mm length, so that Bangs obviously made his figures 1 cm too large.

Bangs (1922) diagnosed this race as similar to *basilanica*, but larger, and brighter, more yellowish, both above and below. As regards the size difference, Bangs was right as far as the MCZ material was concerned, collected in western Mindanao, but the specimens of *basilanica* from eastern Mindanao, to which Camiguin Island is adjacent, are quite as large, so that measurements cannot be used as criterion for subspecific differentiation. As regards the brighter coloration of *forbesi*, as stated above the type is really

separable from a good series of *basilanica* (15 directly compared) on this character, but some of the brighter specimens of *basilanica* are extremely close to it, particularly so the specimen AMNH nr. 700019 from which the type of *forbesi* only differs in its slightly more yellowish head and neck. There is no difference in coloration of under parts between the two races. Also the difference between the greenest and the yellowest specimen of *basilanica* is very much greater than the difference between the yellowest specimen of *basilanica* and the type of *forbesi*.

As, according to information given by Peters (in litt., 21-V-1951), the second known specimen of *forbesi* is quite similar to, hence as yellowish as, the type, the race can at least provisionally be upheld on this colour character. It must also be kept in mind that Camiguin Island is situated on one line with the islands of Bohol and Siquijor which have, in this sequence, increasingly bright and yellow races, so that the appearance of birds slightly more yellowish than *basilanica* on Camiguin is not altogether unexpected.

4. **Zosterops everetti boholensis** McGregor

Zosterops boholensis McGregor, Phil. Journ. Sc. 3, sect. A, 1908 (Sept.), p. 283 — nomen novum for *Zosterops laeta* McGregor, nec *Zosterops laeta* De Vis.

Zosterops laeta McGregor, Phil. Journ. Sc. 2, sect. A, 1907 (Oct.), p. 329 — Guindulman, Island of Bohol.

Zosterops boholensis; McGregor, Manual Phil. Birds, 1910, p. 617; McGregor, Phil. Journ. Sc. 16, 1920, p. 427; Bangs, Bull. M. C. Z. 65, 1922, p. 83; McGregor in Dickerson, Distrib. Life Phil., 1928, p. 210; Snouckaert, Alauda (2) 3, 1931, p. 18.

Zosterops everetti boholensis; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173; Momiyama, Annot. Orn. Or. 2, 1933, p. 63; Mees, Sarawak Mus. Journ. 6, 1954, p. 142.

Zosterops laeta; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205.

Zosterops palpebrosa boholensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211; Delacour & Mayr, Birds Philippines, 1946, p. 236; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Manuel, Phil. Journ. Sc. 85, (1956), 1957, p. 320 (Sierra Bullones. Bohol Is.).

Subspecific characters. Close to *basilanica*, from which this form differs in its rather brighter, slightly more yellowish, upper parts; deeper yellow, less greenish-yellow, coloration on the under surface, which is definitely Lemon Chrome (the throat is slightly more greenish than the crissum and the broad median streak); flanks slightly but definitely paler grey than in *basilanica*. Loral line dusky, as in *basilanica*, though perhaps slightly paler; not so much dusky below the eye as in that form; eye-ring interrupted in front by a dusky spot.

The differences from *forbesi* are the same; the differences from *siquijorenis* are given under that form.

Unfeathered parts. Apparently not recorded.

Measurements. Wing 16 ♂, 54-58 (55.44); 13 ♀, 51-56 (54.23); 29 specimens, 51-58 (54.90); tail 16 ♂, 34½-40½ (36.41); 13 ♀, 34-37 (35.62); 29 specimens, 34-40½ (36.05); tarsus 28 specimens, 14-17 (15.29); entire culmen 29 specimens, 11-14 (12.64); exposed culmen 29 specimens, 8¼, 9½-11 (10.13); culmen from anterior point of nostril 29 specimens, 6½-8 (7.72).

Weights. 13 ♂, 8.5-11.1 (10.15); 11 ♀, 7.5-11.2 (9.67) g.

Distribution. Confined to Bohol Island, where it is apparently well distributed.

First collectors. Probably McGregor and Celestino in May, 1906 at Tagbilaran.

Not figured.

Type. Destroyed in Manila in 1945. I have examined paratypes belonging to the collections of the USNM and of the Dresden Museum. Recently Manuel (1957) has proposed as neotype the specimen Phil. Nat. Mus. nr. 0-5124. In view of the fact that paratypes exist and that no doubt has ever been expressed about the identity of this race, it is questionable if any good purpose is served by his action. Anyhow the specimen will not gain validity for nomenclatorial purposes until its selection as neotype will be approved of by the International Commission on Zoological Nomenclature.

Moult. Specimens collected in April (18) and May (6) are not in moult, they are in fairly fresh plumage.

Nidification. A female collected on 9 April 1955 bears the note: "ripe egg in uterus" (Rabor, Chicago Mus. nr. 223708).

Habits, etc. "*Zosterops palpebrosa boholensis* was collected inside virgin forest on Bohol Island, at Cantaub, at about 2000 to 3000 feet. This form was also taken in second growth forests in the lowlands at about 1000 to 1500 feet elevation. It appears that *Zosterops palpebrosa* ranges from lowlands in second growth forests, up to the highest elevation of Bohol mountains" (Rabor, in litt., 8-VIII-1956).

5. **Zosterops everetti siquijorensis** Bourns & Worcester

Zosterops siquijorensis Bourns & Worcester, Occ. Pap. Minnesota Ac. 1, 1894 (8 Dec.), p. 21 — Siquijor.

Zosterops siquijorensis; Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560; (pt.) Finsch, Tierreich 15, 1901, p. 19; (pt.) Dubois, Syn. Av. I, 1902, p. 707; (pt.) *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; McGregor, Phil. Journ. Sc. 3, sect. A, 1908, p. 280; (pt.) Sharpe, Hand-List Birds 5, 1909, p. 5; (pt.) McGregor, Manual Phil. Birds, 1910, p. 617; (pt.) Bangs, Bull. M. C. Z. 65, 1922, p. 83; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.

Zosterops chlorates siquijorensis; (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216; (pt.) Momiyama, Annot. Orn. Or. 2, 1933, p. 64.

Zosterops palpebrosa siquijorensis; Mayr in Delacour & Mayr, Zoologica 30, 1945, p. 116; Delacour & Mayr, Birds Philippines, 1946, p. 236; Rabor, Auk 69, 1952, p. 257; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Ripley & Rabor, Condor 58, 1956, p. 290.

Zosterops everetti siquijorensis; Mees, Sarawak Mus. Journ. 6, 1954, p. 142.

Subspecific characters. The brightest subspecies; nearest to *boholensis*, but with definitely more yellow on the forehead and over the lores; lores pale yellow; eye-ring with a pale yellow spot in front; yellow longitudinal line on under parts narrower, and yellow of under parts paler; flanks decidedly paler grey. Differs also — in the skins — from *boholensis* in its paler bill, particularly the mandible and the tomia of the maxilla being pale; the bill is also, on the average, a trifle longer than in *boholensis*.

Unfeathered parts. Eyes brown ("pardo"); bill black, base of mandible yellowish; legs yellowish leaden (Celestino).

Measurements. Wing 9 ♂, 54-57 (55.50); 9 ♀, 54-56½ (55.22); 18 specimens, 54-57 (55.36); tail 9 ♂, 35-39 (36.50); 8 ♀, 34½-36½ (35.25); 17 specimens, 34½-39 (36.21); tarsus 18 specimens, 15-16¼ (15.71); entire culmen 18 specimens, 12¼, 13-14 (13.26); exposed culmen 18 specimens, 9-11 (10.25); culmen from anterior point of nostril 7½-8½ (7.89).

Distribution. Confined to Siquijor Island. All records for Negros are erroneous, and are due to confusion with *Zosterops montana*.

First collectors. Bourns and Worcester in February 1891.

Not figured.

Type. One cotype, collected 10 February 1891, now in the USNM, was examined by me; other cotypes were not traced.

Moult. Specimens collected in January (2), May (1), June (1), and December (6), are not in moult. One specimen collected in December is not moulting primaries, secondaries, or rectrices, but shows moult on the forehead; two specimens collected in December are moulting primaries; one specimen collected in December is moulting both primaries and rectrices.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. As has already been pointed out by Ogilvie-Grant (1896), there is a misprint in the measurements as presented by Bourns & Worcester (1894): "Wing 2.16. Tail 1.51. Culmen 1.55. Tarsus 1.57. Two females measure; Wing 2.13. Tail 1.53. Culmen .56. Tarsus .56". Probably the measurements for culmen and tarsus in the male should read .55 and .57, not 1.55 and 1.57 [inch].

6. **Zosterops everetti mandibularis** Stresemann

Zosterops palpebrosa mandibularis Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211 — Maimbun (Sulu-Inseln).

Zosterops everetti; Guillemard, Proc. Zool. Soc. London, 1885, p. 250, 264 (Sulu Island); Sharpe, Ibis (6) 6, 1894, p. 252, 259 (Tawi-Tawi, Bongao); Bourns & Worcester, Occ. Pap. Minnesota Ac. 1, 1894, p. 39 (Tawi-Tawi, Sulu); (pt.) Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 164 (Joló).

Zosterops basilanica; (pt.) Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560 (Sulu, Tawi-Tawi, Bongao); (pt.) Finsch, Tierreich 15, 1901, p. 19 (Tawi-Tawi); Mearns, Proc. U. S. Nat. Mus. 36, 1909, p. 473 (Papahag Island, Tawi Tawi group); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 5 (Tawi-tawi, Sulu, Bongao); (pt.) McGregor, Manual Phil. Birds, 1910, p. 618 (Bongao, Papahag, Sulu); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 4 (Bongao); (pt.) McGregor, Phil. Journ. Sc. 16, 1920, p. 427 (Bongao-Sulu); (pt.) Bangs, Bull. M. C. Z. 65, 1922, p. 83 (Bongao, Papahag, Jolo, Tawi Tawi).

Zosterops everetti Var. *Basilanica*; (pt.) Dubois, Syn. Av. I, 1902, p. 707 (Tawi-Tawi).

Zosterops everetti basilanicus; (pt.) Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173 (Sulu, Bongao).

Zosterops everetti mandibularis; Momiyama, Annot. Orn. Or. 2, 1933, p. 64; Mees, Sarawak Mus. Journ. 6, 1954, p. 142, 147.

Zosterops palpebrosa mandibularis; Delacour & Mayr, Birds Philippines, 1946, p. 236; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Nearest to the small populations of *basilanica* occurring on Basilan and western Mindanao, but differs by its brownish bill (in the skin), and also by having decidedly paler grey flanks. Differs from *tahanensis* in the same characters, in having a dusky, not black, loral line, and in the presence of greenish edges to the rectrices.

Unfeathered parts. Iris brown; upper mandible dark brown, lower whitish; tarsus light brown (Guillemard, 1885); iris pale brown; bill, maxilla dark brown, mandible pale brown; feet pale brown (Platen).

Measurements of 7 specimens (4 ♂, 3 ♀): wing 51½-54 (52.93), tail 31½-35 (33.21), tarsus 15-16 (15.79), entire culmen 11½-13¾ (12.46), exposed culmen 8¾-10½ (9.54), culmen from anterior point of nostril 7-8 (7.43).

Distribution. Sulu Archipelago, where it has been recorded from the following islands and islets: Joló (Solo or Sulu), Tawi-Tawi, tiny Bongao close to Tawi-Tawi, Papahag in the Tawi-Tawi group.

First collector. H. Guillemard on 1 May 1883 at Maimbun, Sulu Island.

Not figured.

Type. AMNH nr. 700030.

Moult. Specimens collected in April (1) and May (1), are not in moult; other material not checked.

Nidification. Ogilvie-Grant (1912) records a clutch of three eggs taken on

Bongao on 13 July, by A. H. Everett; he describes the eggs as white, and gives as measurements for two eggs .55 × .45 inch.

Habits, etc. Not recorded.

Discussion. Guillemard (1885) already drew attention to the fact that Sulu specimens differ from those of the Philippine Islands by being brighter above and destitute of any subocular dusky mark (presumably he compared them with the nominate race). Hence it is surprising that this distinct race, of which specimens were since many years present in several collections, was named as late as 1931.

7. **Zosterops everetti babelo** Meyer & Wiglesworth

Zosterops babelo Meyer & Wiglesworth, Abh. Ber. Mus. Dresden 5, (9), 1895, p. 6 — Ins. Talaut: Karkellang (= Karakelong).

Zosterops babelo; Hartert, Nov. Zool. 5, 1898, p. 90 (Lirung or Salibabu); Meyer & Wiglesworth, Birds Celebes, 1898, p. 495; Finsch, Tierreich 15, 1901, p. 20; Dubois, Syn. Av. I, 1902, p. 707; (Célèbes N.); Sharpe, Hand-List Birds 5, 1909, p. 5; Mathews, Syst. Av. Australas. II, 1930, p. 697.

Zosterops palpebrosa babelo; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211.

Zosterops everetti babelo; Momiyama, Annot. Orn. Or. 2, 1933, p. 63; Mees, Sarawak Mus. Journ. 6, 1954, p. 142.

Subspecific characters. Under parts as in *basilanica*; upper parts distinctly more yellow than in that form; white eye-ring and dark loral line absent in the single specimen examined, which probably is due to the way it was skinned, as Meyer & Wiglesworth (1898) describe the presence of both a white eye-ring and a dusky loral and subocular line.

Unfeathered parts. Not recorded apparently; legs in the skin pale brown, much paler than in all other races; bill less dark than in the other forms.

Measurements. Size larger than in any other race of the species; one male measures: wing 61, tail 41, tarsus 18, entire culmen 15, exposed culmen 11, culmen from anterior point of nostril 8½.

Distribution. Talaut Islands, whence it has been recorded from Karakelong and Salebaboe.

First collector. Apparently Cursham's native collectors, on 25 November 1894, at the type locality.

Figure. Meyer & Wiglesworth (1898), pl. XX fig. 1 (coloured, on natural size, by Geisler).

Type. Dresden Museum.

Moult. Not recorded.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Hartert's (1898) statement that his specimens were "from

the Island of Lirung or Salibabu, the largest of the Talaut Group", is evidently a slip, as, of course, the island of Karakelong is much larger.

8. **Zosterops everetti tahanensis** Ogilvie-Grant

Zosterops tahanensis Ogilvie-Grant, Bull. B. O. C. 19, 1906, p. 10 — Gunong Tahan, Malaya.

Zosterops aureiventer media Robinson & Kloss, Ibis (11) 5, 1923, p. 152 — Gunong Sidong, Samarahan, 1200 ft., S. W. Sarawak.

Zosterops aureiventer parvus Hachisuka, Bull. B. O. C. 47, 1926, p. 56 — Kina Balu, N. Borneo.

Zosterops auriventer; Sharpe, Proc. Zool. Soc. London, 1887, p. 441 (Larut Range, Perak); Sharpe, J. Straits Br. R. As. Soc. 19, 1887, p. 138 (reprint of preceding paper); Sharpe, Ibis (6) 1, 1889, p. 427 (Kina Balu); Sharpe, Ibis (6) 2, 1890, p. 279, 286 (Kina Balu); Sharpe & Whitehead in Whitehead, Expl. Kina Balu, 1893, p. 234 (Kina Balu); (pt.) Finsch, Tierreich 15, 1901, p. 17 (Kina Balu); Hartert, Nov. Zool. 9, 1902, p. 575 (Gunong Tahan, common between 2000 and 5000 ft.).

Zosterops aureiventer; Sharpe, Ibis (5) 5, 1887, p. 452 (Kina Balu); Everett, J. Straits Br. R. As. Soc. 20, 1889, p. 141 (Kina Balu); Shelford, J. Straits Br. R. As. Soc. 33, 1900, p. 16 (Penrissen); Ogilvie-Grant, Fasc. Malayenses, Zool. 3, 1905, p. 75 (Bukit Besar); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 4 (Malay Peninsula, Borneo); Robinson, Birds Malay Peninsula I, 1927, p. 317 (Malay Peninsula, interior).

Zosterops tahanensis; Robinson, Journ. F. M. S. Mus. 2, 1907, p. 83; Ogilvie-Grant, Journ. F. M. S. Mus. 3, 1908, p. 30 (Gunong Tahan 5300-6000 ft.); Robinson, Journ. F. M. S. Mus. 2, 1909, p. 215 (Ginting Bidei, Selangor 2300 ft.); Sharpe, Hand-List Birds 5, 1909, p. 631 (Mt. Gunong Tahan [!]); Robinson, Hand-List Birds Malay Peninsula, 1910, p. 20; Robinson & Kloss, Ibis (11) 5, 1923, p. 151 (Negri Sembilan); Snouckaert, Alauda (2) 3, 1931, p. 21.

Zosterops palpebrosa aureiventer; Moulton, J. Straits Br. R. As. Soc. 67, 1914, p. 171 (Borneo); (pt.) Chasen, Bull. Raffl. Mus. 11, 1935, p. 264 (Malay Peninsula (mountains)); Chasen, Birds Malay Peninsula IV, 1939, p. 419 (Malay Peninsula, in heavy jungle); Madoc, Malayan Nat. Journ. 2, 1947, p. 116 (Malaya, thicker jungles); Gibson-Hill, Bull. Raffl. Mus. 20, 1949, p. 246 (distribution in Malaya); Bromley, Bull. Raffl. Mus. 24, 1952, p. 214 (Maxwell's Hill); Newmark, Malayan Nat. Journ. 10, 1955, p. 12 (Maxwell's Hill, quite common).

Zosterops palpebrosa auriventer; (pt.) Gyldenstolpe, Ibis (11) 2, 1920, p. 466 (Bukit Besar).

Zosterops aureiventer buxtoni; (pt.) Stuart Baker, Ibis (11) 4, 1922, p. 146 (Borneo).

?*Zosterops aureiventer tahanensis*; Stuart Baker, Ibis (11) 4, 1922, p. 146 (perhaps not this form).

Zosterops aureiventer media; Robinson & Kloss, Bull. B. O. C. 47, 1926, p. 93; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 212.

Zosterops aureiventer aureiventer; (pt.) Robinson, Birds Malay Peninsula II, 1928, p. 283 (south to Negri Sembilan and Pahang); Chasen & Kloss, J. Malayan Br. R. As. Soc. 6, 1928, p. 73 (Kledang Hills, Perak); (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 211 (Negri Sembilan und Pahang).

Zosterops aureiventer parvus; Snouckaert, Alauda (2) 3, 1931, p. 21.

Zosterops palpebrosa media; Chasen, Bull. Raffl. Mus. 11, 1935, p. 264 (Borneo); Hachisuka, Tori 11, 1942, p. 305.

Zosterops atricapilla tahanensis; Stresemann, Journ. f. Orn. 87, 1939, p. 159-164; Delacour, Birds Malaysia, 1947, p. 320; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops atricapilla media; Stresemann. Journ. f. Orn. 87, 1939, p. 160.

Zosterops atricapilla clara; (pt.) Peters, Bull. M. C. Z. 87, 1940, p. 207 (Kinabalu, 3100 ft.).

zosterops palpebrosa auriventer; Glenister, Birds Malay Peninsula, 1951, p. 239 (Penang Hill and Kledang Hill).

Zosterops everetti tahanensis; Mees, Sarawak Mus. Journ. 6, 1954, p. 144-148, 153.

Subspecific characters. A small and dark subspecies; differs, with the following race (*wetmorei*), from all Philippine forms by its relatively short tail, without greenish margins to the rectrices; by the lack of yellow on forehead and over the lores, which are of the same colour as the mantle (but see discussion — this character is not infallible); and from the majority of Philippine forms also by its black, not dusky or pale, lores. As regards general appearance this form is closest to the dark specimens of *basilanica*, inhabiting eastern Mindanao; the flanks are quite as dark, and the yellow streak over the belly is broad.

Unfeathered parts. Iris hazel, or brown; bill plumbeous, dark at tip, or lead blue, with black culmen; feet lead, or lead blue (H. C. Robinson).

Measurements of 9 specimens (8 ♂, 1 ♀) from Borneo: wing 49-52, 56 (50.78), tail 28-32, 34½ (30.06), tarsus 13-14, 15 (13.47), entire culmen (4 specimens only) 11½-12½ (11.94), exposed culmen 8-10 (8.94), culmen from anterior point of nostril (4 specimens only) 6½-7 (6.63).

Measurements of 7 specimens (5 ♂, 2 ♀) from the Malay Peninsula: wing 50-55 (52.50), tail 27½-33 (31.42), tarsus 12¾-14 (13.32), entire culmen (2 specimens only) 11¾-12 (11.88), exposed culmen 8½-9¾ (9.17), culmen from anterior point of nostril (2 specimens only) 6½, 6½ (6.50).

Distribution. Known from British North Borneo, Sarawak, Malaya, and the extreme south of Peninsular Siam. For the distribution in Borneo, cf. Mees (1954, map II); the locality Mt. Mulu as given there is erroneous, as the specimen on which this record was based turned out to be a *Z. a. atricapilla* (cf. the discussion of that form).

In Malaya it is known as follows: Ginting Bidei, Selangor, 2300 ft.; Ulu Gombak, Selangor; Maxwell's Hill, Larut Range, Perak; Taiping, Perak; Fraser's Hill; Cameron's Highlands; Kledang Hills; Koe Koeang Gasing, Langat, Selangor (from specimens examined and from literature, especially Gibson-Hill, 1949).

In Peninsular Siam it is known from a single specimen taken by Robinson at Bukit Besar, and already recorded by Ogilvie-Grant (1905); I have examined the specimen in the BM, and found it to agree with the present race, and not with *wetmorei*, which has a larger bill. This subspecies was not listed for Siam by Deignan (1943), and may be considered an addition to the avifauna of that country.

First collector. L. Wray, curator Perak Museum, in September or October, 1886, in the Larut Range, Perak (cf. Sharpe, 1887). In Borneo it was discovered by J. Whitehead, in March 1887, on Mt. Kinabalu.

Not figured.

Type. BM nr. 1906.7.23.13 (type examined).

Moult. Borneo. One specimen collected in April is not in moult; one specimen collected in June has probably just completed its moult.

Malay Peninsula. One specimen collected in July (type) is moulting primaries; one specimen collected in September is probably not in moult, but is not in good condition.

Nidification. As far as I am aware, there do not exist certain records on the breeding of this subspecies. Robinson (1928) and Gibson-Hill (1949) have already had their say on the nests found by Kellow in Perak.

Habits, etc. Apparently confined to forest, where it is seen moving about in flocks, and seems to behave in the usual way.

Discussion. This form was, with some doubt, listed for Sumatra by Stresemann (1931) on the strength of a specimen from Sungei Penoh, Korintji, 2600 ft., at the time in the Tring collection. I have examined the specimen (now it is AMNH nr. 700042), and found it to be a normal specimen of *Z. palpebrosa buxtoni*, which, for reasons given in the description of the species *Z. palpebrosa*, has rather dark grey flanks. The specimen was already re-identified by Deignan. Stresemann (1939), writing about the type specimen of *auriventer*, wrote that if it were identical with *tahanensis* (as Robinson, 1928, and others thought), Hume would certainly not have failed to note: "die viel dunklere, düster olivgrüne Oberseite, die dunkler grauen Flanken und das Fehlen der gelben Stirnfarbung". As is shown by the trouble I had with the identification of Hume's type specimen (cf. the discussion of *Z. palpebrosa auriventer*), and more convincingly by the fact that Stresemann himself misidentified a specimen as discussed above, the distinction is not always quite as easy as Stresemann surmised. Even Stresemann's (1931) earlier assertion that *Z. everetti tahanensis* and *Z. e. wetmorei* (*Z. a. aureiventer* in his revision) do not have a yellow streak over the black loral line, is not always true, for I have seen a specimen of *wetmorei* from Chong (BM nr. 1910.12.27.330) that has above the right lore a bright yellow streak, though this streak is absent from its left side.

This and the following race (*wetmorei*) are only provisionally united with the Philippine species *Z. everetti*. I have already given my arguments pro and contra this union (Mees, 1954, p. 147), to which I can add nothing new.

Delacour (1929) under the name of *Z. aureiventer* subsp., and Delacour & Jabouille (1931) under the name of *Z. aureiventer mesoxantha*, and in

the addenda of the same work under the name of *Z. aureiventer aureiventer,* list a skin collected at Bokor, Indo-China, at 1000 m altitude, which they evidently believed to belong to the present race (or to *wetmorei,* not yet described at the time). At my request for information, Dr. Amadon (in litt., 24-I-1951) wrote to me:

"Delacour tells me that his identification of *aureiventer* from Indochina was an error, which he has corrected in later papers. The bird (probably in Paris, perhaps in London) is *joannae*".

I have not seen the specimen in question, but on account of the evidence as presented above, I have listed the reference in the synonymy of *Z. p. palpebrosa.*

9. **Zosterops everetti wetmorei** Deignan

Zosterops atricapilla wetmorei Deignan, Zoologica 28, 1943 (31 Dec.), p. 202 — Chong near Trang, Peninsular Siam.

Zosterops tahanensis; Robinson & Kloss, Ibis (9) 5, 1911, p. 79 (Chong); Robinson, Journ. F. M. S. Mus. 5, 1914, p. 110 (near summit of Kao Nawng); Gyldenstolpe, Ibis (11) 2, 1920, p. 467 (Chong and Kao Nawng); (pt.) Robinson & Kloss, Ibis (11) 5, 1923, p. 152 (Chumporn).

Zosterops aureiventer tahanensis; Robinson & Kloss, Journ. Nat. Hist. Soc. Siam 5, 1924, p. 394 (Tasan, Chumporn, P. Siam).

Zosterops palpebrosa aureiventer; (pt.) Chasen, Bull. Raffl. Mus. 11, 1935, p. 264; de Schauensee, Proc. Ac. Nat. Sc. Philad. 98, 1946, p. 82 (Khao Luang 3400 ft., Khoa Bhanam Bencha. 3500 ft., Waterfall Trang).

Zosterops atricapilla tahanensis; (pt.) Stresemann, Journ. f. Orn. 87, 1939, p. 160.

Zosterops atricapilla wetmorei; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops everetti wetmorei; Mees, Sarawak Mus. Journ. 6, 1954, p. 146.

Subspecific characters. Differs from the preceding race (*tahanensis*) only in its slightly larger bill; in my rather scanty material there was no detectable difference in coloration between the two races, nor could Gibson-Hill (in litt., 30-I-1951) find any.

Unfeathered parts. Iris dark; maxilla black, mandible slate; feet slate (Robinson & Kloss, 1924); eyes chestnut; bill black; legs blue grey (de Schauensee, 1946).

Measurements of 10 specimens (4 ♂, 6 ♀): wing 51-55 (53.10), tail 30-34 (32.15), tarsus 13-15 (13.93), entire culmen (one specimen only) 12; exposed culmen 9-10¾ (9.97), culmen from anterior point of nostril (5 specimens only) 7-8 (7.55).

Distribution. Peninsular Siam, where it has been recorded from the following localities: Tasan, Chumporn; Khao Bhanam Bencha 3500 ft.; Waterfall Trang; Kloa Luang 3400 ft.; lat. 11° 5′; Chong, Trang; Kao Nong,

Bandon, 3500 ft. (material from all these localities examined); Kao Nawng (Robinson, 1914).

First collector. Probably the collectors of the F. M. S. Museums in December 1909 at Chong, Trang.

Not figured.

Type. USNM nr. 234322.

Moult. One specimen, collected in December, is in very fine and fresh plumage. Other material, moult not checked.

Nidification. Not recorded.

Habits, etc. Habitat (jungle) and vertical range are apparently identical with those of the preceding subspecies (*tahanensis*); this race has been taken both in the lowlands (Waterfall Trang) and at 3500 ft.; as the mountains of Peninsular Siam do not quite attain the height of those of Malaya, the upper limit of occurrence of the present form must be somewhat lower.

Discussion. The remarks made in the discussion of the preceding race (*tahanensis*), pertain equally well to the present form, which only recently has been separated from it.

Species 8. **Zosterops nigrorum** Tweeddale

Characters. A yellow-bellied species of small to average size, of the ordinary *Zosterops*-type.

Upper parts generally Warbler Green, in some races slightly brighter, in others duller, showing a slight approach to Olive Green; rump and crown very slightly, if at all, brighter than remainder of upper parts; frontal area and supra loral region yellow; lores dusky to blackish dusky, a streak of the last-mentioned colour also being present under the eye-ring; eye-ring white, of average width to rather wide, entire or interrupted in front by a blackish or partly yellowish spot; primaries, secondaries, and rectrices blackish brown, broadly margined with Warbler Green, the outer pair of rectrices washed with this colour, also on the inner webs.

Under parts. Generally yellow, varying, according to race, wear and age, from Citron Yellow to Lemon Chrome; this colour gradually — in the nominate race rather abruptly — merges into greenish, like the colour of the mantle, though somewhat paler, on the sides of head and breast, and on the flanks.

Unfeathered parts rarely recorded on labels of the specimens examined, hence the colours of the soft parts, as far as the evidence is available, will be dealt with under the separate races.

Measurements are given in table IV.

TABLE IV

Zosterops nigrorum

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
nigrorum	23	52-57	34-39	54.52	35.65	65.39 %
luzonica	2	51½-54	31-34	52.75	32.50	61.61 %
aureiloris	11	51-54	32-35	52.05	33.73	64.80 %
mcyleri	4	53½-56	36-38	54.38	36.75	67.59 %
richmondi	8	56-58	38-41½	57.13	39.88	69.83 %

Structure. Like in most other species of the genus, the 2nd primary is in length generally between the 6th and the 8th, only in some specimens of *richmondi* I found it to be slightly shorter, between the 8th and the 9th. The tail : wing indices of the various races are given in table IV.

Distribution. Distributed over the northern and central Philippine Islands, whence it has been recorded as follows: Camiguin (N. of Luzon), Luzon, Caluya (?; cf. McGregor, 1910); Mindoro, Cresta de Gallo, Masbate, Negros, Panay, Ticao, Cagayancillo.

Found at low and moderate altitudes.

Geographical variation. The species is divided into five races which, though fairly distinct from each other, are not very pronounced. As, moreover, they inhabit, on different islands, a contiguous area, there is no doubt that they belong to one natural unit (species) — a conclusion Stresemann (1931) did not venture to draw because of lack of material.

The differences between the races are mainly found in size, in tone of mantle and belly (pale and rather dull versus bright yellow and yellowish green), in shape and extension of the eye-ring, and in coloration of the lores.

Related species. As regards the affinities of the species, apparently Delacour & Mayr (1946) were the first to consider this problem at all, their conclusion being that: "The taxonomy of this species is still unsettled. It is either a representative of the Australo-Moluccan species *lutea* or a yellow-bellied group of forms of the Oriental White-eye (*Z. palpebrosa*). Exact records of song, color of the iris, habitat preference, and altitudinal range are necessary before these questions can be settled".

As I have already tried to show (Mees, 1954), it is not likely that *Z. nigrorum* is particularly closely related to either *Z. lutea* of Delacour & Mayr (*Z. chloris* in this revision) or to *Z. palpebrosa*. In the same paper, written before I came into contact with Dr. Rabor, I suggested that *Z. nigrorum* might vicariate with *Z. everetti*, a supposition that has since been confirmed by Dr. Rabor (in litt., 9-IV-1952; Rabor, 1952), who could practically prove

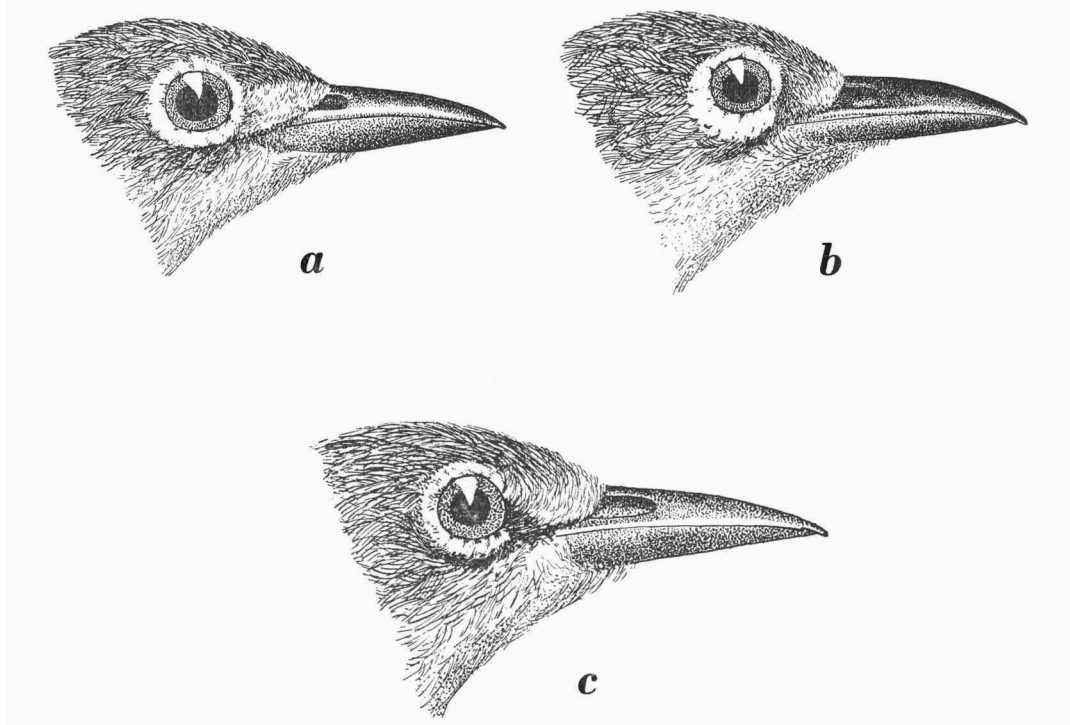

Fig. 9. Heads of races of *Zosterops nigrorum,* illustrating subspecific differences; a, *aureiloris*; b, *meyleri*; c, *richmondi*. × 2½.

that the alleged occurrence of *Z. everetti siquijorensis* on Negros Island, where *Z. n. nigrorum* occurs, is due to confusion with *Z. montana.*

Notwithstanding their evident geographical representation, I find the differences even between forms that are geographically so close to each other as *Z. everetti siquijorensis* or *Z. e. everetti* and *Z. n. nigrorum*, quite striking, and I do not consider it justified to unite the two species, or even to more than suggest the possibility of their being fairly close akin. As Delacour & Mayr (1946) rightly stated, much more field work, and even collecting, must be done before this problem can be satisfactorily settled.

1. **Zosterops nigrorum nigrorum** Tweeddale

Zosterops nigrorum Tweeddale, Proc. Zool. Soc. London, 1878 (May), p. 280 (nomen nudum), 286 — Valencia, Negros.

Zosterops nigrorum; Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 186 (Negros); Bourns & Worcester, Occ. Pap. Minnesota Ac. 1, 1894, p. 39 (Masbate); Casto de Elera, Cat. Sist. Faun. Filip. I, 1895, p. 165 (Negros); Ogilvie-Grant, Ibis (7) 2, 1896, p. 553 (lower slopes of Canloon, Negros); Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 360; Worcester, Proc. U. S. Nat. Mus. 20, 1898, p. 577 (Negros, Panay,

Masbate); J. Whitehead, Ibis (7) 5, 1899, p. 232 (Canloön volcano, Negros); Finsch, Tierreich 15, 1901, p. 32; Dubois, Syn. Av. I, 1902, p. 710; McGregor, Bull. Phil. Mus. 1, 1903, p. 4, 11 (Masbate, Ticao); Anonymus, Bull. Phil. Mus. 2, 1903, p. 8; McGregor, Bur. Govt. Lab. Publ. 25, 1905, p. 19, 23 (Cresta de Gallo); *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 446; Sharpe, Hand-List Birds 5, 1909, p. 12; McGregor, Manual Phil. Birds, 1910, p. 620 (range); McGregor, Phil. Journ. Sc. 16, 1920, p. 417, 428 (Cresta de Gallo); McGregor, Phil. Journ. Sc. 18, 1921, p. 552 (Panay: Tibiao, Culasi); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 203, 209 (Negros, Panay, Masbate, Ticao, Cresta de Gallo); Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173; Hachisuka, Birds Phil. Isl. I, 1931, p. 23 (Negros).

Zosterops nigrorum nigrorum; Stresemann, Mitt. Zool. Mus. Berlin, 17, 1931, p. 213; Momiyama, Annot. Orn. Or. 2, 1933, p. 64; Delacour & Mayr, Birds Philippines, 1946, p. 237; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Ripley & Rabor, Condor 58, 1956, p. 286, 288 (Negros).

Subspecific characters. The dullest form. Upper parts dull and slightly more greyish than Warbler Green, with only crown and rump a little brighter; lores and streak under the eye-ring dusky; eye-ring of average width, interrupted in front by a blackish spot.

Under parts. Yellow of under parts variable, in some specimens as pale as Citron Yellow, in others quite as dark as Lemon Yellow; throat generally darker yellow than remainder of under parts; flanks decidedly greenish, not quite as dark as upper parts.

Unfeathered parts. One male, iris two grey rings, inner darker; bill horn blue, black tip to upper mandible; legs and feet horn blue; nails white (Masbate: McGregor & Celestino, USNM nr. 192700); one female, iris light brown; upper mandible dark horn brown, lower mandible and legs horn blue; nails white (Masbate: McGregor & Celestino, USNM nr. 192701); iris pale brown; bill tipped with black; base of bill and feet slate-blue (Negros: J. Whitehead, 1899); iris greyish brown (Negros: Rand).

Measurements. Wing 7 ♂, 53-57 (54.86); 16 ♀, 52-56 (54.38); 23 specimens, 52-57 (54.52); tail 7 ♂, 34½-37 (35.64); 16 ♀, 34-39 (35.66); 23 specimens, 34-39 (35.65); tarsus 23 specimens, 15-17 (15.77); entire culmen 22 specimens, 12-14 (12.95); exposed culmen 22 specimens, 9-11 (10.01); culmen from anterior point of nostril 22 specimens, 7-8 (7.61).

Distribution. Negros, Panay, Masbate, Caluya, Ticao, and Cresta de Gallo. The last-mentioned island, south of Sibuyan, is, according to McGregor (in Dickerson, 1928): "little more than a sand bar". The vertical range is from sea-level to about 1200 m. No specimens from Caluya, Ticao, and Cresta de Gallo were examined, they are included on the authority of McGregor (1905, 1910, 1928).

First collector. A. H. Everett at the type locality in August, 1877.

Not figured.

Type. This form was described after two specimens; the male cotype is now BM nr. 88.7.1.789 (specimen examined); female cotype not traced.

Moult. Specimens collected in January (1), February (1), April (1), May (2), June (2), July (1), November (2), and December (3) are not in moult; one specimen collected in April on Negros is moulting rectrices; 3 specimens collected in October on Panay are all moulting primaries and secondaries, and two of them also rectrices. The moult in one of these specimens (USNM nr. 315705) is different from anything I have ever seen in the family; on both sides the 2nd and the 6th primaries are about half-grown. Unfortunately it is difficult to see what other feathers are old or new. As generally the moult of Zosteropidae follows the normal Passerine type, the primaries being cast and replaced from the 10th outwards to the 2nd, this case, where primaries have simultaneously moulted on two places, is worth mentioning.

Nidification. Apparently unrecorded.

Habits, etc. "*Z. n. nigrorum* may be found in clearings among the low growths, in secondary forests, in the lower story of lowland dipterocarp forests and even in isolated growths in grassland areas" (Rabor, in litt., 9-IV-1952).

Discussion. No differences between the populations from Negros, Panay, and Masbate could be detected, neither in coloration nor in measurements.

2. **Zosterops nigrorum luzonica** Ogilvie-Grant

Zosterops luzonica Ogilvie-Grant, Bull. B. O. C. 4, 1895, p. XXII — South Luzon (...obtained at the foot of Mayon Volcano in the Albany district of South-east Luzon).

Zosterops luzonica; Ogilvie-Grant, Ibis (7) 1, 1895, p. 250, 257, 278 (Mayon Volcano); Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560; Worcester, Proc. U. S. Nat. Mus. 20, 1898, p. 588; (pt.) J. Whitehead, Ibis (7) 5, 1899, p. 232 (Mayon Volcano); Finsch, Tierreich 15, 1901, p. 31; Dubois, Syn. Av. I, 1902, p. 710; *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 510; Sharpe, Hand-List Birds 5, 1909, p. 12; McGregor, Manual Phil. Birds, 1910, p. 619; McGregor, Phil. Journ. Sc. 16, 1920, p. 428; McGregor in Dickerson, Distrib. Life Phil., 1928, p. 205; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.

Zosterops nigrorum luzonica; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 213; Mayr in Delacour & Mayr, Zoologica 30, 1945, p. 116 (distribution); Delacour & Mayr, Birds Philippines, 1946, p. 237; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Zosterops nigrorum luzonicus; Momiyama, Annot. Orn. Or. 2, 1933, p. 64.

Subspecific characters. Definitely brighter and more yellowish than the nominate race, both above and below; but somewhat greener, less yellow than *aureiloris*, especially on the under surface.

The lores are yellowish, not dusky as in *nigrorum*; the eye-ring is scarcely interrupted in front.

As might be expected from its range, this subspecies is in several characters somewhat intermediate between *nigrorum* and *aureiloris*; nevertheless, if the two specimens examined are representative for the race as a whole, it is not a pure intermediate, for this form has distinctly less yellow on the forehead and above the lores than either *nigrorum* or *aureiloris*.

Unfeathered parts. Iris black (Porter).

Measurements of two specimens (♂, ♀): wing 51½-54, tail 31-34, tarsus 14½-15¼, entire culmen 12¼-12½, exposed culmen 9½-10, culmen from anterior point of nostril 7-7½.

Distribution. Southeastern Luzon, whence it is known from Mayon volcano and from Sorsogon.

First collector. J. Whitehead in August 1894, at the type locality.

Not figured.

Type. The form was based on two specimens (♂, ♀)); what is probably the male cotype is now BM nr. 96.1.17.9 (specimen examined); Mayr (in Delacour & Mayr, 1945) mentions two paratypes in the AMNH collection. How there could be two paratypes, Mayr does not explain, but Ogilvie-Grant may have had a larger series at his disposal than the two specimens he actually demonstrated at the meeting of the British Ornithologists' Club.

Moult. One specimen collected at Sorsogon in March is moulting primaries; a second one from the same month and locality is not in moult. The probable cotype, referred to above, collected in August, is heavily moulting primaries.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Mayr (in Delacour & Mayr, 1945), has discussed the geographical range of this form, excluding Cap Engaño from it. He writes that one Cap Engaño bird, and two paratypes, are all immature, but that two specimens from Sorsogon distinctly show the characters of *luzonica* (these are the specimens that I have examined). Though, not having seen enough material to form a well-founded opinion, I follow Mayr in considering the Cap Engaño birds *aureiloris*, the two specimens from that locality that I could compare with the cotype of *luzonica* seemed to agree very well with it, and not with a series of *aureiloris*. Perhaps Mayr is right in stating that immature birds are much duller than adult specimens, but even so it remains curious that all four specimens collected at Cap Engaño would be immature, and none of the specimens from western Luzon and Mindoro. Incidentally, the cotype from Albany District, like the two paratypes examined by Mayr, does give the impression of being immature.

3. **Zosterops nigrorum aureiloris** Ogilvie-Grant

Zosterops aureiloris Ogilvie-Grant, Bull. B. O. C. 4, 1895, p. XL — mountains of Lepanto, Northern Luzon.

Z[osterops] innominata Finsch, Tierreich 15, 1901, p. 31 — Philippinen (Luzon) = Manila [1]).

Zosterops meyeni; Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 180 (Manila).

Zosterops aureiloris; Ogilvie-Grant, Ibis (7) 1, 1895 (Oct.), p. 453, 485 (Lepanto); Ogilvie-Grant, Ibis (7) 2, 1896, p. 468 (Mindoro, highlands); Worcester & Bourns, Proc. U. S. Nat. Mus. 20, 1898, p. 560; Worcester, Proc. U. S. Nat. Mus. 20, 1898, p. 586; J. Whitehead, Ibis (7) 5, 1899, p. 86, 232 (Abra, Luzon, 1000 ft.; Mindoro, nearly 5000 ft.); Hartlaub, Abh. Naturwiss. Ver. Bremen 16, 1899, p. 260 (Mindoro); Finsch, Tierreich 15, 1901, p. 31; Dubois, Syn. Av. I, 1902, p. 710; McGregor, Bull. Phil. Mus. 4, 1904, p. 26, 27 (Mariveles); *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 510; Sharpe, Hand-List Birds 5, 1909, p. 12; McGregor, Manual Phil. Birds, 1910, p. 619; McGregor, Phil. Journ. Sc. 16, 1920, p. 408, 428 (Abra, Luzon 300 m); McGregor, Phil. Journ. Sc. 25, 1924, p. 119 (Ilocos Norte, Luzon: Bangui, Piddig, Solsona); Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.

Zosterops luzonica; Hartert, Nov. Zool. 2, 1895, p. 488 (Laguna de Bay, not far from Manila); Ogilvie-Grant, Ibis (7) 2, 1896, p. 120 (Cap Engaño); (pt.) J. Whitehead, Ibis (7) 5, 1899, p. 232 (Cap Engaño).

Zosterops innominata; Dubois, Syn. Av. I, 1902, p. 710; Sharpe, Hand-List Birds 5, 1909, p. 12.

Zosterops nigrorum aureiloris; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 213; Peters, Bull. M. C. Z. 86, 1939, p. 119 (Lagangilang, near Bangued); Momiyama, Annot. Orn. Or. 2, 1933, p. 64; Mayr in Delacour & Mayr, Zoologica 30, 1945, p. 116 (discussion of distribution); Delacour & Mayr, Birds Philippines, 1946, p. 237; Wynne, North W. Nat. N. S. 2, 1954, p. 625; Rabor, Silliman Journ. 2, 1955, p. 300, 310 (Abra Highlands).

? *Zosterops* sp. (probably *Z. nigrorum aureiloris*); Amadon & Jewett, Auk 63, 1946, p. 549 (Baguio).

Zosterops nigrorum luzonica; Gilliard, Bull. Am. Mus. Nat. Hist. 94, 1950, p. 465, 501 (Lamao, Batan).

Subspecific characters. A very bright race, easily recognised because of the peculiarities in the loral region as discussed below; size small.

Upper parts, including rump and crown, bright Warbler Green, very much brighter and yellower than the nominate race and very close to these parts in *richmondi*; though perhaps a trifle darker and greener; a narrow frontal area, supra loral region and lores Lemon Chrome; this region rather sharply defined against the Warbler Green of the crown (cf. fig. 9a); eye-ring of average width, white, in front narrower, but not interrupted; the lores are yellow, but under the lores there is a fine black line, running from the gape

1) Based on three skins, recorded by Sharpe (1884) as *Z. meyeni*, and by Ogilvie-Grant (1895). One specimen was labelled Manila, Luzon; the other two solely Philippine Islands, collected by Hugh Cuming, Esq. As Cuming lived in Manila (cf. Proc. Zool. Soc. London 7, 1839, p. 93) it is likely that the skins were collected near Manila, to which place the type-locality is hereby restricted.

to under the eye-ring — in this peculiarity as well as in the well-defined yellow supra loral region, this form is sharply distinguished from the other races.

Under parts even deeper, though also more greenish, yellow than in *richmondi*.

Unfeathered parts. Iris dark brown; upper mandible slate-blue, tipped with black; legs and half of lower mandible lead-blue; soles of feet yellow (J. Whitehead, 1899); bill black, becoming paler, more dark grey at base of mandible; legs dark grey; nails dark brownish grey (Gilliard, 1950).

Measurements of 11 specimens (7 ♂, 3 ♀, 1 ♀): wing 51-54 (52.05), tail 32-35 (33.73), tarsus 14½-16 (15.20), entire culmen 11¾-13 (12.34), exposed culmen 9-10½ (9.52), culmen from anterior point of nostril 6¼-8 (7.08).

Distribution. Northern Luzon, south at least to the neighbourhood of Manila; Mindoro. In Luzon it has been recorded from the following localities: Mariveles; Massisiat, Abra Province; Lepanto; Ilocos Norte; Laguna de Bay near Manila; Cap Engaño; Lagangilang near Bangued; Batan. In Mindoro it has been recorded from Mt. Dulangan at nearly 5000 ft.

The vertical distribution is from sea-level to about 5000 ft.

First collector. Probably Hugh Cuming, who mailed a lot of bird-skins from Southern Luzon, covered by a letter dated Manilla, November 18, 1837. It is likely that the specimens which were destined to become the types of *Z. innominata*, were contained in this shipment.

Not figured.

Type. No type is designated in the original description, which was based on an unrecorded number of specimens from Lepanto District, northern Luzon, collected by J. Whitehead. I have seen original cotypes from the AMNH, Berlin nr. 33219, and BM nrs. 97.5.13.223 and 97.5.13.224.

The types of *Z. innominata* are in the BM; I found that two specimens are labelled "Phil. I." and "Manila" respectively, without mention of their collector, whereas the third has on the label the note "Philippines, Cuming, BM nr. 42.2.15.53". The last-mentioned specimen is juvenile, and moreover it is very dirty, nevertheless it seems to belong to *aureiloris*. As its subspecific status is fairly certain — contrary to that of the other two specimens which are in an even worse condition — and as it is the only specimen with a collector's name indicated an the label, I make this specimen a lectotype. This makes *innominata* a synonym of *aureiloris*.

Moult. Specimens collected in May (7), August (1), and December (2) are not in moult; the August specimen is in rather abraded plumage, but its condition of preservation is bad.

Nidification. Apparently not recorded.

Habits, etc. This form is, like the whole species, very little known. Whitehead (1899) found it fairly numerous at an altitude of 1000 ft. in Abra, and did not meet with it above this height in Luzon, though in Mindoro he obtained it at nearly 5000 ft. Rabor (1955) also observed it in the Abra Highlands, where he found it very common among the trees and shrubs on the edges of both dipterocarp and midmountain forests, and in the patches of mixed growths of trees and shrubs in open country. The behaviour, as he describes it, is typical of the whole group.

4. **Zosterops nigrorum meyleri** McGregor

Zosterops meyleri McGregor, Phil. Journ. Sc. 2, sect. A, 1907 (Oct.), p. 348 — Camiguin Island, P. I.

Zosterops meyleri; McGregor, Manual Phil. Birds, 1910, p. 618; Bangs, Bull. M. C. Z. 65, 1922, p. 83; McGregor, Phil. Journ. Sc. 16, 1920, p. 428; McGregor in Dickerson, Distrib. Life Phil., 1928, p. 211; Snouckaert, Alauda (2) 3, 1931, p. 18; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 214.

Zosterops meyleri meyleri; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 206; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.

Zosterops richimondi meyleri; Momiyama, Annot. Orn. Or. 2, 1933, p. 64, 113.

Zosterops nigrorum meyleri; Delacour & Mayr, Birds Philippines, 1946, p. 237; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. Can easily be distinguished from the other races by its wide eye-ring, which is particularly wide under the eye (fig. 9b). In coloration the scanty material that was available to me, is variable.

Upper parts varying from rather dull Warbler Green (though never as greyish green as, always more yellowish than, in the nominate race) to bright yellowish Warbler Green, almost identical with these parts in *richmondi*.

Unfeathered parts. Iris brown; bill black, but basal two-thirds of lower mandible leaden blue; legs and nails flesh-colour (McGregor, 1910).

Measurements of 4 specimens (2 ♂, 2 ♀): wing 53½-56 (54.38), tail 36-38 (36.75), tarsus 15¾-16 (15.88), entire culmen 12¾-13¾ (13.19), exposed culmen 9¾-11 (10.44), culmen from anterior point of nostril 7-8 (7.75).

Distribution. Only known from Camiguin Island, north of Luzon (not to be confused with Camiguin Island near Mindanao, as Bangs, 1922, did).

First collectors. R. C. McGregor and A. Celestino in July (1st), 1907.

Not figured.

Type. Destroyed in Manila in 1945. The four specimens examined, USNM nrs. 211090-93, are all paratypes.

Moult. Out of four specimens, collected in July, three are not in moult — one of these is in definitely abraded plumage — the fourth has just started

its wing moult, on both sides the 10th primary being short, and the 9th very short.

Nidification. Not recorded.

Habits, etc. Not recorded.

5. **Zosterops nigrorum richmondi** McGregor

Zosterops richmondi McGregor, Proc. Biol. Soc. Washington 17, 1904 (27 Dec.), p. 165 — nomen novum for *Zosterops flavissima* McGregor, nec *Zosterops flavissima* Hartert, 1903.

Zosterops flavissima McGregor, Bull. Phil. Mus. 4, 1904 (15 May), p. 3 (nom. nud.), 26 — Cagayancillo Island, Paragua Province, P. I.

Zosterops; McGregor, Bull. Phil. Mus. 3, 1904, p. 5, 6, 11, 16.

Zosterops richmondi; *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Sharpe, Hand-List Birds 5, 1909, p. 12; McGregor, Manual Phil. Birds, 1910, p. 619; McGregor, Phil. Journ. Sc. 16, 1920, p. 399, 416, 428; McGregor in Dickerson, Distrib. Life Phil., 1928, p. 202; Snouckaert, Alauda (2) 3, 1931, p. 18; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 214.

Zosterops meyleri richmondi; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205.

Zosterops meyleri richimondi; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.

Zosterops richimondi richimondi; Momiyama, Annot. Orn. Or. 2, 1933, p. 64.

Zosterops nigrorum richmondi; Delacour & Mayr, Birds Philippines, 1946, p. 237; Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Subspecific characters. The brightest and largest race, with deep yellow under surface.

Upper parts, including rump and crown, bright Warbler Green, decidedly brighter and yellower than the nominate race; rump and crown in this race not different in coloration from the mantle; frontal area and supra loral region Lemon Chrome; eye-ring of average width, white, interrupted in front by a partly dusky, partly yellowish, spot; lores with a narrow blackish line, continued under the eye (fig. 9c).

Under parts. On throat almost pure Lemon Chrome; remainder of under parts in coloration intermediate between Lemon Yellow and Lemon Chrome, though nearer to the latter.

No noticeable difference between the sexes.

Unfeathered parts. Not recorded on the labels of the specimens examined, nor could I find a reference in the available literature.

Measurements of 8 specimens (5 ♂, 3 ♀): wing 56-58 (57.13), tail 38-41½ (39.88), tarsus 17¼-18 (17.69), entire culmen 13½-15 (14.25), exposed culmen 10½-11¾ (11.19), culmen from anterior point of nostril 8¼-9 (8.56).

Distribution. Only known from Cagayancillo in the Sulu Sea, where it was abundant in 1903 (McGregor, 1904a and 1904b).

First collectors. R. C. McGregor and A. Celestino in January 1903.

Not figured.

Type. Destroyed in Manila in 1945. The five specimens from the USNM, the one from Chicago, and the two from the BM, examined by me, all belong to the original series. I am not aware that Cagayancillo has ever been revisited by an ornithological collector.

Moult. The 8 specimens, collected between 24 January and 8 February 1903, are not moulting wing or tail feathers, though one specimen is moulting feathers of the forehead. Several specimens show a somewhat abraded plumage. The plumage evidently is fairly soft.

Nidification. Not recorded.

Habits, etc. Not recorded; as tiny Cagayancillo cannot boast mountains of any great height, this race must be a lowland form.

Species 9. **Zosterops montana** Bonaparte

Description. A small to average sized species of the ordinary *Zosterops*-pattern.

Upper parts. Between Pyrite Yellow and Warbler Green; rump slightly more yellow; forehead, including supra loral region, yellow; eye-ring white, of medium width, interrupted in front by the usual blackish spot; lores and a stripe under the eye-ring black; primaries, secondaries, and rectrices blackish brown, with greenish outer edges.

Under parts. Throat, upper breast, and under tail coverts yellow; belly and flanks either greyish white, with or without a more or less pronounced yellowish streak over the centre of the abdomen, or yellow like the remainder of the under parts; in the white-bellied races the flanks are sometimes tinged with buff, which I am inclined to consider a result of post-mortem discoloration rather than a real character.

Unfeathered parts. Bill black, under bill often paler, especially at its base; iris always pale, generally greyish or whitish, sometimes apparently pale brownish or yellowish. The pale iris seems to be a reliable specific character, found in all races. Records of darker (e. g., brown) irides are probably erroneous.

Measurements are given in table V.

Distribution (fig. 10). Central and Southern Sumatra, Java, Bali, Lombok, Soembawa, Flores, Timor, Celebes, Boeroe, Ceram, Batjan, Ternate, Mindanao, Negros, Mindoro, and Luzon. A true mountain species, never found below 1000 meters, and generally much higher. Absent from Borneo; in Panay probably yet to be discovered.

Ecology. A montane species that seems partial to the more or less open mountain tops, and is not usually found in heavy forest.

Geographical variation. The main variation exists in the following points.

TABLE V

Zosterops montana

	number of specimens	wing	tail	av. wing	av. tail	tail : wing index
Padang Highlands	7	57-60	37-43	58.07	38.86	66.91 %
Korintji	7	56-57½	35-40	56.93	37.57	65.75 %
Dempo (*difficilis*)	6	58-60	38½-41	58.83	40.08	68.13 %
Papandajan	12	54-56½	34-38	55.68	36.72	65.22 %
Tjerimai	4	57.59	36-39	57.88	37.88	65.58 %
Soembing-Sindoro	51	56½-60½	35½-43	58.35	39.13	66.93 %
Ardjoeno	3	58 *)	36-38	58.—	37.00	63.79 % *)
Tengger	15	54-58	35-39½	56.30	37.21	66.16 %
Idjen	13	55-58	34-38	56.12	36.12	64.36 %
Bali	6	54-55½	33-36	55.00	34.42	62.58 %
Lombok	9	57-59½	36-40	57.61	37.94	65.86 %
Soembawa	1	56	37	56.—	37.—	66.07 %
Flores	6	55-57	35½-40½	55.67	37.67	67.66 %
Moetis (*steini*)	11	59-62½	38-40	60.00	39.27	65.45 %
Ramelan (*steini*)	9	56½-61	37-40	58.44	38.28	65.49 %
Bonthain	7	54-57	33-36	55.21	34.36	62.23 %
Latimodjong	7	56-58	36-40	57.00	38.00	66.67 %
Minahassa & Central Celebes	21	51-56	33-37	53.90	35.26	65.42 %
Boeroe	3	57-58	36½-38	57.67	37.17	64.45 %
Apo	11	55½-59	34-38½	57.32	36.41	63.52 %
Katanglad	6	54-56½	33½-36	55.50	35.08	63.21 %
Ilong-Ilong	6	54½-56½	34-37½	55.67	35.33	63.47 %
Malindang	12	56-59	35-39	57.21	37.04	64.75 %
Southern Negros	10	55-57	33½-37½	55.75	35.05	62.87 %
Canloan (*pectoralis*)	8	56-60½	35-39	57.75	37.38	64.72 %
Mindoro	3	54-58	37-37½	56.33	37.33	66.27 %
Luzon (*whiteheadi*)	12	52½-55	32-34½	53.67	33.18	61.76 %
Ceram (*seranensis*)	3	56-56½	37-38½	56.17	37.50	66.77 %
Batjan (*obstinata*)	8	57-60	36-41	58.00	38.13	65.73 %
Ternate (*ternatana*)	4	55-58	36-38	56.13	36.75	65.48 %

*) Wing length and index of one specimen only.

1) Amount of yellow on the forehead.

2) Tone of colour of the mantle, sometimes more yellowish, sometimes more greenish.

3) Colour of the under parts, the amount of yellow varying from no traces of yellow on flanks and belly to an entirely yellow under side.

4) Measurements (wing-length).

5) Size of bill.

The differences between the various races and infra-subspecific groups are discussed under the separate headings of the subspecies.

Related species. *Zosterops montana* belongs to the great group of very

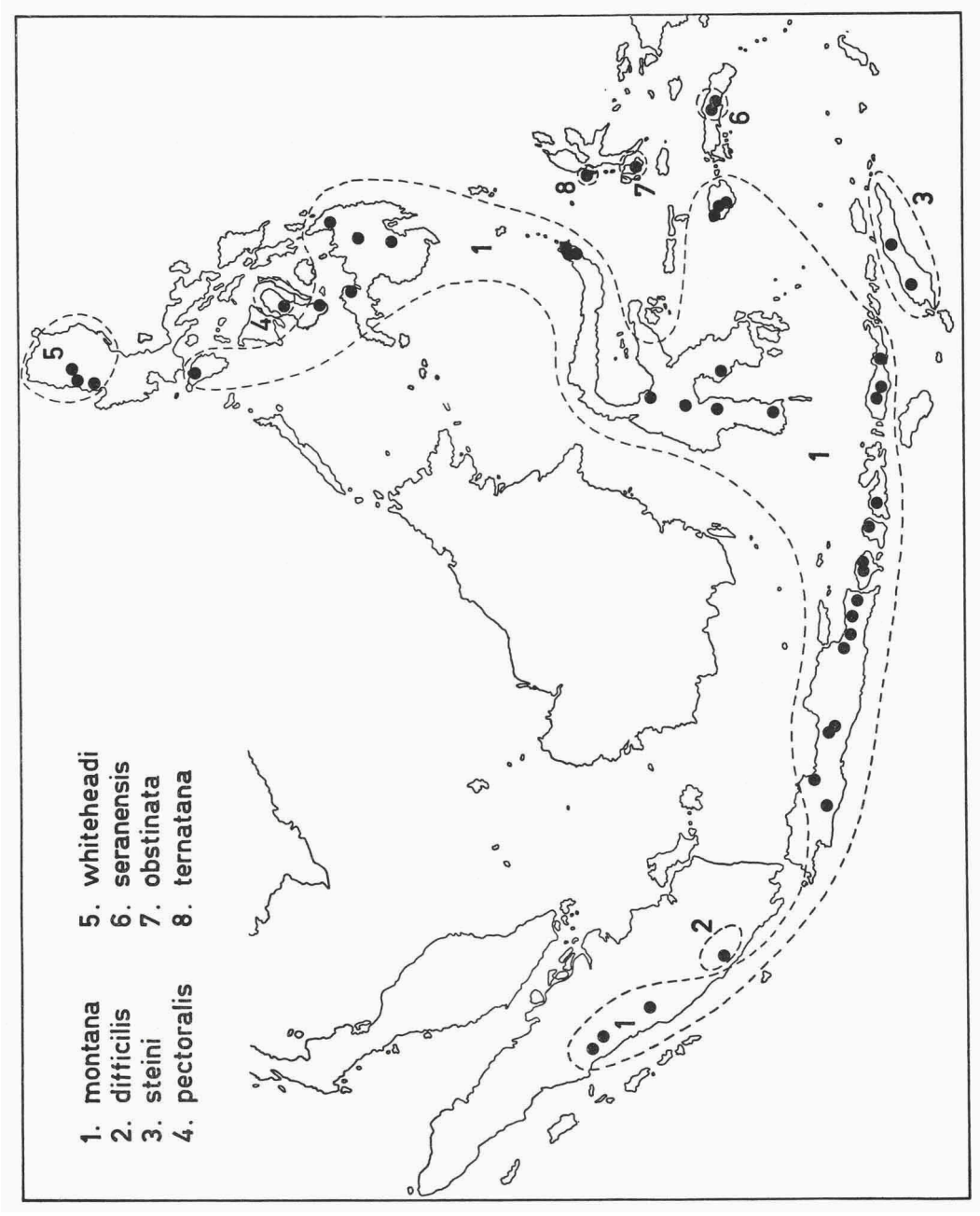

Fig. 10. The distribution of *Zosterops montana* and races.

similar species with greenish mantle, yellow forehead, throat and crissum, and pale grey or yellow belly and flanks, that also includes *Z. palpebrosa* and *Z. citrinella,* and in the past it has been associated — and often confused — with both.

Mayr (1945, p. 116) suggested a close relationship with *Z. novaeguineae,* but I do not consider the evidence convincing; for a fuller discussion, see under *Z. novaeguineae.*

The relation with *Z. palpebrosa,* notwithstanding the close similarity of the two species, is also not very well founded, as I have already tried to show in the discussion of the relations of that species. As stated above, the similarity is largely caused by the fact that both these species — as also a score of others — have the general appearance that is found in many widely separated species, and is apparently not of much value for deciding their true affinities.

Origin. Perhaps it is justified to assume, with Delacour & Mayr (1946) that: "The species has its center of distribution in Celebes and the Moluccas and extends to Timor, Sumatra, and the Philippines".

Though the above-mentioned authors do not especially say so, their statement seems to imply that they consider the Moluccan region also the center of origin of the species. The slight geographical variation over the greater part of its range indicates that, in these parts, it is a fairly young species; and it is natural — taking into consideration that it is a mountain bird, so that even on the larger islands the populations are quite isolated — to regard the region where the most distinct subspecies are found as its original home. This is certainly the Moluccan region, where three entirely yellow-bellied races (*ternatana, obstinata, seranensis*) and one white-bellied race (*montana,* on Boeroe) are found.

As regards the variation outside this region, the Philippine forms are very little differentiated, and the Celebes-populations are not worth recognition. The race from Timor is fairly distinct from the more greenish specimens of the nominate race, but rather similar bright specimens pop up in Java (Mt. Tjerimai, Mt. Soembing and Sindoro) and Bali. The Dempo-race (*difficilis*) in S. Sumatra has a yellow under side, but whereas the Moluccan races have the whole under surface a deep and bright yellow, in *difficilis* traces of greyish are often present on the flanks, showing that the transition from grey- to yellow-bellied has not yet been completed. Indeed there is little doubt that it is a "young" form.

Several other populations seem to be in the process of transition to a yellow belly, notably so *pectoralis* from Negros and "*oriochares*" from

Celebes, which is a very variable population as regards the amount of yellow on the under surface.

The facts found here are of some evolutionary significance, as it is almost certain that yellow-bellied forms are evolving from grey-bellied ones, and not vice versa.

The hypothetical picture of origin and dispersal as presented here, is conflicting with that given by Stresemann (1939, p. 379), who states that *Z. montana* has "sicher" colonized Celebes from the Philippines, whereas I would rather assume the Philippines to have been colonized from Celebes, a view better in accordance with the central position Celebes takes in the range of the species.

Discussion. Bonaparte's (1850) short and erroneous description of the species: "Similis Z. flavae ex Java, sed paullo major" has caused considerable confusion. Notwithstanding the fact that Finsch (1901) already wrote: "Bonaparte vergleicht die Art in seiner kurzen Diagnose aus Versehen mit *Z. flava*, anstatt mit *Z. citrinella*, aber seine Heimatsangabe "Sumatra" lässt keinen Zweifel, dass er die typischen Exemplare Müller's vor sich hatte, die später von Hartlaub irrthümlich als von "Morotai" beschrieben wurden" [1]), Stresemann (1931) rejected this name again with the remark: "Seit Finsch ... ist diese Form mehrfach als *Zosterops montana* Bp. bezeichnet worden. Bonaparte's Diagnose kann aber selbst bei gutem Willen nicht auf sie bezogen werden...". Apparently Stresemann overlooked the fact that the types were, and are, in Leiden, so that, even though the description was faulty, there could be no doubt as to the identity of the species.

The same specimens were described by Hartlaub (1865) as *Zosterops chlorates*, erroneously recorded from Morotai instead of Sumatra. This error was, of course, also bound to create confusion sooner or later, which resulted in Kloss's (1931) renaming of the Central Sumatra specimens with the following comment: "On consideration I am now unable to refer this bird to *Z. montana* Bp. (probably from Mt. Singgalang or Mt. Merapi in the Padang Highlands) as the description of that is "Like *Z. flava* of Java but a little larger". Neither can I apply to it Hartlaub's name *Z. chlorates*, for a bird from Morotai Island, in the northern Molucca group. This provenance has been rejected by several authors, but I see no need to query it. There is no

1) Personally I am convinced that Bonaparte compared it with *Z. palpebrosa buxtoni*, a form that, contrary to *Z. citrinella*, does occur in Java. Moreover the specimens in Leiden may well have been labelled as *Z. flava* at the time. The lectotype of *Z. buxtoni* = *Z. lateralis* Hartlaub, was named *Dicaeum flavum* by Boie (1828) and by Temminck (1835), and it seems very likely that it was labelled accordingly. The question, of course, is of little practical significance because the type-specimens of *montana* are preserved, and we therefore exactly know which bird was named *montana* by Bonaparte.

reason to doubt the presence of a *Zosterops*, and of *chlorates* in particular, on Morotai: that island is in an area possessing numerous forms only subspecifically distinct from it;".

Here, as in the preceding case, one wonders why an author who has not been able to personally examine the type specimens, rejects the explicit statements of those ornithologists who did (cf. Salvadori, 1881: "I due esemplari tipici, conservati nel Museo di Leida, sono indicato di Sumatra, e non di Morty, come per errore disse l'Hartlaub"; later Finsch, 1901a, 1901b); this quite apart from the fact that Salomon Müller never visited Morotai, and that there are no specimens of Zosteropidae from Morotai, collected before 1865 (when Hartlaub described *chlorates*) in the Leiden Museum. Actually no white-eyes were known to exist at all in Morotai until 1938, when de Haan collected the first, and only known, specimens of *Z. atriceps dehaani*.

It was not before 1939 that Stresemann finally accepted the name *Zosterops montana*: "Ich habe in meiner Revision (1931) diese Gruppe als *chlorates*-Gruppe bezeichnet, weil mir der ältere Name *Zosterops montana* Bonaparte 1850 mit seiner Diagnose "similis Z. flavae ex Java, sed paullo major" undeutbar erschien. Inzwischen hat aber das Berliner Museum den Balg eines *Zosterops chlorates difficilis* Rob. & Kloss 1918 vom G. Dempoe (Sumatra) erworben, und seitdem ich diese gelbbäuchige Rasse kenne, ist es mir unzweifelhaft geworden, dass die Namen *Z. montana* Bp. und *Z. chlorates* Hartlaub auf sie bezogen werden müssen. Finsch ... war also im Recht, wenn er angab, die Typen dieser beiden Namen seien identisch und von Salomon Müller im Gebirge von Sumatra, wahrscheinlich in den Padang-Hochländern gesammelt worden. Daraus ergeben sich die folgenden Aenderungen der Nomenklatur:

1. Der Rassenkreis heisst *Zosterops montana*, nicht *Zosterops chlorates*.

2. Die Rasse des G. Korintji und G. Talamau muss *Z. montana korinchi* Kloss 1931, nicht *Z. chlorates chlorates* Hartlaub heissen.

3. Die Rasse des G. Dempoe muss *Z. montana montana* Bonaparte 1850, nicht *Z. chlorates difficilis* Robinson & Kloss 1918 heissen".

Curiously Stresemann altogether neglects the fact that Finsch, on the place quoted by Stresemann, clearly described the types as similar to *Z. citrinella* (with greyish white under parts), and not to *Z. flava* (with yellow under parts). Finsch (1901) also gives a good description of the types. Stresemann does not explain how Salomon Müller could have obtained specimens of the yellow-bellied race from Mt. Dempo. Whereas Müller is known to have collected extensively in the Padang Highlands, he never ascended Mt. Dempo, a mountain that remained ornithologically unexplored until 1881, when Forbes climbed it and obtained the first specimens of the yellow-bellied race of

Z. montana. This is the more remarkable as Stresemann himself quotes evidence from Finsch that the types were collected in the Padang Highlands.

However this may be, the two type specimens in the Leiden Museum agree with specimens collected by Jacobson on Mt. Talamau, Ophir District, Padang Highlands, but for the fact that their under parts are more strongly washed with isabel, which is certainly to be attributed to their having been mounted, and presumably having been exposed to sunlight during a long period. Moreover, the type locality of the specimens has actually been published by Müller (1837); a full quotation of the relevant passage in Müller's paper, which is presumably scarce outside libraries in the Netherlands, will be found under the heading "type" of the nominate race (p. 184).

The nomenclatorial consequences of these points, as opposed to Stresemann's currently accepted views, are the following:

1) The race of Central Sumatra (Merapi, Korintji, Talamau) must bear the name *Zosterops montana montana* Bonaparte, with type locality Mt. Merapi, Padang Highlands, not that of *Zosterops montana korinchi* Kloss, 1931.

2) The race of Mt. Dempo must be known as *Zosterops montana difficilis* Robinson & Kloss, 1918, not *Zosterops montana montana* Bonaparte, 1850.

A discussion of the many races included here for the first time under the name *Zosterops montana montana* Bp., will be found under that race.

1. **Zosterops montana montana** Bonaparte

Z[osterops] montana Bonaparte, Consp. Gen. Av. I, 1850, p. 398 — ex Sumatra = Mt. Merapi, Padang Highlands (cf. discussion of types).

Z[osterops] chlorates Hartlaub, Journ. f. Orn. 13, 1865 (Jan.), p. 23 — Morotai [errore!] = Mt. Merapi, Padang Highlands.

Zosterops neglecta Seebohm, Bull. B. O. C. no. 5, 1893, p. XXVI — East Java = near Tosari at 5000 ft. (cf. Seebohm, 1893).

Zosterops sarasinorum Meyer & Wiglesworth, Journ. f. Orn. 42, 1894, p. 114 — G. Klabat, 2000 m, N. Celebes.

Zosterops whiteheadi vulcani Hartert, Bull. B. O. C. 14, 1903, p. 14 — Mt. Apo, Mindanao, 8000 ft.

Zosterops halconensis Mearns, Phil. Journ. Sc. 2, sect. A, 1907, p. 360 — Mount Halcon, Mindoro.

Zosterops palpebrosa foghaensis Stresemann, Nov. Zool. 19, 1912, p. 347 — Gunung Fogha (= Kapala Madang = "Mount Mada"), N. W. Buru, 5500 ft.

Zosterops palpebrosa florensis Rensch, Orn. Monatsber. 36, 1928, p. 9 — Geli Moetoe (1500 m), Flores.

Zosterops palpebrosa sindorensis Siebers, Treubia 11, 1929, p. 151 — G. Tjerimai, 3072 m, West-Java.

Zosterops chlorates korinchi Kloss, Treubia 13, 1931 (Dec.), p. 369 — Korinchi Peak, 10000 ft., Sumatra.

Zosterops chlorates oriochares Stresemann, Orn. Monatsber. 46, 1938, p. 45 — Latimodjong Gebirge, 2300 m, Südliches Central Celebes.

Zosterops chlorates origenes Stresemann, Orn. Monatsber. 46, 1938, p. 46 — Wawa Karaeng 2500 m, Lompo Batang (= Pik von Bonthain), Süd Celebes.

Zosterops montana minor Hoogerwerf & de Boer, Zool. Med. 28, 1947, p. 252 — Tegal Aloen-aloen, Gn. Papandajan, W. Java, 2500 m.

Zosterops montana minima Hoogerwerf, Zool. Med. 30, 1949, p. 108 — nomen novum for *Zosterops montana minor* Hoogerwerf & de Boer, nec *Zosterops albiventer minor* Meyer.

Zosterops montana diuatae Salomonsen, Vidensk. Medd. Dansk naturh. Foren. 115, 1953, p. 280 — Mt. Hilong-Hilong (1350 m altitude), Diuata Mts., Agusan Prov., Mindanao.

Zosterops montana finitima Ripley & Rabor, Condor 58, 1956 (24 July), p. 290 — Luzuniaga, 4000 ft., Cuernos de Negros, Negros Island, Philippine Islands.

Note. Because of the wide distribution of this subspecies and its complicated synonymy, the following references have been arranged geographically, so that information concerning special populations can readily be found.

Central Sumatra

Dicaeum; Müller, De Gids, Wetensch. Bijdr., 1837, p. 10 (Goenoeng Merapi, op 7000 tot 8000 voeten hoogte).

Zosterops montana; Reichenbach, Handb. spec. Orn. Meropinae, 1852, p. 96; Finsch, Notes Leyden Mus. 22, 1901, p. 222; Finsch, Tierreich 15, 1901, p. 11; Dubois, Syn. Av. I, 1902, p. 706; Sharpe, Hand-List Birds 5, 1909, p. 1; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 248, 283 (Korinchi Peak, 7300 and 10000-10500 ft.); Robinson & Kloss, J. Straits Br. R. As. Soc. 81, 1920, p. 86 (mountains of W. Sumatra); Robinson & Kloss, Journ. F. M. S. Mus. 8, add., 1923, p. 354; Robinson & Kloss, Journ. F. M. S. Mus. 11, 1924, p. 338 (Mt. Talamau, Ophir Districts, 2500-2600 m).

Oreosterops montana; Bonaparte, Compt. Rend. Ac. Sc. 38, 1854, p. 264; Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1890, p. 401.

Zosterops chlorates; G. R. Gray, Hand-List Birds 1, 1869, p. 163 (Morty I.); Salvadori, Orn. Pap. II, 1881, p. 374 (Sumatra).

Orosterops montana; G. R. Gray, Hand-List Birds 1, 1869, p. 164 (Sumatra).

Zosterops chlorater; Giebel, Thes. Orn. 3, 1877, p. 774 (Ins. Moretai).

Zosterops chloratis; Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1890, p. 401 (Sumatra, Moluques).

Zosterops; Jacobson, Trop. Nat. 8, 1919, p. 121 (Gng. Talamau, Ophir).

Zosterops chlorates chlorates; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 215 (G. Talamau, G. Korintji); Chasen, Bull. Raffl. Mus. 11, 1935, p. 265.

Zosterops chlorates korinchi; Snouckaert, Alauda (2) 4, 1932, p. 110; Gibson-Hill, Bull. Raffl. Mus. 19, 1949, p. 150.

Zosterops montana korinchi; Stresemann, Journ. f. Orn. 87, 1939, p. 160, footnote 2 (G. Korintji und G. Talamau); Hoogerwerf & de Boer, Zool. Med. 28, 1947, p. 253 (Piek van Korintji, 3300 m); Hoogerwerf, Zool. Med. 30, 1949, p. 109.

West and Central Java

Zosterops palpebrosa subsp. nov. (prope: *neglecta*); H. Docters van Leeuwen, Treubia 10, 1928, p. 446 (Soembing, 1900-3300 m; Sindoro, 3100 m).

Zosterops palpebrosa sindorensis; Dammerman & Siebers in Dammerman, Treubia 11, 1929, p. 63 (nom. nud.); Siebers, Treubia 11, 1929, p. 148 (nom. nud.); Kuroda, Tori 6, 1930, Eng. col., p. 75 (Mt. Tjerimaij, 3072 m); Snouckaert, Alauda (2) 3, 1931, p. 17; W. M. Docters van Leeuwen, Verh. Kon. Ak. Wetensch. (2) 31, 1933, p. 136, 137, 160, 240 (Sumbing and Sindoro); Kuroda, Birds Isl. Java I, 1933, pl. 6 fig. 13.

Zosterops chlorates sindorensis; Kuroda, Birds Isl. Java I, 1933, p. 127 (West and Mid Java); Chasen, Bull. Raffl. Mus. 11, 1935, p. 266; Kuroda, Birds Isl. Java II, 1936, p. 698, 704.

Zosterops montana sindorensis; Hoogerwerf & de Boer, Zool. Med. 28, 1947, p. 252; Delacour, Birds Malaysia, 1947, p. 319; Hoogerwerf, Treubia 19, 1948, p. 134; Voous, Limosa 21, 1948, p. 100 (Mt. Tjaremei at about 3000 m); Hoogerwerf, Zool. Med. 30, 1949, p. 107; Hoogerwerf, Limosa 22, 1949, p. 248; Hoogerwerf, Bijdr. Oöl. Eil. Java, 1949, p. 248; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops montana; Bartels Jr., Trop. Nat. 29, 1940, p. 140 (Papandajan).

Zosterops montana subsp.; Hoogerwerf, Treubia 19, 1948, p. 108, 134 (Papandajan).

Eastern Java and Lesser Soenda Islands

Zosterops neglecta; Seebohm, Ibis (6) 5, 1893, p. 219, 258 (Tosari, 5000 ft.); Whitehead, Exp. Mount Kina Balu, 1893, p. 91, 261 (Tosari); Vorderman, Nat. Tijdschr. Ned. Ind. 60, 1901, p. 66, 143 (Tosari); Finsch, Tierreich 15, 1901, p. 16; (pt.) Dubois, Syn. Av. I, 1902, p. 707 (Java, Flores, Sumbawa, Lombok); Finsch, Journ. f. Orn. 54, 1906, p. 312, 321; Sharpe, Hand-List Birds 5, 1909, p. 4.

Zosterops citrinella; Hartert, Nov. Zool. 3, 1896, p. 540, 557, 594 (Mount Arjuno, 8000 and 10000 ft.; Lombok, 4000, 5000 and 6000 ft.; Lombok, 3000 to 4500 ft.); Hartert, Nov. Zool. 4, 1897, p. 520 (Flores).

Zosterops zitrunella; Elbert, Die Sunda-Expedition I, 1911, p. 30 (Segare-Anak, Lombok).

Zosterops intermedia; Elbert, Die Sunda-Expedition I, 1911, p. 30 (Segare-Anak, Lombok).

Zosterops palpebrosa neglecta; Stresemann, Nov. Zool. 19, 1912, p. 346 (Gebirge von Ost-Java, Bali, Lombok und Flores oberhalb 3000 ft.); Stresemann, Nov. Zool. 20, 1913, p. 366 (Bali: Gunung Bratan, 6500 ft.; Batur, 3500 ft.; Kintamani, 4000 ft.); Robinson & Kloss, Treubia 5, 1924, p. 298 (E. Java: Ongop-Ongop); Dammerman & Siebers in Dammerman, Treubia 11, 1929, p. 63; Bartels & Stresemann, Treubia 11, 1929, p. 143; Kuroda, Tori 6, (29), 1930 (April), Eng. col. p. 74 (Tosari, 6000-6500 ft.); Rensch, Eine biol. Reise Kl. Sunda-Inseln, 1930, p. 30, 47 (Rindjani, Lombok; Sembalun-Hochebene); Mathews, Syst. Av. Australas. II, 1930 (July), p. 699.

Zosterops aureiventer; Porsch, Jahrb. wiss. Bot. 63, 1924, p. 603 (Tosari).

Zosterops palpebrosa florensis; Rensch, Eine biol. Reise Kl. Sunda-Inseln, 1930, p. 147 (West-Flores); Mathews, Syst. Av. Australas. II, 1930 (July), p. 699; Snouckaert, Alauda (2) 3, 1931, p. 17.

Zosterops palpebrosa; Rensch, Eine biol. Reise Kl. Sunda-Inseln, 1930, p. 171-172 (Batu Dulang, Sumbawa; Badjawa, Flores; Segare Anak, Sumbawa; Geli Mutu, Flores); Berlioz, Ois. & Rev. Fr. d'Orn. N. S. 6, 1936, p. 385 (Lombok).

Zosterops chlorates neglecta; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 215; Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 618 (Plawangan, Lombok; Batoe Doelang, Sumbawa); Kuroda, Birds Isl. Java I, 1933, p. 126; Chasen, Bull. Raffl. Mus. 11, 1935 (Dec.), p. 226 (Java (east), Bali); Kuroda, Birds Isl. Java II, 1936, p. 699, 700, 704, 723, 727, 729 (E. Java, Bali, Lombok, Sumbawa).

Zosterops chlorates florensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 215; Rensch, Mitt. Zool. Mus. Berlin 17, 1931, p. 619 (Badjawa, Geli Moetoe, on Flores); Kuroda, Birds Isl. Java II, 1936, p. 734 (Flores).

Zosterops chlorates; Rensch, Gesch. des Sundabogens, 1936, p. 97 (Java).

Zosterops montana neglecta; Stresemann, Journ. f. Orn. 87, 1939, p. 161, scheme; Kooiman, Irena 1, 1941, p. 10, 18 (Ijang-Hoogland); Delacour, Birds Malaysia, 1947, p. 319; Hoogerwerf & de Boer, Zool. Med. 28, 1947, p. 253; Hoogerwerf, Treubia 19, 1948, p. 134; Hoogerwerf, Zool. Med. 30, 1949, p. 108; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops montana florensis; Hoogerwerf & de Boer, Zool. Med. 28, 1947, p. 253; Hoogerwerf, Zool. Med. 30, 1949, p. 109; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Celebes

Zosterops sarasinorum; Meyer & Wiglesworth, Abh. Ber. Mus. Dresden 5, 1894/95, nr. 8, 1895 (May), p. 12 (Klabat, 2000 m); Meyer & Wiglesworth, Abh. Ber. Mus. Dresden 6, 1896/97, nr. 1, 1896 (Jan.) p. 6 (Soputan Sattel, massenhaft; Rurukan: Krater des Masarang; Lokon); Hartert, Nov. Zool. 3, 1896, p. 153 (Bonthain Peak, above 6000 ft.); Hartert, Nov. Zool. 4, 1897, p. 157 (Bonthain Peak, 5000 ft.); Meyer & Wiglesworth, Birds Celebes, 1898, p. 100, 491, pl. 31; Finsch, Tierreich 15, 1901, p. 18; Dubois, Syn. Av. I, 1902, p. 707; Sharpe, Hand-List Birds 5, 1909, p. 4; Riley, Proc. U. S. Nat. Mus. 64, art. 16, 1924, p. 87 (Goenoeng Kalabat, 1830 meters; Toemaratas; Toewo Mountain, Besoa; Rano Rano); Gardner, Proc. U. S. Nat. Mus. 67, art. 19, 1925, p. 26 (tongue); Porsch, Biol. Gen. 5, 1929, p. 161 (tongue).

Zosterops Sarasinorum; P. & F. Sarasin, Reisen in Celebes I, 1905, p. 27 (Klabat).

Zosterops sarasinorum sarasinorum; Mathews, Syst. Av. Australas. II, 1930, p. 697.

Zosterops chlorates sarasinorum; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216; Stresemann, Ibis (13) 6, 1936, p. 360; Stresemann, Orn. Monatsber. 46, 1938, p. 45.

Zosterops montanus sarasinorum; Stresemann, Journ. f. Orn. 87, 1939, p. 307.

Zosterops montana sarasinorum; Stresemann, Journ. f. Orn. 88, 1940 (Jan.), p. 61; van Marle, Limosa 13, 1940 (Aug.), p. 66 (Minahasa); Coomans de Ruiter, Ardea 38, 1950, p. 46 (Minahasa: Kelelondei-hoogvlakte op 1380 m); Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops montana origenes; Stresemann, Journ. f. Orn. 88, 1940, p. 62 (Lombasang 1100 m, Wawa Karaeng 2500 m).

Zosterops montana oriochares; Stresemann, Journ. f. Orn. 88, 1940, p. 62 (Latimodjong-Gebirge 1800-3500 m, Tanke Salokko 1500 m); Salomonsen, Vidensk. Medd. Dansk naturh. Foren. 115, 1953, p. 280; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Zosterops montana origines; Wynne, North W. Nat. N. S. 2, 1954, p. 324.

Boeroe

Zosterops palpebrosa foghaensis; Stresemann, Nov. Zool. 21, 1914, p. 362, 364, 371, 391 (Buru: Fogha 1850 m); Hartert, Nov. Zool. 27, 1920, p. 435 (Gunong Fogha 5500 ft.); Mathews, Syst. Av. Australas. II, 1930, p. 698; Snouckaert, Alauda (2) 3, 1931, p. 16.

Zosterops foghaensis; Siebers, Treubia 7, suppl., 1930, p. 295 (Buru: Tagalago 1330 m, Fakal 1200 m).

Zosterops chlorates foghaensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216.

Zosterops montana foghaensis; van Bemmel, Treubia 19, 1948, p. 331; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Mindanao

Zosterops vulcani; *McGregor & Worcester, Hand-List Birds Phil. Is., 1906, p. 95; Ogilvie-Grant, Ibis (8) 6, 1906, p. 473 (Mt. Apo 8000 ft.); Sharpe, Hand-List Birds 5, 1909, p. 7; McGregor, Manual Phil. Birds, 1910, p. 616; McGregor, Phil. Journ. Sc. 16, 1920, p. 411, 427 (Mt. Apo); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 207; Hachisuka, Ois. & Rev. Fr. d'Orn. N. S. 1, 1931, p. 589 (mont Apo); Hachisuka, Birds Phil. Isl. I, 1931, p. 41.

Zosterops whiteheadi vulcani; Hartert, Nov. Zool. 27, 1920, p. 436; Snouckaert, Alauda (2) 3, 1931, p. 18.

Zosterops chlorates vulcani; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216; Momiyama, Annot. Orn. Or. 2, 1933, p. 64.

Zosterops montana vulcani; Mayr in Delacour & Mayr, Zoologica 30, 1945, p. 116; Delacour & Mayr, Birds Philippines, 1946, p. 235; Salomonsen, Vidensk. Medd. Dansk naturh. Foren. 115, 1953, p. 280, 281; Wynne, North W. Nat. N. S. 2, 1954, p. 624.
Zosterops meyeni vulcani; Hachisuka, Contrib. Orn. Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.

Negros

Zosterops montana pectoralis; (pt.) Rabor, Auk 60, 1952, p. 257; Salomonsen, Vidensk. Medd. Dansk naturh. Foren. 115, 1953, p. 280, 281.

Mindoro

Zosterops halconensis; McGregor, Manual Phil. Birds, 1910, p. 616; McGregor, Phil. Journ. Sc. 16, 1920, p. 410, 427 (Mt. Halcon 1400 m); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 204; Snouckaert, Alauda (2) 3, 1931, p. 18.
Zosterops meyeni halconensis; Hachisuka, Contrib. Birds Phil. 2, 1930, p. 205; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.
Zosterops halconis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216.
Zosterops chlorates halconensis; Momiyama, Annot. Orn. Or. 2, 1933, p. 64.
Zosterops montana halconensis; Delacour & Mayr, Birds Philippines, 1946, p. 235; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. As the species. Belly and flanks greyish white, with or without a yellow streak over the middle of the under parts. In some populations this streak is well developed, in others almost obsolete, whereas several populations are quite variable in this character. The amount of yellow on the forehead is also subject to a fairly considerable amount of both geographic and individual variation. Further particulars are given in the discussion of this race.

According to Robinson & Kloss (1918), "young birds are duller in colour and have the yellow of the throat more greenish and that of the forehead less differentiated from the rest of the head. The brownish ashy of the flanks is not so marked". I have not been able to verify these points.

Unfeathered parts. Iris greyish white; bill, upper horny black, lower grey, tip black; legs leaden, or upper bill brownish black, lower grey, tip black; legs grey (G. Talamau, Jacobson); iris hazel; bill black, basal two thirds of lower mandible slate; feet pale slate (Kerintji, Robinson & Kloss); eye white; bill, upper black, lower white; legs (fleshy) blue (Papandajan, A. de Vos); iris brown; bill black; feet black (Tjeremai, Menden) [1]; iris brown; bill

1) It is significant that the commercial collector Menden invariably describes the irides as brown, whereas careful collectors as Jacobson and van Bemmel describe them as pale grey in specimens belonging to the same populations. Menden's records are doubtless false. In this connection I want to draw attention to the drongo *Dicrurus hottentottus banggaiensis* Vaurie (1952), described as distinct from the Celebes-form by having a brown instead of a white iris, the brown iris being given on the authority of Menden. Until material from Banggai has been taken, and the colour of the soft parts has been recorded, by a trustworthy collector, the subspecies *banggaiensis* must be considered an extremely doubtful one.

black; feet black (Ardjoeno, Menden); iris white; bill black; feet dull cobalt (Tosari, Whitehead, 1893); iris greyish white; bill brownish black, lower grey, or upper and lower black, or bluish grey; legs pale greyish blue, or pale bluish grey, or dark grey (Tengger, van Bemmel); iris greyish white; bill brownish black, lower grey; legs dark grey (Tengger, Soeparma); iris greyish white; bill brownish black, lower grey; legs dark grey (Tengger, Wegner); eyes black, or dark grey, or very pale grey, or whitish (greyish); bill black (horny underneath), or black, or dark to light horny, or bluish black, or horny black, or horny, or dull cobalt (Ngadiwono, Kooiman); iris white, or greyish white, or whitish grey; bill black, or upper black, lower pale grey with a black tip; feet blackish grey, or dark grey, or dark bluish grey (Bali, Stresemann); iris yellowish white, or pale yellow-brownish; bill, upper black or blackish grey, lower pale grey, or horny white, or whitish leaden; feet dark grey, or dark brown (Lombok, Rensch); iris brownish white; bill black, lower horny white; feet grey (Soembawa, Rensch); iris white; bill, upper black, lower horny white; feet dark grey, or leaden (Flores, Rensch); iris whitish grey, or dirty white; bill black, or black/grey; feet grey, or dark grey, or greyish green (Piek van Bonthain, Heinrich); iris yellowish green, or greenish yellow; bill black, or upper black, lower grey; feet grey (Latimodjong, Heinrich); iris whitish (Tanke Salokko, Stresemann, 1940, ex Heinrich); iris pale brown, or very pale brown; bill black, or upper black, lower greyish blue, or dark horny, or upper dark horny, lower paler; legs black, or dark horn colour, or horn colour (Minahassa, Coomans de Ruiter); iris sepia; bill above black, base of under mandible bluish; feet and legs slate colour (Minahassa, Meyer & Wiglesworth, 1898, ex Sarasin); iris greyish white; feet dark grey; upper mandible and tip of lower mandible black, base of lower pale grey (Boeroe, Stresemann, 1912); eye pale grey, blackish near the rim, or white inner ring, black outer ring; bill, upper black, lower pale grey with a black tip; legs pale grey (Boeroe, Toxopeus); iris brownish grey; bill black above and at tip, with its basal $^2/_3$ of mandible plumbeous; feet and claws plumbeous (Mt. Apo, Mindanao, Mearns); iris light brown; legs and feet lead grey; nails pale flesh (Ilong Peak, Halcon, Mindoro, Rabor).

Measurements. Padang Highlands, 7 specimens (2 ♂, 4 ♀, 1 ♂): wing 57-60 (58.07), tail 37-43 (38.86), tarsus 17-17¾ (17.14), entire culmen 12-14 (13.39), exposed culmen 9¾-11 (10.32), culmen from anterior point of nostril 7½-8 (7.86).

Kerintji, 7 specimens (5 ♂, 2 ♀): wing 56-57½ (56.93), tail 35-40 (37.57), tarsus 16¼-17¾ (17.18), entire culmen 13-15 (13.75), exposed

culmen 10½-11 (10.68), culmen from anterior point of nostril 7½-8½ (8.11).

Papandajan, 12 specimens (8 ♂, 2 ♀, 2 ○): wing 54-56½ (55.68), tail 34-38 (36.32), tarsus 16-18 (16.75), entire culmen 11¾-13 (12.23), exposed culmen 8-9¾ (9.09), culmen from anterior point of nostril 6½-7 (6.84).

Tjerimai, 4 specimens (3 ♂, 1 ♀): wing 57-59 (57.88), tail 36-39 (37.88), tarsus 17-18 (17.38), entire culmen 12-13 (12.63), exposed culmen 9-10 (9.63), culmen from anterior point of nostril 7-7½ (7.13).

Soembing-Sindoro: wing of 34 ♂, 56-60½ (58.60); 16 ♀, 56½-59 (57.78); 51 specimens, 56-60½ (58.35); tail 34 ♂, 35½-43 (39.26); 16 ♀, 36½-42 (38.59); 51 specimens, 35½-43 (39.13); tarsus 50 specimens, 16½-18 (17.15), entire culmen 45 specimens, 11¼-14 (12.84); exposed culmen 45 specimens, 8-11 (9.52); culmen from anterior point of nostril 45 specimens, 6-8 (7.14).

Ardjoeno, 3 specimens (wing measured in one specimen only): wing 58, tail 36-38 (37.00), tarsus 16¼-17 (16.50), entire culmen 12-13½ (12.50), exposed culmen 10 (10.00), culmen from anterior point of nostril 7-8 (7.50).

Tengger, 15 specimens (7 ♂, 5 ♀, 3 ○): wing 54-58 (56.30), tail 35-39½ (37.21), tarsus 16-18 (17.05), entire culmen 11-13 (12.52), exposed culmen 9-10 (9.62), culmen from anterior point of nostril 6½-8 (7.18).

Idjen: wing of 6 ♂, 56-58 (56.75); 7 ♀, 55-56 (55.57); 13 specimens, 55-58 (56.12); tail 6 ♂, 35-37 (36.00); 7 ♀, 34-38 (36.21), 13 specimens, 34-38 (36.12); tarsus 11 specimens, 16-17 (16.59); entire culmen 12 specimens, 12-13 (12.29); exposed culmen 12 specimens, 9-11 (9.56), culmen from anterior point of nostril 12 specimens, 6¾-8 (7.06).

Bali, 6 specimens (2 ♂, 3 ♀, 1 ○): wing 54-55½ (55.00), tail 33-36 (34.42), tarsus 16-17 (16.54), entire culmen 12-13½ (12.90), exposed culmen 9-10½ (9.90), culmen from anterior point of nostril 7-8 (7.60).

Lombok, 8 specimens (5 ♂, 1 ♀, 2 ○): wing 57-59½ (57.56), tail 36-40 (38.06), tarsus 16½-18 (17.22), entire culmen 13-14 (13.64), exposed culmen 9½-10½ (9.96), culmen from anterior point of nostril 7-8 (7.64).

Soembawa, one female: wing 56, tail 37, tarsus 17, entire culmen 13, exposed culmen 9½, culmen from anterior point of nostril 7½.

Flores, 6 specimens (5 ♂, 1 ♀): wing 55-57 (55.67), tail 37-40½ (37.67), tarsus 16½-18 (17.21), entire culmen 12-14 (12.90), exposed culmen 9-10 (9.50), culmen from anterior point of nostril 7-7½ (7.10).

Bonthain Peak, 7 specimens (1 ♂, 5 ♀, 1 ○): wing 54-57 (55.21), tail 33½-36 (34.36), tarsus 17-17¼ (17.04), entire culmen 12-13 (13.57), exposed culmen 8½-10 (9.36), culmen from anterior point of nostril 6½-8 (7.14).

Latimodjong, 7 specimens (6 ♂, 1 ♀): wing 56-58 (57.00), tail 36-40 (38.00), tarsus 17-18 (17.33), entire culmen 12½-13½ (13.00), exposed culmen 9-10½ (9.71), culmen from anterior point of nostril 7-8 (7.46).

Central and North Celebes: wing of 12 ♂, 52½-56 (54.17); 9 ♀, 51-56 (53.56), 21 specimens, 51-56 (53.90); tail 12 ♂, 33-37 (35.46), 9 ♀, 33-36½ (35.00), 21 specimens, 33-37 (35.26); tarsus 20 specimens 15-16¾ (15.84), entire culmen 20 specimens 11-14 (11.90), exposed culmen 20 specimens 8½-10½ (9.25); culmen from anterior point of nostril 20 specimens 6½-7½ (6.91).

Boeroe, 3 specimens (2 ♂, 1 ♀): wing 57-58 (57.67), tail 36½-38 (37.17), tarsus 16½-18 (17.42), entire culmen 13 (13.00), exposed culmen 10-11 (10.33), culmen from anterior point of nostril 7½-8 (7.67).

Mt. Apo, Mindanao, 11 specimens (6 ♂, 5 ♀): wing 55½-59 (57.32), tail 34-38½ (36.41), tarsus 16-17 (16.68), entire culmen 13-14½ (13.90), exposed culmen 10-11½ (10.60), culmen from anterior point of nostril 7-8 (7.75).

Mt. Katanglad, 6 specimens (3 ♂, 3 ♀): wing 54-56½ (55.50), tail 33½-36 (35.08), tarsus 15¾-16¾ (16.21), entire culmen 13½-13¾ (13.67), exposed culmen 10¼-10¾ (10.50), culmen from anterior point of nostril 10¼-10¾ (10.50), culmen from anterior point of nostril 7¼-7¾ (7.42).

Mt. Ilong-Ilong, 6 specimens (3 ♂, 3 ♀): wing 54½-56½ (55.67), tail 34-37½ (35.33), tarsus 16-17¼ (16.50), entire culmen 13-13¾ (13.25), exposed culmen 10-11¼ (10.25), culmen from anterior point of nostril 7-8 (7.42).

Mt. Malindang: wing of 8 ♂, 56-59 (57.06); 4 ♀, 56-59 (57.50); 12 specimens, 56-59 (57.21); tail 8 ♂, 35-38 (36.94); 4 ♀, 36-39 (37.25); 12 specimens, 35-39 (37.04); tarsus 11 specimens, 15¾-17 (16.45); entire culmen 12 specimens, 11½-14 (13.13); exposed culmen 12 specimens 9¾-11¼ (10.48); culmen from anterior point of nostril 12 specimens, 7-8 (7.54).

Cuernos de Negros, South Negros, 10 specimens (7 ♂, 3 ♀): wing 55-57 (55.75), tail 33½-37½ (35.05), tarsus 16-18 (16.85), entire culmen 12½-14 (13.22), exposed culmen 9½-11 (10.11), culmen from anterior point of nostril 7½-8 (7.78).

Mt. Halcon, Mindoro, 3 specimens (1 ♂, 2 ♀): wing 54-58 (56.33), tail 37-37½ (37.33), tarsus 16½-17 (16.67), entire culmen (2 specimens only) 14 (14.00), exposed culmen 11-11¼ (11.13), culmen from anterior point of nostril 8-8¼ (8.13).

Distribution. Central Sumatra, Padang Highlands: Talamau, Merapi, Kerintji; W. Java: Japandajan, Tjerimai; Central Java: Soembing, Sindoro; Eastern Java: Ardjoeno, Tengger, Ijang (cf. Kooiman, 1941), Idjen; Bali:

Batoer, Bratan, Kinlaman; Lombok: Sangkarean; Soembawa: Batoe Doelang; Flores: Geli Moetoe 1500 m, Badjawa 1200 m, Rana Mese 1300 m; Celebes: Piek van Bonthain (Wawa Karaeng 2500 m), Latimodjong, Mengkoka 1500 m (Heinrich in Stresemann, 1940), Loewo (Besoa), Rano Rano (Riley, 1924), Klabat, Sopoetan (Hoogvlakte Kelelondey 1380 m, hoogvlakte Sopoetan 1500 m), Rurukan, Krater des Masarang, Lokon (Meyer & Wiglesworth, 1898); Boeroe: Fogha 5500 ft. (Stresemann, 1912), Tagalago 1330 m, Fakal 1200 m; Mindanao: Apo 6000-6250 ft., Katanglad, Ilong-Ilong, Mt. Bliss 5750 ft. (a spur of Mt. Malindang), Mt. Malindang; Negros: Cuernos de Negros; Mindoro: Mt. Halcon 4500 ft. A true mountain form, hardly ever occurring below 1200 m, and most abundant above about 2000 m.

First collector. Salomon Müller on Mt. Merapi, Padang Highlands in the first months of 1834.

Figures. Meyer & Wiglesworth (1898), plate 31 (coloured, natural size, by Geisler); Kuroda (1933), plate 6 fig. 14 (coloured, ½ natural size, by Kobayashi).

Types. The two cotypes of *montana* (and *chlorates*, which name is based on the same specimens) are RMNH cat. nrs. 1 and 2; type of *minima* is RMNH nr. 14063; the type of *sindorensis* could not be traced, it is not in Leiden, nor is it in Buitenzorg (Wegner, in litt., 10-V-1952); the types of *neglecta* are BM nrs. 98.9.30.225 and 226; the type of *korinchi* is in the British Museum; the type of *florensis* is in Berlin; the type of *origenes* is Mus. Berlin nr. 34.2490; the type of *oriochares* is AMNH nr. 461239, the type of *foghaensis* is AMNH nr. 700153, the type of *vulcani* is AMNH nr. 700141, the type of *diuatae* is in Copenhagen; the type of *finitima* is Yale nr. 23475; the type of *sarasinorum* is in Basle.

There has been some confusion caused by uncertainty about the type locality, as shown in the general discussion of the species. The following fragment of a little known paper by Salomon Müller (1837), being a report on his ascent of Mt. Merapi early 1834, settles this question:

"Nog verder opwaarts, op 7,000 tot 8,000 voeten hoogte, hoorden wij nu en dan eene *Columba ruficeps* K., en zagen van tijd tot tijd eene *Columba Capellei.* Vrij menigvuldig troffen wij op laatstgenoemde gure hoogte *Ixos bimaculatus* aan, en een klein groenachtig geel *Dicaeum* met sneeuwwitte oogleden, dat, indien ik mij niet vergis, groote overeenkomst heeft met *Dicaeum flavum,* Horsf: en welligt zelfs identisch met deze soort is. Hetzelve leefde toen in kleine troepen en vertoonde zich, even als *Ixos bimaculatus* en *Columba Capellei,* tot digt bij de kraterranden, waar het, gelijk deze, het kleine hout doortrok. Dit zijn de drie eenige vogelsoorten, die wij op den top van den *Merapi* hebben gevonden.

Alle drie aasden op de kleine zwart-blaauwe beziën, die, volgens den Heer Korthals, tot eene soort van *Thibautia* behooren, met welken heester de steenachtige zijhellingen van de kraters voornamelijk bedekt zijn, en die destijds allen zwaar met vruchten beladen waren".

Evidently the "*Dicaeum flavum*, Horsf." of Müller is *Zosterops palpebrosa buxtoni*, we find here again the mistake made by Boie, Temminck, and Bonaparte, as pointed out on a previous page.

Moult. A specimen from Talamau, collected in April, is not in moult; one specimen from Korinchi, collected in April, is moulting secondaries, a second specimen is not in moult; three specimens from Mt. Papandajan, collected in February, are not in moult; specimens from Mt. Tjerimai collected in March (2), April (4), May (3), July (6), September (1), and November (3) are not in moult. Specimens collected in February (5), March (2), April (3), September (4), and November (3) are undergoing their main moult, with the exception of one of the September specimens, which shows moult of the forehead feathers only, and a November specimen which is moulting secondaries only. It is difficult to decide the main moulting season on this rather conflicting evidence, though it is evident that no moult takes place from May to July. Five specimens from Mt. Tengger, collected in October, are not in moult and seem in fairly fresh plumage, two collected in August (types of *neglecta*) are in very abraded plumage; specimens from Mt. Idjen collected in April (2) and October (3) are not in moult, specimens collected in April (4) show moult of primaries, or rectrices, or both; out of two specimens from Bonthain, collected in October, one is moulting primaries, the other is not in moult; six specimens from Mt. Katanglad, taken in November-December are not in moult; five specimens from Mt. Ilong-Ilong, collected in January, are not in moult, a sixth one is moulting rectrices; ten specimens from Mt. Malindang, collected in April, are not in moult; two specimens from Mt. Halcon, collected in May, are not in moult.

Nidification. Notwithstanding the extensive literature on this form, hardly anything seems to have been recorded about its nidification. From Sumatra nothing seems to have been published, for Java the only records I have been able to find are from Whitehead (1893) who found a young bird fully fledged in the beginning of October, in the neighbourhood of Tosari; and from Hoogerwerf (1949), who examined two clutches from West Java, probably Mt. Tjerimai, collected in April and October. According to him the clutch-size is two, and he gives measurements of the eggs. I am not aware that the nest or the eggs have been described from other parts of the extensive range of this subspecies.

Habits, etc. On nearly all mountains whence the form has been reported

it seems to be common, and particularly plentiful in the top zones of the mountains, in the more or less open country and dwarf shrubs, where they far outnumber in individuals all other species. They usually fly in small flocks, and are exceedingly tame and inquisitive (Kerintji: Robinson & Kloss, 1918; Talamau: Jacobson in Robinson & Kloss, 1924; Ijang: Kooiman, 1941). On the Lesser Sunda Islands, Stresemann (1913) and Rensch (1931) found it in large numbers in the *Casuarina montana* forests growing on the mountain tops. In Celebes it was found to be one of the very few species inhabiting the rather barren top of Latimodjong (Abendanon, 1909), whereas it is plentiful in similar country in the Minahassa (cf. Meyer & Wiglesworth, 1898).

H. Docters van Leeuwen (1928) gives interesting notes on the stomach contents of some specimens collected on Mts. Soembing and Sindoro at altitudes ranging from 1900 to 3300 m. The food included seeds of *Polygonum chinense* L., *Vaccinium varingifolium* Miq., *Myrica javanica* Bl., and insects, among which beetles, Psyllidae, and Noctuinae. Others (Rensch, 1931; Meyer & Wiglesworth, 1898) found remains of berries in the stomach, and no animal food. Porsch (1924) saw birds of this form (misidentified by him as *Z. aureiventer*) visit the flowers of *Agave americana* L. at Tosari, East Java.

Voice. Apart from the usual chirp already mentioned by Meyer & Wiglesworth (1898), and described by Rensch (1931) as: "ein feines, meisenartiges Zirpen", there seems to be "a low but melodious little song of three notes" (Robinson & Kloss, 1918).

Discussion. The uniting of so many described forms under one name asks for some explanation, and I shall here give a brief discussion of all those named populations that are now, for the first time, placed in the synonymy of the nominate race.

Zosterops montana korinchi. When Kloss (1931) named this form, he did not claim it to be in any way different from specimens of the Padang Highlands — here accepted as type locality of the nominate race — but believed that *Z. chlorates* came from Morotai and that *Z. montana* was a yellow-bellied form, perhaps identical with *Zosterops difficilis* R. & K. from Mt. Dempo. As a matter of fact the Korintji population is not entirely similar to the specimens from the Padang Highlands, for specimens from the first-mentioned locality have distinctly more yellow on the under surface. This fact was already recognised by Robinson & Kloss (1924). It is probable that, going from the Padang Highlands to the south, there are a number of populations with an increasing amount of yellow on the under side, reaching its extreme development on Mt. Dempo in the yellow-bellied race *difficilis*. It

would be nonsense to nomenclatorially separate any of these intermediate populations. This was evidently also the view of Kloss, the author of *Z. m. korinchi*, for in 1924 Robinson & Kloss wrote already, having before them specimens from Mt. Talamau: "These specimens, which are probably topotypes of *Z. montana* are less yellow below than our large Korinchi series, but we are not inclined at present to separate them on this account".

Zosterops montana minima, of which *Z. m. minor* is an objective synonym, was based on a series of nine skins from Mt. Papandajan, W. Java. According to its describer it "Can easily be distinguished from the other subspecies of *montana* by the lesser amount of yellow colour in the plumage. The throat on the average is lighter tinged and its colour generally is less extended than in the subspecies from the other parts of Java (*sindorensis* and *neglecta*). The latter peculiarity can be easily ascertained when comparing large series of specimens. The under tail coverts are distinctly lighter yellow in *minima* and form an easy distinction from the subspecies mentioned above... The upper parts in *minima* on the average are more greenish gray, and different from the much more yellowish *sindorensis*, and from the somewhat darker *neglecta*... Moreover the present subspecies is smaller..."

I have examined the entire type-series, and all these skins have evidently been preserved in alcohol, several, including the type, being directly marked as such on their labels. The differences noted by Hoogerwerf, namely the bleaching out of the yellow, and the consequently more greenish appearance of the skin — when the green begins to bleach out greyish green — are exactly those one might expect to be the result of conservation in alcohol. As regards the smaller size of the population, I cannot consider this sufficient for subspecific separation.

As regards the other races described from the Soenda-Island chain, two of these were described on differences of measurements only; *Zosterops montana florensis* Rensch was said to be similar to specimens from Lombok and Soembawa, but: "deutlich kleiner ... sie messen: Flügel 55.5-57 mm, durchschnittlich 56 mm..."; *Zosterops montana sindorensis* Siebers, on the other hand, was separated from the same race *neglecta* (that, itself, had never been compared with topotypical *montana*) on account of its larger size alone, the wing-length being given as 58-61½ mm.

A glance at table V shows that not the population from Flores is the smallest, nor even that of Mt. Papandajan, but that from Bali, a fact that, fortunately, seems to have escaped the attention of splitters. From the table it is at once evident that the naming of any population in the species on account of differences in size alone is absurd.

Hoogerwerf (1947) stated that "*sindorensis*" is yellower than "*neglecta*",

and my examination of large series confirms this. "*minima*", "*neglecta*" and "*florensis*" are all slightly greener, and similar to topotypical *montana,* whereas "*sindorensis*", moreover, tends to have more yellow above the lores. Similar yellow-fronted specimens can, however, be found in other populations and the character is somewhat variable. Because of this, because of the slightness of the difference, and also because it seems undesirable to separate a few populations in the centre of the range of *montana montana,* I prefer to suppress the name *sindorensis,* though it has a better claim to recognition than any other named population here placed with the nominate race.

Zosterops montana origenes can in no way be distinguished from specimens from Sumatra, Java, and the Lesser Soenda Islands.

Zosterops montana oriochares does not differ from series of specimens from other localities, nor has it the rump much greener than in the specimens from Bonthain, as claimed by Stresemann. As regards the amount of yellow on the under surface, this is a very variable population, one of the specimens examined (Berlin nr. 34.2443) has the under parts all washed with yellow.

Zosterops montana sarasinorum. All the specimens of this form belonging to the USNM and Basle Museum can readily be distinguished from "*vulcani*" (Mindanao) by their smaller bills. Unfortunately in the series taken by Coomans de Ruiter (collection van Marle) there are some specimens that have their bills quite as heavy as "*vulcani*". Moreover if series of these forms are compared with adequate material from the other islands, the differences disappear completely, neither of them being satisfactorily separable from East Java birds.

Zosterops montana foghaensis is thoroughly similar to *montana,* though it is not entirely impossible that the Boeroe birds have their loral lines slightly less blackish, more dusky, than in other races. As long as this point has not been confirmed, however — and no variation in this character has as yet been found in the species — there is not the slightest excuse for maintaining *foghaensis* as distinct from *neglecta.* Stresemann (1912) differentiated this alleged race, on the base of one specimen, on account of its darker flanks, but my three specimens give no support to this difference.

Zosterops montana vulcani. Specimens from Mindanao tend to have less yellow on the foreheads than the majority of skins from the Soenda-chain. But there is overlap in this character, and moreover topotypical specimens from Sumatra also tend to have the yellow slightly less extended than in many Java birds ("*sindorensis*"). The individual variation is so great that no nomenclatorial distinction is possible.

Zosterops montana diuatae. This recently described race was said to be

very close to *vulcani,* but slightly yellower above; from the foregoing remarks it is evident that it even more thoroughly agrees with the nominate race than *vulcani.*

Zosterops montana finitima. This form was stated by its describers to differ from other Philippine forms only in the greater extent of yellow on the under surface, especially the rather broad yellow longitudinal streak. This is only true as long as the Malindang population and some Apo specimens (where this character is variable) are left out of consideration, and yellow streaks are also found in specimens from Latimodjong and Kerintji, whereas the character is variable in eastern Java and in other populations.

Zosterops montana halconensis. Only three specimens were available, and I could not distinguish them from the nominate race. It is evident that Mearns's statement that it is larger than the Mindanao (Apo) population, is incorrect. In the absence or the very weak development of a yellow streak over the under parts it differs from some specimens from Mt. Apo, but not from others, and in many specimens from the Java-Flores area this streak is also missing.

Summarizing the evidence, it may be said that from two neighbouring populations the specimens often seem sufficiently different to be named (and they very often have been named in the past), but that if both are compared with series from some remote locality, neither of them can be satisfactorily separated. The situation being as it is, I conclude that the only nomenclatorially sound treatment is to unite all these populations under one name.

2. **Zosterops montana difficilis** Robinson & Kloss

Zosterops difficilis Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 250 — Mt. Dempo (based on Robinson, 1899, plate 1, and the description by Sharpe, 1884).

Zosterops chlorates; Nicholson, Ibis (5) 1, 1883, p. 253 (Mount Dempo); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 191 (Mt. Dempo 8000 ft.); Tristram, Cat. Coll. Birds, 1889, p. 210 (Mount Dempo); Robinson, Bull. Liverpool Mus. 2, 1899, p. 47, pl. 2 fig. 1 (Dempo Volcano); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 432.

Zosterops chlorata; H. O. Forbes, Naturalist's Wand. Eastern Arch., 1885, p. 210 (summit Mt. Dempo 9700 ft.); Porsch, Jahrb. wiss. Bot. 63, 1924, p. 604; Porsch, Biol. Gen. 5, 1929, p. 162; Docters van Leeuwen, Verh. Kon. Ak. Wetensch., sect. 2, 31, 1933, p. 102.

Zosterops; H. O. Forbes, Naturalist's Wand. Eastern Arch., 1885, p. 212 (summit Mt. Sawah 10562 ft.); Jacobson, Trop. Nat. 7, 1918, p. 51 (Dempo).

Zosterops difficilis; Robinson & Kloss, Journ. F. M. S. Mus. 8, 1918, p. 283; Robinson & Kloss, Journ. F. M. S. Mus. 8, add., 1923, p. 354; Robinson & Kloss, Journ. F. M. S. Mus. 11, 1924, p. 338; Snouckaert, Alauda (2) 3, 1931, p. 18; Gibson-Hill, Ibis 90, 1948, p. 147; Gibson-Hill, Bull. Raffl. Mus. 19, 1949, p. 162.

Zosterops chlorates difficilis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 215; Chasen, Bull. Raffl. Mus. 11, 1935, p. 265.

Zosterops montana montana; Stresemann, Journ. f. Orn. 87, 1939, p. 160, footnote 2 (G. Dempoe); Delacour, Birds Malaysia, 1947, p. 319 (South Sumatra); Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. Differs from the nominate race by its entirely yellow under surface, the yellow being slightly paler on the flanks.

Unfeathered parts. Eyes yellowish white; bill, maxilla horny black, mandible grey, tipped black; legs lead colour (Jacobson); iris brown; bill black; feet slate-blue (Menden); irides pale grey; bill black; legs and feet dirty slate-blue (Nicholson, 1883, ex Forbes). For comments on the iris colour as recorded by Menden, see footnote on p. 180.

Measurements of 6 specimens (2 ♂, 3 ♀, 1 ○): wing 58-60 (58.83), tail 38½-41 (40.08), tarsus (5 specimens only) 16-17½ (16.85), entire culmen 13-15 (14.20), exposed culmen 10-11 (10.67), culmen from anterior point of nostril 7¼-8 (7.88).

Distribution. Only known from Mt. Dempo in southern Sumatra. Probably this population is the extreme of a geographical gradient which runs from grey-bellied in the Padang Highlands over the Piek van Korintji to the Dempo. Specimens from Korintji have decidedly more yellow underneath than topotypical specimens of the nominate race, as has been explained in the discussion of that form.

The material examined comes from altitudes varying between 2500 and 3200 m.

First collector. H. O. Forbes on 1 May 1881 (specimen examined), not 1880 as stated by Robinson (1899).

Figure. Robinson (1899), plate 1 fig. 1 (coloured, natural size, by J. Smit).

Type. The authors of *difficilis* did not have actual specimens at their disposal when naming this distinct form, but based their account on the description given by Sharpe (1884), and on the plate and paper of Robinson (1899). They made the specimen in the Liverpool Museum, after which the plate had been drawn, the type. Like other specimens of *Zosterops* in the Liverpool Museum, this skin has been destroyed during an air raid (cf. Gibson-Hill, 1949, p. 162, footnote).

Moult. One specimen collected in May is not in moult.

Nidification. Unknown.

Habits, etc. Both Forbes (1885) and Jacobson (1918) found the form to be common on the barren summits of Mt. Dempo, in the growths of *Vaccinium forbesii* Fawcett and *Rhododendron*.

3. **Zosterops montana steini** Mayr

Zosterops montana steini Mayr, Bull. Am. Mus. Nat. Hist. 83, 1944, p. 137 (nomen nudum), 169 — Mt. Ramelan (2600 meters), eastern Timor.
Zosterops montana subsp.; Stresemann, Journ. f. Orn. 87, 1939, p. 161, scheme.
Zosterops montana steini; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. According to Mayr (1944), this form is: "Similar to *neglecta* ... and *florensis* ..., but much more yellowish citrine above; rump very yellowish; yellow region of forehead more clearly yellow and more extensive, covering anterior third of crown; yellowish wash on the "white" parts of the abdomen more pronounced; size larger".

The following additional notes can be given: Upper parts not more yellowish than in many specimens of *montana montana* (including "*neglecta*", "*florensis*", etc.), nor is there any regular trend of variation in this character. The yellow of the front is, indeed, rather more extended than in the majority of specimens from the other islands, though a single specimen from Bali (RMNH, von Plessen nr. 315) is identical in this respect — this specimen, of course, can be distinguished from *steini* by its smaller size. Seen in series, the birds from Timor average definitely yellower on the foreheads than the nominate race.

Particularly interesting was a comparison with a large series from Mts. Soembing-Sindoro in the Bartels collection; from this series *steini* can be distinguished by the slightly greener shade of yellow on throat and forehead, and also by the fact that the yellow in the Sikatok specimens is more confined to the sides of the head, the green of the crown extending nearly to the base of the bill, whereas in *steini* the middle of the forehead is also yellowish.

Unfeathered parts. Iris greenish grey, or yellowish grey (pale), or greenish yellow, or dirty greenish yellow, or yellow-greenish, or yellowish green; bill blackish, or black; feet bluish grey (Mt. Moetis, Stein); iris greyish, or grey-yellowish green, or pale yellowish grey, or yellowish grey, or ivory grey (Mt. Ramelan, Stein).

Measurements of 11 specimens from Mt. Moetis (8 ♂, 1 ♀, 2 o): wing 59-62½ (60.00), tail 38-40 (39.27), tarsus 17¼-19 (18.03), entire culmen 12-13½ (12.85), exposed culmen 9-10½ (9.78), culmen from anterior point of nostril 7-8 (7.35).

Measurements of 9 specimens from Mt. Ramelan (5 ♂, 1 ♂?, 1 ♀, 2 o): wing 56-61 (58.44), tail 37-40 (38.28), tarsus 17-18¼ (17.53), entire culmen 12½-13 (12.96), exposed culmen 9-10 (9.81), culmen from anterior point of nostril 7-8 (7.28).

Distribution. Mountains of Timor, where known from Mount Moetis, at an altitude of 1800-2300 m, and Mt. Ramelan, at an altitude of 2000-2600 m.

First collector. Georg Stein on Mt. Moetis in February, 1932.

Not figured.

Type. AMNH nr. 308005, from Mt. Ramelan at 2600 m.

Moult. Three specimens taken on Mt. Moetis in February are not in moult; of two specimens taken on Mt. Ramelan on 1 May, one is not in moult, the other is moulting primaries, the 2nd, 3rd and 4th on both sides being unfullgrown.

Nidification. Not recorded.

Habits, etc. Not recorded.

Discussion. Specimens from Mt. Moetis differ from those of Mt. Ramelan in the following characters: yellow longitudinal streak on the under parts slightly more developed (though always rather feeble in this race); yellow of the throat slightly deeper in tone; yellow of forehead slightly more extented; upper tail coverts slightly more yellow. One of the Ramelan specimens, however, is identical with the Moetis birds. The birds from Mt. Moetis, moreover, tend to be slightly larger. Even if these differences are constant, and will not be found to be due to wear (different season of collecting) and age of the specimens, it would be nonsense to separately name the two populations; nevertheless it seems interesting to point out that the Moetis specimens show the diagnostic characters of the race rather better than the Ramelan specimens (type locality).

The lowland species from Timor, *Z. chloris citrinella,* is rather similar to *Z. montana steini,* and as I have seen a specimen collected by Stein on Mt. Moetis at 1200 m altitude, it may occasionally co-occur with *steini.* Differences are: *citrinella* has the bill, in lateral view, somewhat thicker; black loral line perhaps slightly more developed; flanks almost pure grey, as against slightly buffy in *steini*; moreover, *steini* has the yellow of throat and breast more extensive, and its iris is paler, not definitely brown as in *citrinella.* Size of *steini* slightly larger on an average.

4. **Zosterops montana pectoralis** Mayr

Zosterops montana pectoralis Mayr in Delacour & Mayr, Zoologica 30, 1945, p. 116 — Canloan Volcano, Negros, Philippine Islands.

Zosterops siquijorensis; Ogilvie-Grant, Ibis (7) 2, 1896, p. 526, 551 (volcano of Canloon); J. Whitehead, Ibis (7) 5, 1899, p. 231 (Canloön); (pt.) Finsch, Tierreich 15, 1901, p. 19 (Negros); (pt.) *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95 (Negros); (pt.) Sharpe, Hand-List Birds 5, 1909, p. 5 (Negros); (pt.) McGregor, Manual Phil. Birds, 1910, p. 617 (Negros); (pt.) Bangs, Bull. M. C. Z. 65, 1922, p. 83 (Negros); McGregor in Dickerson, Distrib. Life Phil., 1928, p. 210 (Negros).

Zosterops chlorates siquijorensis; (pt.) Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216 (Negros); (pt.) Momiyama, Annot. Orn. Or. 2, 1933, p. 64 (Negros).

Zosterops montana pectoralis; Delacour & Mayr, Birds Philippines, 1946, p. 233;

(pt.) Rabor, Auk 60, 1952, p. 257; Wynne, North W. Nat. N. S. 2, 1954, p. 624; Ripley & Rabor, Condor 58, 1956, p. 286, 287, 288, 290 (Canloan Volcano).

Subspecific characters. Differs from the nominate race, to which it is nearest, by the broad yellow streak over the under parts, and by the flanks, which are more or less washed with yellow; here, indeed, seems to be a population in the transition from pale-bellied to yellow-bellied. The fact that the material is rather homogeneous as regards the coloration of the under parts, makes it justified and desirable to give it an own name.

Unfeathered parts. Iris stone-grey; upper mandible black, base of lower light blue; feet greyish cobalt (J. Whitehead, 1899).

Measurements of 8 specimens (6 ♂, 1 ♀, 1 o♀): wing 56-60½ (57.75), tail 35-39 (37.38), tarsus 16¾-18 (17.44), entire culmen 14-14¾ (14.36), exposed culmen 10½-11½ (11.00), culmen from anterior point of nostril 7½-8¾ (8.14).

Distribution. Confined to Canloan Volcano, northern Negros, where it goes down to about 3500 ft., and is common near the summit (J. Whitehead, 1899; Ripley & Rabor, 1956).

First collector. John Whitehead in the first part of 1896.

Not figured.

Type. AMNH nr. 700150.

Moult. Specimens collected in April (6) are not in moult.

Nidification. On 12 April 1896 Whitehead (1899) found two nests containing newly hatched young. Rabor (cf. Ripley & Rabor, 1956) found a nest with two eggs in April or May, he describes them as long and oval, creamy-white in colour, and measuring 17 × 12 and 18 × 12 mm.

Habits, etc. Apparently thoroughly agrees in habits with the other races of the species. It is reported by several observers to be the most common bird near the summit of Canloan Volcano, where it ascends as high as the fumes, fires, and eruptions of the volcano permit vegetation to approach its summit (Whitehead, 1899).

5. **Zosterops montana whiteheadi** Hartert

Zosterops whiteheadi Hartert, Bull. B. O. C. 14, 1903, p. 13 — Lepanto, Luzon, 5000 ft.

Zosterops meyeni; Ogilvie-Grant, Ibis (6) 6, 1894, p. 515 (Highlands of North Luzon); J. Whitehead, Ibis (7) 5, 1899, p. 231 (highlands of Luzon).

Zosterops whiteheadi; *McGregor & Worcester, Hand-List Birds Phil. Isl., 1906, p. 95; Mearns, Proc. U. S. Nat. Mus. 36, 1909, p. 473 (Baguio, Benguet Province, Luzon); Sharpe, Hand-List Birds 5, 1909, p. 7; McGregor, Manual Phil. Birds, 1910, p. 615; McGregor, Phil. Journ. Sc. 16, 1920, p. 408, 427 (Benguet); Hachisuka, Ois. & Rev. Fr. d'Orn. N. S. 1, 1931, p. 589; Hachisuka, Birds Phil. Isl. I, 1931, p. 41.

Zosterops whiteheadi whiteheadi; Hartert, Nov. Zool. 27, 1920, p. 436; Snouckaert, Alauda (2) 3, 1931, p. 18.

Zosterops meyeni whitehcadi; Hachisuka, Contrib. Birds Phil. 2, 1930, p. 204; Momiyama, Bull. Biogeogr. Soc. Japan 1, 1930, p. 173.
Zosterops chlorates whiteheadi; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216; Momiyama, Annot. Orn. Or. 2, 1933, p. 64.
Zosterops montana whiteheadi; Delacour & Mayr, Birds Philippines, 1946, p. 235; Salomonsen, Vidensk. Medd. Dansk. naturh. Foren. 115, 1953, p. 280, 281; Wynne, North W. Nat. N. S. 2, 1954, p. 624; Rabor, Silliman Journ. 2, 1955, p. 265, 267, 307 (Mt. Data).

Subspecific characters. No direct comparison with all populations of the nominate race could be made, but this subspecies may be tenable on the base of its rather small measurements and its greener upper parts, slightly greener than in at least the majority of the populations of the nominate race.

Unfeathered parts. Iris stone-grey; bill at base lead-blue, tipped with black; feet lead-blue (J. Whitehead, 1899).

Measurements of 12 specimens (7 ♂, 5 ♀): wing 52½-55 (55.67), tail 32-34½ (33.18), tarsus 15½-17 (16.38), entire culmen 12-14 (12.98), exposed culmen 9-10 (9.71), culmen from anterior point of nostril 6¼-7½ (7.02).

Distribution. Highlands of northern Luzon, whence it has been recorded as follows: Mt. Pauai, Atok, Benguet; Mt. Sta. Iomda, Benguet, 5500 ft.; near Pavay, Benguet, 7000 ft.; Baguio, Benguet; Bontoc; La Trinidad, Buguio (material from all these localities examined); Mt. Data, Mountain Province (J. Whitehead, 1899; Rabor, 1955).

First collector. John Whitehead in January 1894, at the type locality.

Not figured.

Type. AMNH nr. 700139.

Not figured.

Nidification. Whitehead (1899) found, on 24 January 1894, a nest with two young ready to fly, on the summit of Monte Data.

Habits, etc. A common bird in the highlands of northern Luzon, where it frequents pine-forests as well as other types of more or less wooded country. Like other members of its species and genus, it is usually seen in small flocks, often in company with other birds such as *Parus elegans montigena* Hachisuka and *Loxia curvirostra luzoniensis* Ogilvie-Grant (cf. J. Whitehead, 1899; Rabor, 1955).

6. **Zosterops montana seranensis** Stresemann

Zosterops obstinatus seranensis Stresemann, Nov. Zool. 21, 1914, p. 34 (nomen nudum), 139 — G. Pinaia, Mittel-Seran, 6000 ft.
Zosterops obstinatus seranensis; Hartert, Nov. Zool. 27, 1920, p. 434; Mathews, Syst. Av. Australas. II, 1930, p. 703; Snouckaert, Alauda (2) 3, 1931, p. 21.
Zosterops obstinatus seranensis; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216.

Zosterops montana seranensis; van Bemmel, Treubia 19, 1948, p. 331; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. The three skins examined are on the upper parts clearly, though not very pronouncedly, more yellow than specimens from Batjan and Ternate. As regards coloration of the under parts, I fail to see any significant difference between this form and *obstinata* (contrary to Stresemann's original diagnosis).

Unfeathered parts. Iris pale grey, whitish grey, or white; bill black, base of mandible whitish grey; feet greenish blue (Stresemann, 1914).

Measurements of three specimens (1 ♀, 2 ♂): wing 56-56½ (56.17), tail 37-38½ (37.50), tarsus 16½-17½ (16.83), entire culmen 13-14 (13.33), exposed culmen 10-11 (10.33), culmen from anterior point of nostril 7½-8 (7.83).

Weights. 11, 11, 11 g (Stresemann).

Distribution. Mountains of Ceram, not lower than 3000 ft.: G. Sofia 4000 and 4500 ft., G. Hoale 3000 ft., G. Pinaia (= Binaia) 6000 ft.

First collector. E. Stresemann in July, 1911.

Not figured.

Type. AMNH nr. 700154.

Moult. Two specimens collected in July are not in moult; one specimen, also collected in July, is moulting both primaries and rectrices.

Nidification. Not recorded.

Habits, etc. According to Stresemann (1914), this form is fairly common in the central mountains between 3000 and 4000 ft., whereas at an elevation of 7000 ft. he found it decidedly scarce. This observation indicates that the present subspecies lives at a lower level than the nominate race, which is only rarely found as low as 3000 or 4000 ft.

Stresemann (1914) found in the stomach of a specimen remains of many small beetles, and a few seeds.

7. **Zosterops montana obstinata** Hartert

Zosterops obstinatus Hartert, Nov. Zool. 7, 1900, p. 238 — Batjan, 4000 ft. high.

Zosterops obstinata; (pt.) Finsch, Tierreich 15, 1901, p. 28; (pt.) Sharpe, Hand-List Birds 5, 1909, p. 10.

Zosterops buruensis Var. *Obstinata*; (pt.) Dubois, Syn. Av. I, 1902, p. 709.

Zosterops obstinatus; (pt.) Hartert, Nov. Zool. 10, 1903, p. 57.

Zosterops obstinatus obstinatus; Stresemann, Nov. Zool. 21, 1914, p. 139; Hartert, Nov. Zool. 27, 1920, p. 431; Mathews, Syst. Av. Australas. II, 1930, p. 703.

Zosterops obstinata obstinata; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216.

Zosterops montana obstinata; van Bemmel, Treubia 19, 1948, p. 331; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. This was the first described of the three yellow-

bellied races of the Moluccas. The differential characters of the other two yellow-bellied races are given there (under *seranensis* and *ternatana*).

Unfeathered parts. Colour apparently neither recorded in literature, nor on the labels of the specimens examined.

Measurements of 8 specimens (4 ♂, 4 ♀): wing 57-60 (58.00), tail 36-41 (38.13), tarsus 15¾-18 (17.34), entire culmen 13-14 (13.41), exposed culmen 10-10¾ (10.38), culmen from anterior point of nostril 7-8 (7.75).

Distribution. Confined to the mountains of Batjan. where it has been collected at altitudes from 5000 to 7000 ft.

First collector. W. Doherty in September, 1897.

Not figured.

Type. AMNH nr. 700169.

Moult. Two specimens, collected in June and July respectively, are moulting primaries; other specimens from July have apparently completed their moult, as they are in fine, fresh plumage.

Nidification. Unknown.

Habits, etc. Not recorded.

Discussion. A little known form, which was originally known from two specimens, collected by Doherty; whereas in 1902 Waterstradt obtained a good series. I am not aware that it has ever been taken since that time.

8. **Zosterops montana ternatana** Stresemann

Zosterops obstinatus ternatanus Stresemann, Nov. Zool. 21, 1914, p. 139 — Ternate, 3000-4000 ft.

Zosterops chloris; G. R. Gray, Proc. Zool. Soc. London 28, 1860, p. 350; (pt.) Wallace, Proc. Zool. Soc. London, 1863, p. 31; (pt.) Hartlaub, Journ. f. Orn. 13, 1865, p. 24; (pt.) Finsch, Neu-Guinea, 1865, p. 163; (pt.) G. R. Gray, Hand-List Birds 1, 1869, p. 162; von Rosenberg, Reist. Geelvinkbaai, 1875, p. 7; (pt.) Giebel, Thes. Orn. III, 1877, p. 774; von Rosenberg, Malayische Archipel, 1878, p. 406.

Zosterops intermedia; (pt.) G. R. Gray, Hand-List Birds 1, 1869, p. 162; von Rosenberg, Malayische Archipel, 1878, p. 406; (pt.) Salvadori, Ann. Mus. Civ. Genova 16, 1880, p. 81; (pt.) Salvadori, Orn. Pap. II, 1881, p. 369; (pt.) Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 185; (pt.) P. & F. Sarasin, Mat. Naturg. Insel Celebes III, 1901, p. 97, 99, 102.

Zosterops obstinatus; (pt.) Hartert, Nov. Zool. 7, 1900, p. 238; (pt.) Hartert, Nov. Zool. 10, 1903, p. 57.

Zosterops obstinata; (pt.) Finsch, Tierreich 15, 1901, p. 28; (pt.) Sharpe, Hand-List Birds 5, 1909, p. 10.

Zosterops buruensis Var. *Obstinata*; (pt.) Dubois, Syn. Av. I, 1902, p. 709.

Zosterops obstinatus ternatanus; Hartert, Nov. Zool. 27, 1920, p. 434; Snouckaert, Alauda (2) 3, 1931, p. 21.

Zosterops obstinatus ternatensis; Mathews, Syst. Av. Australas. II, 1930, p. 703 (lapsus, corrected in Ibis (13) 2, 1932, p. 154: Read *ternatana* for *ternatensis*).

Zosterops obstinata ternatana; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 216; Stresemann, Journ. f. Orn. 87, 1939, p. 381.

Zosterops montana ternatana; van Bemmel, Treubia 19, 1948, p. 331; van Bemmel & Voous, Beaufortia nr. 32, 1953, p. 2; Wynne, North W. Nat. N. S. 2, 1954, p. 624.

Subspecific characters. The diagnosis of *ternatana,* as compared with *obstinata,* reads: "... weicht aber durch gelblicheren Ton der Oberseite, tieferes gelb der Unterseite und weniger olivenfarbene Flanken ab".

My own comparison of, admittedly few, specimens, confirms only Stresemann's last point; the Batjan skins have their flanks somewhat greener than the specimens from Ternate. Moreover, *ternatana* averages slightly smaller than *obstinata.*

Z. montana ternatana is also very similar to *Z. c. chloris* and *Z. c. intermedia,* but is on upper and under parts somewhat greener, and has the under parts not so orange-yellow.

Unfeathered parts. Iris pale grey; bill grey/black; legs grey (de Haan).

Measurements of four specimens (1 ♂, 2 ♀, 1 ○): wing 55-58 (56.13), tail 36-38 (36.75), tarsus 17-17¼ (17.06); entire culmen 12¼-13 (12.58), exposed culmen 9½-10 (9.83), culmen from anterior point of nostril 7-7¼ (7.08). Stresemann (1914) records for *ternatana* a wing length of 54-56 mm.

Weight of one specimen 14 g.

Distribution. Only known from the Piek van Ternate, from 1100 m upwards. It may occur on Tidore and perhaps also on some of the mountains of Halmaheira.

First collector. A. R. Wallace in 1858.

Not figured.

Type. AMNH nr. 700170.

Moult. One specimen, collected in August, is not in moult; Wallace's specimens (BM) both show primary moult; unfortunately they are undated.

Nidification. Not recorded.

Habits, etc. According to de Haan, the form is not common, but this probably pertains to the altitude of 1100 m, higher up it may be more plentiful, as is made likely by the fact that it was already taken by several of the earlier collectors.

Species 10. **Zosterops natalis** Lister

Zosterops natalis Lister, Proc. Zool. Soc. London for 1888, 1889 (April), p. 518, pl. 27 — Christmas Island.

Zosterops; Lister, Nature 37, 1887, p. 204; Lister, Proc. R. Geogr. Soc. N. M. S. 10, 1888, p. 624; Andrews, Geogr. Journ. 13, 1899, p. 33.

Zosterops natalis; Tristram, Cat. Coll. Birds, 1889, p. 211; Ridley, J. Straits Br. R. As. Soc. 23, 1891, p. 128, 130; Sharpe in Andrews, Monogr. Christmas Isl., 1900, p. 49; Finsch, Tierreich 15, 1901, p. 23; Dubois, Syn. Av. I, 1902, p. 708; Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 417; Hanitsch, Guide Zool. Coll. Raffl. Mus., 1908, p. 31; Wood Jones, Proc. Zool. Soc. London, 1909, p. 141 (Pulu Luar); Sharpe, Hand-List Birds

5, 1909, p. 7; Wood-Jones, Coral and Atolls, 1910, p. 345 (Pulu Luar, Cocos-Keeling Islands); Ogilvie-Grant, Cat. Birds' Eggs Brit. Mus. 5, 1912, p. 5; Chasen & Kloss, J. Malayan Br. R. As. Soc. 2, 1924, p. 65, 68; Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 219; Chasen, Bull. Raffl. Mus. 11, 1935, p. 264; Rensch, Gesch. des Sundabogens, 1936, p. 105; Gibson-Hill, Bull. Raffl. Mus. 18, 1947, p. 153, 164; Gibson-Hill, Ibis 91, 1949, p. 225, 227, 229, 230, 236; Gibson-Hill, Bull. Raffl. Mus. 22, 1950, p. 255, 267 (Pulo Luar, Cocos Keeling Islands); Wynne, North W. Nat. N. S. 2, 1954, p. 625; Mees, Sarawak Mus. Journ. 6, 1955, p. 645, 646.

Zoesterops natalis; Wood-Jones, Coral and Atolls, 1910, p. 229 (Cocos-Keeling Atoll).

Zosterops (citrinella?) natalis; Chasen, Bull. Raffl. Mus. 8, 1935, p. 87.

Zosterops lutea natalis; Mayr, Bull. Am. Mus. Nat. Hist. 83, 1944, p. 194, fig. 4.

Characters. A fairy large species with dull green upper parts, whitish under parts, without yellow on the throat, but pale yellow on the under tail coverts, and with a comparatively very long tail.

Upper parts. Mantle dull greenish; forehead and supra loral stripe whitish, higher yellowish; wide black lores, continued to halfway under the eye-ring; eye-ring white, of average width; primaries, secondaries, and rectrices dull brownish, all with their outer edges of the same colour as the mantle.

Under parts. Most of the under parts greyish white; under tail coverts pale yellow; on the throat sometimes a trace of pale yellow, and sometimes a slight trace of pale yellow on the belly [1]); pale buff on the flanks present in a few specimens taken nearly 60 years ago, is probably entirely due to post-mortem discoloration.

Unfeathered parts. Irides chestnut brown; bill black or dark brown, the base of the lower mandible grey; feet greenish grey (Chasen, 1933); iris rich chestnut, bill black with base of mandible grey, feet greyish, or grey, slightly tinged with green (Gibson-Hill).

Measurements. Wing 6 ♂, 59-62½ (60.92); 6 ♀, 59-64 (61.17); 12 specimens, 59-64 (61.04); tail 6 ♂, 43½-47 (45.58); 6 ♀, 44-47 (45.00), 12 specimens, 43½-47 (45.29); tarsus 11 specimens, 21-23 (21.86); entire culmen 11 specimens, 14½-15½ (15.05); exposed culmen 11 specimens, 10½-12½ (11.66); culmen from anterior point of nostril 11 specimens, 8-9 (8.34).

Structure. The tail is relatively longer than in almost any other species of the Indo-Australian group of the Zosteropidae. The tail: wing index in 12 specimens varies from 72 to 77 %, with an average of 74.16 %. Curiously, African representatives of the family seem generally longer-tailed (Moreau, 1957; also my own measurements on some African species).

Distribution. Endemic on Christmas Island, in the Indian Ocean south of Java. Introduced in the Cocos-Keeling group on the Island of Pulo Luar,

1) Chasen (1933) writes: "In fresh plumage *natalis* is *always very faintly yellow on the under tail coverts* but I have never seen any yellow on the throat". This is in conflict with my own observations as regards the presence of yellow on the throat.

between 1885 and 1900; it is flourishing on this island, but has not spread to any other island of the group.

First collector. J. J. Lister on 30 September, 1887 (cf. Tristram, 1889).

Figure. Lister (1889), plate XXVII (coloured, by J. Smit).

Type. BM nr. 88.8.12.6.

Moult. One specimen collected in August is not in moult, one collected in November is not in moult, one collected in March is moulting primaries, other specimens not checked.

Nidification. Lister (1889) describes two nests found in the first week of October; Sharpe (in Andrews, 1900) gives also a description of the nest and mentions two eggs taken by Andrews in November, apparently 9 November (cf. Ogilvie-Grant, 1912). Andrews (1900) remarked that the species seems to breed nearly all the year round, an opinion that has since been confirmed by Gibson-Hill (1950), who noted that occasional individuals may nest at any time of the year, though there is certainly a peak period running from the beginning of September to the end of January, or slightly later.

Gibson-Hill's (1950) contribution to the breeding biology of the species has made this remote endemic perhaps the best known member of its family. He describes the nest, publishes measurements of eggs, and describes the eggs as being a uniform, pale, rather watery blue in colour, with a fine matt surface. The clutch-size is stated to be generally two, less frequently three, and once four. Remarkable is that the eggs hatch after fifteen or sixteen days' incubation, and that the young birds do not leave the nest until they are at least seventeen days old. As already noted on p. 48, the periods of incubation and fledging are much longer than the corresponding periods in *Z. palpebrosa egregia, Z. japonica simplex,* and *Z. lateralis.*

Habits, etc. All authors agree that *Zosterops natalis* is probably the commonest bird inhabitant of Christmas Island (Lister, 1889; Andrews, 1900; Gibson-Hill, 1947); it is gregarious in habits, and flocks may be encountered in every part of the island, though, perhaps, most often in open country and near the edge of forest. Its food is stated by Gibson-Hill to consist of both insects and ripe fruit, including bananas, mangos, sour-sops (*Anona muricata* L.), custard-apples (*Anona squamosa* L.) and papayas (*Carica papaya* L.); also wild *Passiflora* sp., and boiled rice.

Voice. Lister (1889) only heard a short chirping, proceeding from a party of birds, busy among the leaves and twigs above his head; Andrews (1900) called it a "twittering note", but adds to this that when a hawk is in the neighbourhood, the noise made by a flock can be considerable; Gibson-Hill (1947) described the voice in about the same words. Certainly it is remark-

able, as has already been noted by Lister (1889), that no song is known from the species, and it is possible that it does not have one.

Discussion. This species has been associated with *Z. chloris citrinella* by Chasen (1933), whereas Mayr (1944) placed it as a race of *Z. lutea*, a rather unfortunate choice. The only species *Z. natalis* is at all near to is, remarkable enough, *Z. griseovirescens* Bocage from far-away Annobon in the Gulf of Guinea. Were it not for the great geographical distance that separates them, no systematist would hesitate in bringing the two forms to one species. As it is, however, it is extremely unlikely that the external similarity between the two forms is based on genetical affinity, so that it is better to consider *Z. natalis* a distinct species without close relatives.

Species 11. **Zosterops flava** (Horsfield)

Dicaeum flavum Horsfield, Trans. Linn. Soc. London 13, 1821, p. 170 — Java.

Z[osterops] parvula Reichenbach, Handb. spec. Orn., Meropinae, 1851 = 1852, p. 92, pl. 461 fig. 3297 (based on *Zosterops* parvule, Hombron & Jacquinot, Voyage au Pôle Sud, Atlas Zool., Oiseaux, 1843, fig. 4) — Oceanien (errore!) = Bandjermasin, Borneo (cf. Jacquinot & Pucheran, 1853).

Z[osterops] borneensis Hartlaub, Journ. f. Orn. 13, 1865 (Jan.), p. 5 — nomen nudum.

Zosterops flava; *Hartlaub, Verz. Samml. Bremen, 1844, p. 37; Reichenbach, Handb. spec. Orn., Meropinae, 1852, p. 92; Hartlaub, Journ. f. Orn. 13, 1865, p. 16 (Java und Borneo); G. R. Gray, Hand-List Birds 1, 1869, p. 162 (Java, Sumatra, Borneo); Giebel, Thes. Orn. III, 1877, p. 775 (Java, Sumatra, Borneo); Vorderman, Nat. Tijdschr. Ned. Ind. 42, 1883, p. 215-216 (de Fluit, Batavia); Sharpe, Cat. Birds Brit. Mus. 9, 1884, p. 179 (Java, Sumatra, and Borneo); Vorderman, Nat. Tijdschr. Ned. Ind. 44, 1885, p. 194 (Java); Russ, Handb. Vogelliebh. I, 1887, p. 314 (Java und Borneo); (pt.) Everett, J. Straits Br. R. As. Soc. 20, 1889, p. 141 (Banjermasin); Vorderman, Nat. Tijdschr. Ned. Ind. 49, 1890, p. 401 (Sumatra, Java, Borneo); Seebohm, Ibis (6) 5, 1893, p. 218; (?) Kuschel, Orn. Monatsber. 3, 1895, p. 156 (Java); (?) Nehrkorn, Kat. Eiersamml., 1899, p. 80 (Java); Finsch, Tierreich 15, 1901, p. 24 (Java, Borneo); Vorderman, Nat. Tijdschr. Ned. Ind. 60, 1901, p. 76 (Java); Koningsberger, Med. 's Lands Plantentuin 50, 1901, p. 92 (Java); Dubois, Syn. Av. I, 1902, p. 708 (Java, Bornéo); Sharpe, Hist. Coll. Brit. Mus. II, 1906, p. 396; Koningsberger, Med. Dept. Landbouw 7, 1909, p. 5 (Java); Sharpe, Hand-List Birds 5, 1909, p. 7 (Java, Borneo); (?) Nehrkorn, Kat. Eiersamml., 2nd ed., 1910, p. 269 (Java); Koningsberger, Java Zoöl. en Biol., 1912, p. 240; van Balen, Dierenw. Insulinde II, 1915, p. 483 (Java, Sumatra en Borneo); van Oort in Paulus, Encycl. Ned. Ind., 2nd ed. I, 1917, p. 410 (Java); Robinson & Kloss, Journ. F. M. S. Mus. 8, add., 1923, p. 354; Spennemann, Trop. Nat. 13, 1924, p. 179 (Moeara Tjiasem); Dammerman, Treubia 11, 1929, p. 63 (Sumatra, W. Java); Bartels Jr. & Stresemann, Treubia 11, 1929, p. 143 (Java); Stresemann, Mitt. Zool. Mus. Berlin 17, 1931, p. 212; Kuroda, Birds Isl. Java I, 1933, p. 124 (Java); Rensch, Gesch. des Sundabogens, 1936, p. 89, 99 (zoogeography: distr. Java-Borneo); Kuroda, Birds Isl. Java II, 1936, p. 704 (Borneo, Sumatra, W. Java); Banks, Sarawak Mus. Journ. 4, 1937, p. 456, 465; Mees, Sarawak Mus, Journ. 6, 1954, p. 134; Mees, Sarawak Mus. Journ. 6, 1955, p. 653.

Zosterops; (pt.) Blyth, J. As. Soc. Bengal 14, 1845, p. 563 (Java); G. R. Gray,

Gen. Birds I, 1848, p. 198; Sclater, Proc. Zool. Soc. London, 1863, p. 219 (Banjermassing) [1]).

Zosterops flavus; Blyth, J. As. Soc. Bengal 15, 1845, p. 370 (Java); Horsfield, Cat. Birds Mus. East-India Comp. I, 1854, p. 263; Schlegel, Handl. Dierkunde I, 1857, p. 274 (Borneo); Blyth, Ibis N. S. 1, 1865, p. 33.

Zosterops flavum; Bonaparte, Consp. Gen. Av. I, 1850, p. 398; van Oort, Notes Leyden Mus. 32, 1910, p. 159 (Batavia).

Zosterops parvulus; *Jacquinot & Pucheran, Voyage au Pôle Sud, Texte III, 1853, p. 96 (Banjermassin); Hartlaub, Journ. f. Orn. 2, 1854, p. 164.

Dicaeum flavum; Chenu & des Murs, Enc. d'Hist. Nat. Oiseaux 2, 1855-58, p. 290.

Zosterops parvula; Salvadori, Ann. Mus. Civ. Genova 5, 1874, p. 188 (Banjermassing); Wallace, Island Life, 1880, p. 353 (Borneo); Vorderman, Nat. Tijdschr. Ned. Ind. 46, 1887, p. 230 (Borneo).

Zosterops flava flava; Moulton, J. Straits Br. R. As. Soc. 67, 1914, p. 171 (Borneo); (pt.) Chasen, Bull. Raffl. Mus. 11, 1935, p. 265 (Borneo (south), Java (west)); Hoogerwerf & Siccama, Ardea 27, 1938, p. 207 (Batavia); Bartels Jr., Ardea 28, 1939, p. 23 (Batavia); Hoogerwerf, Treubia 19, 1948, p. 134.

Zosterops parvula parvula; Mathews, Syst. Av. Australas. II, 1930, p. 701.

Zosterops lutea flava; Delacour, Birds Malaysia, 1947, p. 320; Voous, Limosa 21, 1948, p. 100 (Batavia); Hoogerwerf, Limosa 22, 1949, p. 249; Hoogerwerf, Bijdr. Oöl. Eil. Java, 1949, p. 249; Mees, Ardea 39, 1951, p. 199, 206 (Batavia, Soengei Boentoe); Wynne, North W. Nat. N. S. 2, 1954, p. 625.

Characters. A very small species, appearing very yellow in the field. Further characterized by the lack of a black loral line, by the greenish edges along the tail feathers, and by the relatively very short tail. These characters suffice to distinguish it from the two other yellow-bellied forms of Java, *Z. chloris maxi* and *Z. palpebrosa melanura*, with which it has sometimes been confused.

Upper parts between Pyrite Yellow and Warbler Green, though brighter than either; rump decidedly more yellowish; frontal area yellow; eye-ring of average width, white, interrupted in front by the yellow loral spot; lores pale yellow; primaries and rectrices brownish black, edged with the colour of the mantle.

Under parts all yellow, varying from Lemon Yellow to Lemon Chrome; on the flanks, and especially on the sides of the breast, this colour gradually merges into the colour of the upper parts, becoming more greenish.

Unfeathered parts. Bill dark horn colour; mandibula, legs, and nails, leaden blue; iris bright yellowish brown (Vorderman, 1883); eyes brown; bill black; legs grey (Jacobson); iris brown (Rosier).

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1) Sclater's description makes it evident that he had before him specimens of *flava* from Borneo (moreover I have examined the Motley specimens, still present in the British Museum), which he compared with specimens of *melanura*, a form not yet described at that time, from Java. The latter he took to be *Z. flava*, and consequently, noting some points of difference, including the absence of a black loral line in the Borneo skins, he ventured not to name his Borneo specimens.

Measurements. Wing 26 ♂, 50-52½ (51.04); 24 ♀, 49, 49½, 50-52½, 55 (51.06); 56 specimens, 49-53, 55 (51.12); tail 26 ♂, 28½-32 (29.73); 24 ♀, 28-32 (29.79); 56 specimens, 28-33 (29.71); tarsus 56 specimens, 14-16 (14.77); entire culmen 53 specimens 10½-13 (11.43); exposed culmen 54 specimens, 8-9½ (8.56); culmen from anterior point of nostril 54 specimens, 6-7½ (6.57).

Structure. Tail relatively very short, average tail index of 56 specimens, 58.15 %. Wing formula typical, with the 2nd primary of about the same length as the 7th.

Distribution. A coastal species, which is known from but a few localities in western Java and southern Borneo. Occasional references in literature to its occurrence in Sumatra are all erroneous, they can probably be traced back to the fact that early workers identified *Zosterops palpebrosa buxtoni* with Horsfield's *Dicaeum flavum*.

In Java it has been recorded from Batavia, Moeara Gembong, Moeara Boengin, Moeara Wettan, Moeara Bloeboek, Telar Tjabang-Tampajan, Soengei Boentoe (specimens from all these localities examined), Moeara Tjiasem (Spennemann, 1924, field observation) and along the canal of Kasemen, Bantam (Hoogerwerf, in litt. 10-V-1953, field observation), all on the northern coast of West-Java.

In Borneo it has been recorded from Bandjermassin only, where it was taken by Hombron & Jacquinot, by Schwaner, and by Motley, but not by later collectors.

It is strictly a coastal species, never found more than about three kilometers from the shore (cf. Hoogerwerf & Siccama, 1938), and locally (Batavia) it is not uncommon.

First collector. Thomas Horsfield on Java, not after 1819, the year in which he left the island.

Figures. An excellent coloured plate is given by Hombron & Jacquinot (1843) under the name *Zosterops* parvule. Reichenbach's (1852) figure is copied from it, and is not of much value.

Type. Horsfield's specimen is present in the BM; it bears two labels, on one it is nr. 60.4.16.171, on the second nr. 60.4.12.171 (type examined).

Moult. Specimens collected in April (1), May (1), June (2), August (9), September (1, imm.), November (1), and December (3), are not in moult; the June and August specimens are in somewhat abraded plumage. Five other August specimens are moulting either primaries, or rectrices, or both; two September specimens are moulting primaries, one from 24 September having nearly completed its moult, the 2nd primary growing out, one from 13 September having a short 8th primary, the primaries 1-7, and all the

rectrices being old and abraded; one December specimen has nearly completed its primary moult; another specimen is heavily moulting its tail feathers, but shows no moult in the wings.

Evidently the main moult in this species takes place in the period from September to December.

Nidification. Hoogerwerf & Siccama (1938) describe a probably not yet completed nest, attended by two specimens, from near Batavia.

The only author who has ever obtained eggs ascribed to the species is Kuschel (1895); these eggs are doubtless those that later came to the collection of Nehrkorn, and were recorded in Nehrkorn's catalogues (1899, 1910). No date and locality being attached to these records, I feel not at all sure that the eggs concerned really belong to *Z. flava*, they might equally well belong to *Z. palpebrosa melanura*, a much more widely distributed form of which the egg-measurements agree with those given by Kuschel. As regards the nests recorded by Meyer (1884) under the name *Zosterops flava*, I have felt quite safe in bringing them under *melanura*, as Meyer mentions that one nest was found in a coffee tree, the other in bamboo. I am not aware that coffee is cultivated anywhere within the range of *Z.flava*, and so close to the coast. Moreover, *melanura* was not yet known to occur in Java when Meyer published his paper, all yellow-bellied species from Java being united under the name *flava* in those days.

Hoogerwerf (1949) writes that the clutch size is two, quoting Kuschel (1895) as his authority, but Kuschel never mentioned a clutch size, not could I find any other reference to it. Altogether the evidence is extremely scanty, and I cannot help expressing my surprise about the fact that a bird common near Batavia — for many years probably the largest town in eastern Asia as regards European population — remains so little known.

Habits, etc. Hoogerwerf & Siccama (1938) described the behaviour, which is thoroughly typical of the genus. Personally I observed the species twice in coastal bushes and mangroves near Batavia, but only a few specimens, not in flocks as large as indicated by Hoogerwerf & Siccama; once I saw a specimen in a mangrove tree catch a small caterpillar, which was beaten to death against a branch and subsequently swallowed.

The stomach of a specimen dissected by Vorderman (1883) contained microcoleoptera.

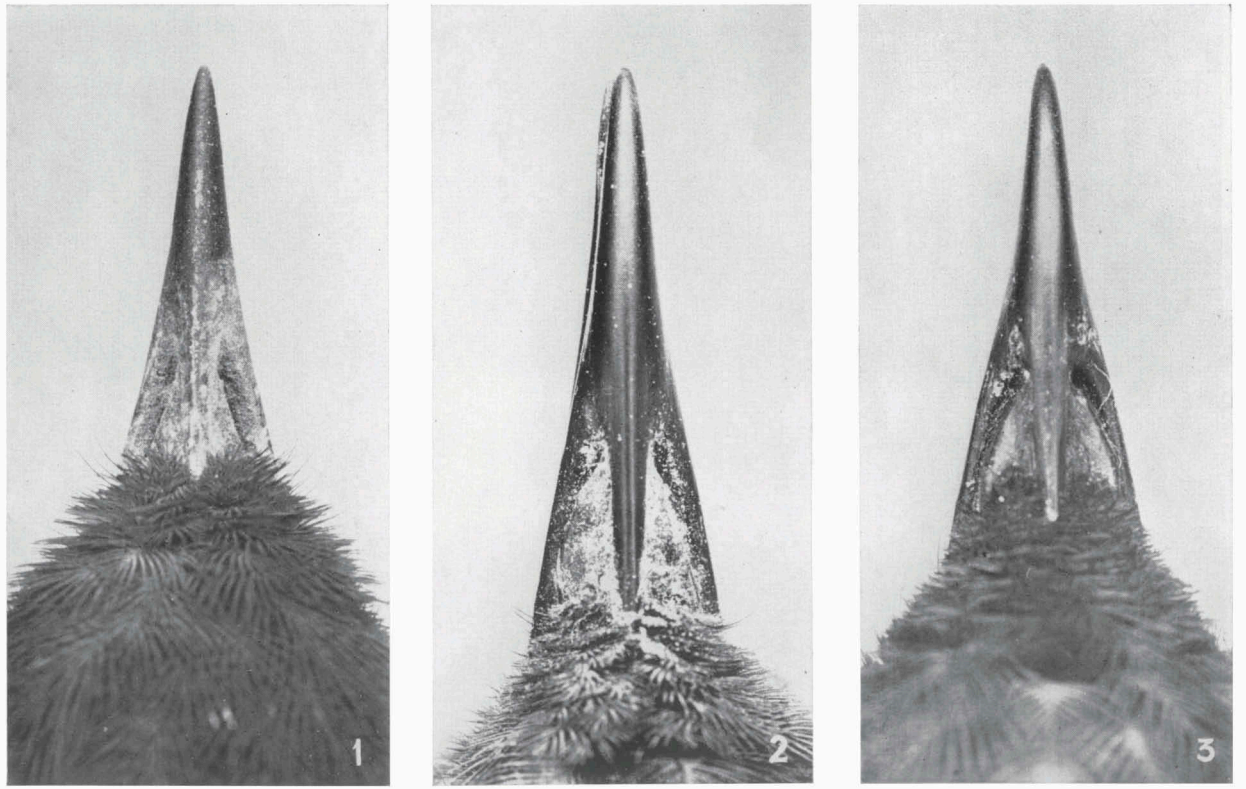
Voice. I only heard a chirp that seemed different from the one made by *Z. palpebrosa*, but no sufficiently critical comparison could be made at the time.

Discussion. For the confusion there has been between *Z. flava* and *Z. palpebrosa melanura*, see the discussion of the last-mentioned form.

As regards its relationships, Stresemann (1931) thought that it was "Anscheinend ohne nähere Verwandte", but Delacour (1947) and Voous (1948), following Mayr (1944) in placing a large number of yellow-bellied, mangrove-inhabiting forms in one single species, *Z. lutea*, unite it with that species. The name to which these authors come, *Z. lutea flava*, quite apart from possible relations, is nonsense from a nomenclatorial point of view inasmuch as the name *flava* has many years' priority over *lutea*.

In my opinion (Mees, 1954) there is no justification in considering *Z. flava* particularly closely related to, and only subspecifically distinct from, some other form, and I share Stresemann's opinion, quoted above, that this well- marked species is without certain close relatives.

"The distribution indicates that the species may be an old inhabitant of the southeastern border of the Pleistocene Sunda Land, and that afterwards its range, once contiguous, has been split up by the transgressing Java Sea" (Mees, 1954).



Variation in bill-size in races of *Zosterops japonica*. Fig. 1, *japonica* (lectotype, RMNH cat. nr. 1); fig. 2, *stejnegeri* (MCZ nr. 277177); fig. 3, *insularis* (MCZ nr. 166241) × 5.