THE SUBSPECIES OF *CHLIDONIAS HYBRIDUS* (PALLAS), THEIR BREEDING DISTRIBUTION AND MIGRATIONS (AVES, LARIDAE, STERNINAE)

by

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(partly based on notes left by the late Dr. G. C. A. Junge)

With three text-figures

CONTENTS

1. INTRODUCTION

During the years preceding his sudden death in Januari 1962, my predecessor, Dr. G. C. A. Junge, was engaged in a broad study of the birds of Java. This study was mainly based on the excellent Bartels collection, purchased not long before, but Junge included other material and also used the manuscripts and diaries of M. E. G. Bartels, which had been received with the collection.

In his accustomed meticulous way, strictly following the "Peters" sequence, Junge has measured and studied every specimen, from the Podicipedidae to the Columbidae, measured their eggs, and noted particulars of breeding, moult, food, etc. Unfortunately, the manuscript as a whole is too incomplete to justify its publication: it is in the form of rough notes and they are evidently no more than a basis from which later a definitive text was to be compiled. Also, the publication of large series of localities and measurements of common species, about which there is no systematic problem requiring

such detailed information, would be of little interest. Information on eggs contained in the Bartels collection and on breeding-seasons as deduced from them, has in the meantime been published separately by Hellebrekers & Hoogerwerf (1967).

A few of Junge's preliminary results were, however, of sufficient interest to be worked out further and published separately; his notes on *Chlidonias hybridus* certainly come in this category. Junge's notes are here given almost verbatim, with only a few small corrections and alterations such as he himself would probably have made in the definitive text, and are marked with his initials.

Originally, all I expected to do was prepare for publication Junge's notes on the two subspecies visiting Java, but one thing led to another and gradually my notes expanded to a revision of the species over its whole range. It is necessary to mention that the desire to keep Junge's contribution recognizable, has led to a less logical construction of this paper than otherwise would have been the case. Although I had intended to publish this paper under our joint names, over nine-tenths of it was written by me alone and it appeared no longer fair to burden a person with the responsibility of authorship of a paper he had never seen (and might not have approved of), over fifteen years after his decease.

Chlidonias hybridus is widely distributed in the Old World and Australia, either as a breeding-bird or as a visiting migrant, but neither its breeding-range, nor its migrations have been properly worked out and the same can be said of its geographical variation. In this paper an attempt will be made to provide a clearer picture of the points mentioned. In the course of the revisional work other, previously unexpected, questions arose, about breeding seasons and seasonality of plumage; these have only been partially answered, but by drawing attention to some of the remaining problems this paper may possibly contribute a little to their solution.

2. Bartels collection from Java (GCAJ)

Chlidonias hybridus javanicus (Horsfield)

Sterna Javanica Horsfield, 1821, Trans. Linn. Soc. Lond., 13: 198 — Java.

Sitoe Palachlar, Batavia: 1 ♀ (no. 14254). Moeara Boengin, Krawang: 1 ♂, 1 ♀ (nos. 12298, 12303). Moeara Gembong, Krawang: 3 ♂, 14 ♀ (nos. 9601, 9602, 9603, 9604, 9605, 9606, 9607, 9608, 9609, 10746, 10754, 11811, 12327, 12329, 12335, 12974, 13107).

No.	Sex	Date	Wing	Tail	Culmen	Tarsus
12303	♂	22.XI.1921	225+	67	27	22
12335	♂	25.XI.1921	228+	69	32	23

No.	Sex	Date	Wing	Tail	Culmen	Tarsus
12974	♂	11.X.1922	222+	65	32	22
13107	♂	21.X.1922	228	62	31	23
9601	♀	18.IV.1914	218	64	27	22
9602	♀	18.IV.1914	221	68	28	24
9603	♀	18.IV.1914	217	65	28	22
9604	♀	18.IV.1914	228	65	27	23
9605	♀	18.IV.1914	222	63	29	24
9606	♀	18.IV.1914	226	64	29	23
9607	♀	19.IV.1914	228	62	27	23
9608	♀	19.IV.1914	232	60	28	23
9609	♀	19.IV.1914	217	65	27	22
10746	♀	18.IV.1917	213	61	27	22
10754	♀	19.IV.1917	222	64	29	21
11811	♀	18.V.1920	(208)	—	27	22
12298	♀	22.XI.1921	—	61	28	23
12327	♀	24.XI.1921	222+	65	28	23
12329	♀	24.XI.1921	214+	64	27	22
14254	♀	17.X.1925	211+	63	25	21

Moult. Wing moult is shown in April (7 out of 11), May (0 out of 1), October (3 out of 3), November (4 out of 5).

Chlidonias hybridus fluviatilis (Gould)

Hydrochelidon fluviatilis Gould, 1843, Proc. Zool. Soc. Lond., (1842): 140 — Rivers and lakes of the interior of New South Wales.

Bay of Batavia: 1 ♂, 3 ♀ (nos. 4963, 4964, 4965, 14157). Rawah Tangerang, Batavia: 1 ♀ (no. 14505). Moeara Boengin, Krawang: 1 ♂, 1 ♀ (nos. 5740, 5741). Moeara Gembong, Krawang: 3 ♂, 5 ♀ (nos. 11802, 11803, 11804, 12336, 12590, 12591, 12592, 12593). Moeara Wetan, Krawang: 3 ♂, 3 ♀ (nos. 5694, 9762, 9767, 10582, 19584, 13613). Moeara Bloeboek, Krawang: 1 ♀ (no. 12528). Cape Krawang, Krawang: 2 ♀ (nos. 11627, 11628).

No.	Sex	Date	Wing	Tail	Culmen	Tarsus
5740	♂	17.VIII.1908	223	65	31	26
9767	♂	10.IX.1914	229	67	28	23
10582	♂	7.V.1916	230	68	32	24
11802	♂	18.V.1920	220+	67	32	25
11804	♂	18.V.1920	220+	65	31	24
12336	♂	25.XI.1921	232	64	32	25
13613	♂	22.VIII.1923	—	—	31	24
14157	♂	15.V.1925	—	59	29	23
4963	♀	12.VIII.1907	228	65	29	21
4964	♀	12.VIII.1907	—	—	27	21
4965	♀	12.VIII.1907	(206)	60	28	23
5694	♀	17.VIII.1908	229	69	27	23
5741	♀	17.VIII.1908	217	61	28	23
9762	♀	9.IX.1914	221	63	28	22
10584	♀	7.V.1916	216+	64	28	22
11629	♀	18.VII.1919	223	—	28	23
11628	♀	18.VII.1919	—	—	28	23

No.	Sex	Date	Wing	Tail	Culmen	Tarsus
11803	♀	18.V.1920	217+	—	—	23
12528	♀	14.V.1922	210+	60	27	22
12590	♀	20.V.1922	—	—	27	23
12591	♀	20.V.1922	215	64	27	22
12592	♀	20.V.1922	212+	62	28	24
12593	♀	20.V.1922	212+	—	26	23
14505	♀	27.V.1926	218	—	27	23

Moult. Wing moult is shown in May (6 out of 8), July (2 out of 2), August (6 out of 7), September (0 out of 2), November (1 out of 1).

Short description. In winter plumage the upperparts are dark grey (Light Neutral Gray, Ridgway, 1912) in *javanicus*, more whitish grey (Light Gull Gray, Ridgway) in *fluviatilis*. Head white or streaked black and white, nape black. Underparts white. In summer plumage the head and nape are black. Upper parts Neutral Gray (Ridgway) in *javanicus*, Gull Gray (Ridgway) in *fluviatilis*. Sides of head and chin white becoming darker on breast, to blackish on abdomen. Breast and abdomen in *javanicus* darker than in *fluviatilis*. Young birds like adults in winter plumage, but with brown on tips of the secondaries.

Irides dark brown. Bill red to purplish red, often washed with brown, darkest at base, in summer plumage, black in winter plumage. Feet dark purplish red washed with brown, soles and webs yellowish red.

Distribution and habits. It was a surprise to find that Java is regularly visited by two different races of the Whiskered Tern. Bartels states that the species winters in considerable numbers along the muddy coasts of north-western Java. These terns can often be met together with other terns on the flats or resting on fish stakes. Bartels observed the species often near the boats of fishermen, preying on shrimps or small fishes. Also regularly observed fishing in the shallow waters near the flats and above fish ponds or sawahs more inland. Sometimes in flocks of 50 to 100 individuals (Hoogerwerf & Rengers Hora Siccama, 1937: 47). *C. h. javanicus*, first date 11 October, last date 18 May, *C. h. fluviatilis*, first date 7 May, last date 9 September, one specimen from 25 November. Food: small fish, shrimps, insects (Diptera, Hemiptera (larvae and eggs)), worms.

3. Specimens from Ceylon (GCAJ)

Chlidonias hybridus javanicus (Horsfield)

No.	Sex	Date	Wing	Culmen
41	♂	14.I.1922	—	28
55	♂	18.I.1922	227+	32

No.	Sex	Date	Wing	Culmen
56	♂	3.II.1923	—	31
49	♀	3.X.1922	222	28
51	♀	4.X.1922	220+	27
57	♀	28.X.1922	—	26
50	♀	4.X.1922	224+	29
42	♀	13.XI.1921	224	29
39	♀	12.XI.1921	212	25
38	♀	13.XI.1921	215	27
53	♀	2.XI.1922	217	28
54	♀	2.XI.1922	217	27
40	♀	12.XI.1922	218	27
37	♀	12.XI.1921	218	27
43	♀	14.I.1922	222	28
48	♀	19.II.1922	—	30
46	♀	19.II.1922	—	27
47	♀	19.II.1922	—	28
44	♀	19.II.1922	—	28
45	♀	19.II.1922	224	31
Also examined:				
Nepal	-	—	238	27 [1]
Kashmir	-	—	236	33

4. Additional material from the Greater Sunda Islands and from the Philippines

Our collection contains a few more skins, originating from various sources, and a number of mounted specimens, which were apparently not examined by Junge.

Additional material from Java. Two unsexed and undated birds, labelled respectively Java Zee and Straat Madoera (A. G. Vorderman, received in March 1896), and a ♀, 15.X.1928, Baai van Batavia (J. Verwey) are referable to *C. h. javanicus*. The Zoölogisch Museum, Amsterdam, possesses one specimen from Java: ♂, 20.IX.1926, Rawah Bekasi (J. P. Rosier); this bird was recorded as *C. h. javanica* by Voous (1948), but is *C. h. fluviatilis*.

Material from Borneo. Four unsexed specimens, 1826, no exact date of collecting, from Pontianak (P. Diard); three of these birds, two in nuptial plumage and one in autumn plumage, are *C. h. javanicus*, the fourth, in

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1) The Nepal specimen, in full breeding plumage, was re-examined by me. It is a mounted bird in the old collection, with underneath the socle in Temminck's handwriting the following notes: "*Sterna similis*, Hodgson, Inde Nepal". *C. hybridus* was not included in the avifauna of Nepal by Biswas (1961), but was listed for the Nepalese lowlands by Ali & Ripley (1969). Hodgson lived in Katmandu, not in the lowlands. The specimen is large for a bird from the Ganges plain; it is also remarkably dark, both above and on chin and throat. It compares well with specimens of *C. h. delalandii*. It must be a mislabelled African bird (GFM).

autumn plumage, evidently belongs to *C. h. fluviatilis*. A ♂, undated, ca. 1845, merely labelled Borneo (C. A. L. M. Schwaner) is also *C. h. fluviatilis*.

Material from Celebes. ♀, 8.X.1841, Gorontalo (E. A. Forsten); 2 ♀, ca. 1841, Celebes, without exact date and locality (Forsten); 3 ♂, 4 ♀, 12-20.VIII.1863, Ajer Pannas, N. Celebes (C. B. H. von Rosenberg); 3 ♂, 2 ♀ and one specimen of uncertain sex, 3-5.IX.1863, Limbotto, N. Celebes (v. Rosenberg); one unsexed specimen without date from Menado, N. Celebes (S. C. J. W. van Musschenbroek, received in 1866); one unsexed specimen without date and exact locality, Celebes (J. G. F. Riedel, received in 1870); four unsexed specimens, 1877, Makassar (J. E. Teysmann) [1]); two unsexed specimens, 15-21.X.1888, Tempe, S. Celebes (M. Weber). All these specimens are *C. h. fluviatilis*.

♀, 25.I.1864, Limbotto, N. Celebes (v. Rosenberg). This specimen is *C. h. javanicus*.

Material from the Philippines. Very few specimens have been available; in Leiden there is only one, unsexed, 27.IX.1892, Cagajan (A. v. d. Valk). Also examined: ♀, 11/14.I.1875, Manila (BM no. 80.11.18.694). Both these birds are *C. h. javanicus*.

♂, 7.XII.1914, Mabitoc, Laguna, Luzon (J. T. Zimmer, AMNH no. 295800). This is *C. h. fluviatilis:* it is the specimen previously recorded by Parkes (1958). The occurrence of an individual of this subspecies so far north and in the southern summer, is unexpected, as is the fact that it is in winter plumage. A likely explanation is that this is a bird in its second year of life. Stresemann & Stresemann (1966: 263-264) found that in the related species *C. leucopterus*, one year old birds retain their winter plumage and remain in the winter quarters. In *C. hybridus* it would almost certainly be the same.

5. Status in the Indo-Australian region

Chlidonias hybridus is known to breed in Kashmir (Kaul, 1939: 90; Bates & Lowther, 1952: 304-306) and in the lowlands of the Ganges Valley, Bengal and Assam (status reviewed by Donahue & Ganguli, 1965; good and exact earlier information provided by Hume, 1890: 305-308). Breeding in Ceylon has often been suggested but never been proved, and perhaps its seasonally common occurrence may be explained by assuming that the island serves as winter-quarters for the population from northern India. According to Henry (1955: 328) the birds leave the island by the time they wear their breeding

1) It is known that Teysmann's specimens were not individually labelled and that his specimens from Makassar may have been collected elsewhere in south Celebes and even on Salayer. He stayed in Celebes and Salayer from June to December 1877.

plumage, in May or June. Phillips (1952: 21) calls them abundant from September to May, and that certainly suggests winter visitors rather than breeding-birds and, incidentally, also disposes of the name *Hydrochelidon leucopareia leggei* Mathews (1912: 320) based on: "A series of breeding birds from Ceylon", supposed to: "differ from the North Indian birds in their lighter under-coloration, though agreeing in their small size". I suppose that Mathews's Ceylonese birds had not yet attained the full breeding-plumage, which would explain the difference.

According to Ali (1969: 137) the species is no more than a winter visitor to Kerala, and Voous (1960: 169), by colouring the whole of peninsular India (although without Ceylon), has certainly given it too extensive a breeding-range. Ripley (1961: 142) included West Pakistan in the breeding-range, but Donahue & Ganguli (1965) were unable to locate definite breeding records from there and subsequently Ali & Ripley (1969: 39) also mentioned that there is no definite evidence of breeding in Pakistan. Ticehurst's (1924) notes are suggestive of breeding in Sind, but do not yet prove it.

Although birds from the northern Indian population do not differ subspecifically from the population of north-east Asia, there is little evidence of contact between the two populations, even in winter. The north-east Asian population winters in the Philippines, Borneo, Java and the Celebes, but it is a curious fact that *Chlidonias hybridus* has never been formally recorded from either the Malay Peninsula or Sumatra (cf. Chasen, 1935: 45; Gibson-Hill, 1949; Deignan, 1963). The species might conceivably have been overlooked in Sumatra, but of records from Malaya the paucity is remarkable when one considers that it is supposed to be a "very common resident bird" in Thailand (Lekagul, 1970: 62; see also Madoc, 1950: 163), whence one would certainly expect it to disperse along the coast of the Malay Peninsula [1]). In recent years a few field-observations from Malaya have been published (Medway & Nisbet, 1965). There is nothing unlikely in these records, but the description given by the observer: "Identified by white throat and cheeks contrasting with dark grey underparts and *blackish upperparts*" (my italics), is inaccurate. A more recent observation (Wells, 1974) is unaccompanied by any particulars and is therefore a matter of faith in the observer.

Unspecified records, given in a general way, of the occurrence in Malaya (Baker, 1929: 113) are evidently erroneous. Whistler (1949: 483) makes

1) The word "resident" used by Lekagul suggests breeding, but I am not aware of any definite breeding-records in Thailand. The absence of records was confirmed by Mr. Dickinson (in litt., 20.X.1973), who informed me that in his extensive ornithological card-index of Thailand, there are no records of breeding.

it even worse with the statement that *C. h. javanicus*: "breeds in Assam and Burma and eastwards through the Malay States to Java, Borneo and Celebes". Delacour (1947: 91) is also positive and wrong with: "Nests in Malaya and Java". Smythies (1957: 616), who was aware of the lack of breeding records from Malaya and Borneo, surmised that there were breeding stations in Java or Celebes. There is no shred of evidence for breeding in Malaya, Java, Borneo, or Celebes.

The same is true for Indo-China, from where Wildash (1968: 100) writes that *Chlidonias hybridus* is sedentary, but makes local migrations during the hot season. Thus it is clearly implied that the species is a breeding-bird in Viet-Nam, but is it? Evidently, Wildash based his notes on the status of the species on Delacour & Jabouille (1930: 31), who give descriptions of nests and eggs. Although the superficial reader could be forgiven for thinking that these nests and eggs were found in Indo-China, this is nowhere stated clearly, and I get an impression that the information given is only of a general nature, and may have been based on observations made in an entirely different part of the range of the species, for example in France. This was confirmed by Mr. Delacour (in litt., 29.XI.1976): "I do not think we ever found *Chlidonias* nests in Indochina, our descriptions were taken from others. I have no evidence that they breed in Indochina and I doubt that they do. It is too far south".

In Formosa there is similar confusion, *C. hybridus* has been claimed as a resident and as a breeding-bird, but the evidence to support these claims is lacking (cf. Mees, 1977).

The supposed breeding of *Chlidonias hybridus fluviatilis* off the coast of Buru can also be dismissed. It is based on an observation by Martin (1894: 366): "Um 11½ Uhr verliess ich am 10ten Juni P. Tenga wieder, um mit Hilfe der erwähnten kleinen Prau meine Fahrt um die Nortwestecke von Buru forzusetzen, und gelangte nun alsbald ein wenig nördlich von P. Tomahu zu kleinen Klippen, die inmitten der Strasse zwischen der letztgenannten Insel und den Tandjung Biloro gelegen sind. Seeschwalben, welche hier umherflogen (sehr wahrscheinlich *Sterna hybrida* Pall.), verriethen durch ihre Unruhe, dass ihnen die Felsen als Brutstätte dienten, und ohne sonderliche Mühe fand ich auch binnen kurzem daselbst ein Gelege mit stark angebrüteten Eiern. Da die Klippen kaum 1 m. hoch über den Wasserspiegel hervorragen und so klein sind, dass man nur zur Noth darauf stehen kann, so beweist der Fund wohl zur Genüge, dass das Meer an diesem Orte im Ost-Muson sehr ruhig sein muss, da die Thiere sonst schwerlich längere Zeit hindurch jene Stätte behauptet haben würden".

Stresemann (1914b: 378) had his doubts about this record but did not

reject it. To me the idea that a marsh-tern would breed on reefs in the sea seemed preposterous. The attention which Martin has given to these birds in his book made me wonder whether, perchance, he had collected any eggs. Examination of our egg-collection did not reveal the presence of any eggs of *C. hybridus* from Buru but I found an egg correctly identified as from *Sterna sumatrana*, with an original label reading: "Klippen van West-Buru bij het eilandje Tomahoe, Martin". This disposes of *C. hybridus fluviatilis* as a breeding-bird of Buru, and at the same time establishes *Sterna sumatrana* as such. Hitherto *S. sumatrana* was known on Buru from only two skins, as recorded by Hartert (1924) and Siebers (1930).

Superficially the breeding of *C. h. javanicus* on the Togian Islands looks better-founded. The first reference to it was by Meyer & Wiglesworth (1898: 897) who stated: "We suppose it to be a resident, as a number of specimens were collected by Meyer at the Togian Islands in August, and the bird breeds in India — except the Central and Southern parts of the country, — and in Australia". It will be noted that there is nothing positive here; there is no mention of breeding activities, of eggs or young. Thus the two grounds for the assumption of breeding were geographical possibility and the month August in which the birds were present, an early month if it concerned migrants from the North, but quite normal for migrants from the South. Meyer & Wiglesworth did not distinguish between the subspecies and therefore would not have been aware that Australian birds are migratory.

Later Stresemann (1941: 20) came with a definite record which would appear to prove the case, as he mentioned: "... die Tatsache, dass A. B. Meyer noch flugunfähige Jungvögel auf den Togian-Inseln gesammelt hat. Eines davon (B. 9194) befindet sich im Zool. Museum Berlin". In view of the great interest of this record, the only definite evidence of breeding between Bengal and Australia, I asked to borrow the specimen (its number is B. 9174, but it is definitely the bird examined by Stresemann, and a misprint may account for the difference). The bird is a large young, well-feathered (but damaged by moths) but, as Stresemann wrote, definitely still a "flugunfähiger Jungvogel", therefore there can be no reasonable doubt that it had hatched on the Togian Islands. The matter of correct identification of this bird now became of great importance. It appeared to be very close to two specimens of *Sterna sumatrana* of about the same age in our collection, but we lack juveniles of *C. hybridus*. Fortunately a loan could be arranged with the British Museum: I received one bird somewhat younger than the one from Berlin, with especially the head still in down (♂, 22.XI.1958, Tananarive, Madagascar, c. 4000 ft., leg. C. W. Benson, BM no. 1959.5.433) and one older bird, probably already able to fly (♀, 5.VIII.1928, Sumbul,

Kashmir, 5000 ft., leg. H. Whistler, BM no. 1949. Whl. 1. 17094). As I was concerned with specific, not subspecific differences, the fact that these birds belonged to different subspecies did not appear to matter. It was at once evident that the Togian bird could not be *C. hybridus:* it has a much more slender bill even than the bird with down, it is definitely smaller than the downy young although it must be older, and the inner webs of the outer primaries have very broad white margins, the inner primaries are almost entirely white. In the specimens of *C. hybridus* the inner webs of the primaries are darker than the outer webs, blackish. Saunders (1896: 128) already mentioned the white inner webs as a character of *S. sumatrana.* Hence, there is no question that the Togian bird is *Sterna sumatrana.*

It will be noted that Stresemann used the plural ("flugunfähige Jungvögel"), but there appears to be no basis for this. Meyer's specimens of *C. hybridus* from the Togian Islands are in the British Museum (Saunders, 1896: 16), where I have examined them and there are no juveniles amongst them. Moreover it is not clear why Stresemann should have ascribed the birds from the Togian Islands to *C. h. javanicus.* Actually, five out of Meyer's specimens are *C. h. fluviatilis* as one would expect from their month of collecting (the specimens are undated but, as quoted above, Meyer's visit took place in August 1871), and only one (BM no. 91.5.1.147) belongs to *C. h. javanicus.*

There are no previous records of *Sterna sumatrana* from the Togian Islands (cf. Meyer, 1879; Ripley, 1941), but breeding had been reported from Lembeh Island, off the north-eastern tip of Celebes (Meyer & Wiglesworth, 1898: 904-905).

With the definite rejection of the breeding record from Buru, all that remains of the status of *Chlidonias hybridus* in the Moluccas is a few scattered records: Bruijn obtained a male at Kajeli, Buru, on 25.IX.1875 (Salvadori, 1882: 429), Platen one at Ambon on 25.X.1881 (Salvadori, 1882: 566), and Kuroda Jr. (1953) mentioned an undated female from Halmahera. In addition, Stresemann (1914a: 56) reported an immature male collected by Stalker at Wahai, Ceram, in November 1909, but I have examined Stalker's specimen (BM no. 1910.12.12.38) and am reasonably certain that it is *C. leucopterus* and not *C. hybridus. C. leucopterus* was not yet listed from the Moluccas by van Bemmel (1948), but Kuroda Jr. (1953) recorded a male from Halmahera, collected on 5.IV.1937 and there is also a specimen in Leiden, an unsexed bird in winter plumage, from Tobelo, Halmahera, collected by A. Hueting around the end of 1911 (RMNH reg. no. 2479). As this species is even known from Australia and from the south coast of New Guinea, where periodically it is not rare, and in the Philippines is a common

migrant in autumn and spring (Temme, 1973), it might be expected to be of regular occurrence in the Moluccas. Kuroda's record was overlooked by White (1976).

The only remaining area outside Australia that requires discussion is New Guinea. Although several authors are noncommittal in their remarks about the status of *Chlidonias hybridus fluviatilis* in New Guinea, consensus of opinion is definitely that it is a breeding-bird, and as such it is treated in the latest literature, for example by Rand & Gilliard (1967: 149) and Condon (1975: 147). Only Iredale (1956: 47) observed that in New Guinea it might be a visitor from Australia, an unexpected pearl in a work that otherwise is not of a very high standard. Certainly the species is widely distributed in New Guinea. Mayr (1941: 35) gave as its habitat: "Shallow lowland lakes, lagoons, slow flowing lowland rivers", but subsequently Junge (1953: 25) recorded it from the Wisselmeren at an altitude of 1750 m. Our collection contains 13 specimens of *C. h. fluviatilis* from New Guinea, and their dates of collecting fall between 13 May and 19 September. The great majority of other records is also during the southern winter. Van den Assem (1960) observed the species on Lake Sentani between April and early November (in the years 1957-1959); towards the end of their stay the birds were assuming their breeding-plumage. Van den Assem especially stated that the birds left to breed elsewhere, and Condon's (1975) categorical statement that *C. h. fluviatilis*: "Breeds commonly in New Guinea (e.g. Sentani Danau, near Humboldt Bay)", is unfounded. Gyldenstolpe (1955: 226) recorded a bird from Lake Aimaroe on 12.III.1949; I have examined this specimen (NRS), and found it to be an adult male changing into winter plumage. The most likely explanation appears to me that this is an early migrant. Proof that birds from Australia migrate to New Guinea has been provided by a bird ringed as a pullus at Port Fairy, Victoria, and recovered three years later on the Sepik River (Purchase, 1969: 50). All the evidence points therefore to *C. h. fluviatilis* being only a non-breeding winter visitor in New Guinea. This opinion is strengthened by the fact that at least the great majority, if not all, of the reliable breeding records from Australia concern the extra-tropical part of that continent. In southern Australia *C. h. fluviatilis* is known to be present in summer only, as mentioned for Victoria by Wheeler (1967), for South Australia by Condon (1969) and for the neighbourhood of Sydney by McGill (1945). Even as far north as Brisbane it appears to be mainly a summer visitor (Jack, 1963). Actually there is some rather casual evidence that even in the extreme southern part of the range a few individuals stay throughout the year (cf. Bedggood, 1970; Roberts, 1975), but this evidence does not, of course, affect the general picture.

Further investigations have made it clear that all records of breeding in tropical Australia are suspect. In tropical Western Australia there is only Shilling's (1948: 66) remark from Liveringa, Kimberley: "I have heard reports of their nesting on Moolamer Swamp, but have not found nests myself". This sentence expresses doubt and moreover Shilling was not even certain of the identification of the birds seen. In my opinion the record — if it may be called that — can be dismissed.

From tropical Queensland I have found two records meriting discussion. The first is by Barrett (1925: 221), who observed in the Fitzroy Vale near Rockhampton: "... flocks of Marsh Terns (*Chlidonias leucopareia*), which circled about ... and perchance had nested in the swamp". This looks positive enough, but remarks made by Wolstenholme (1925: 232) on the same excursion make it clear that no nests were found, he said only: "a small flock was disturbed from among the reeds of Goose Swamp, Fitzroy Vale. They looked very pretty circling above the Pied Geese". Evidently Barrett's record was based on hearsay only. In this connection it is perhaps well to state that the visit to Fitzroy Vale took place in October. Although the irregular breeding habits of the species make it difficult to be certain, this is a good time of the year to observe birds in breeding plumage on their way south, but very early for birds (in eastern Australia) to have finished breeding. The observers made no mention of the presence or otherwise of fledglings or juvenile birds.

Originally I had more confidence in the record from Townsville by Lavery & Hopkins (1963: 243). As it was my opinion that such an interesting record deserved better documentation than an asterisk (denoting breeding recorded near Townsville) preceding its name, I wrote to Dr. Lavery to ask for particulars. From his reply (Lavery, in litt., 1.IV.1976) I cite: "since there is certainly no nesting information that I have on the species ... you must assume that the entry was in error". Miss Hopkins (in litt., 25.IV.1976) was able to supply more particulars, which are of sufficient interest to be quoted here, as an example how doubtful records find their way into the literature: "In October 1954 I had brought Mr. Roy Wheeler of Melbourne to an outing of the Townsville Naturalist Club on the Townsville Common, where we saw a flock of these terns. Here I quote from the account in "The Townsville Naturalist" probably written by our Secretary-Editor: "The same pool attracted a party of Marsh Terns, in various plumage phases. *Some appeared so young as to suggest that they were bred locally* and Mr. Wheeler thought a drying salt-pan near the Shelley Beach road a likely breeding place". The part I have underlined [italicized here] is more or less what I would have mentioned in writing an account ... I could hardly have

spoken of their breeding as a fact, as I have always remembered it simply as an idea of Roy's". The only point that remains puzzling is that, like the record from Fitzroy Vale discussed above, the month of observation was October, when the birds ought to be moving south towards their breeding places, and should not be accompanied by young. Unfortunately the record is silent on how the young were identified, and whether they were fed by the adults.

There are a few summer records from tropical Queensland, for example of a flock of one hundred or more near Mt. Isa in January 1968 (Carruthers, 1969), but there is no suggestion that this would be connected with breeding (Horton, 1975: 60). Thus, the only reliable records of breeding in Queensland are from the south-western interior (cf. Nielsen, 1963).

Now that the tropical localities have been dismissed, the extra-tropical part of Australia remains as the breeding range of *C. h. fluviatilis*, in particular south-eastern Australia, where it is widely distributed. Although the species is a regular breeder in southern coastal Victoria (Bryant, 1950; Smith & O'Connor, 1955; Portbury & Buntine, 1961; Bowker, 1973) and on the Armidale Tablelands (Gosper, 1973), its stronghold is the interior, especially the flood-plains of the great rivers, where very large numbers can breed when conditions are favourable. Observers mention colonies of hundreds and even thousands of nests (cf. Stone, 1913; Bourke, 1956; Hobbs, 1956, 1961). Unfortunately estimates of actual numbers are rarely given in literature; a favourable exception is Disher (1966) who in November 1964 found a colony of about 2000 nests near Barham.

Finally, mention must be made of the fact that Condon (1975: 147) has erroneously included Tasmania in the breeding range of the species, for actually *Chlidonias hybridus* has only recently been added to the avifauna of that island on the basis of a sight observation of a single straggler (Wall, 1970) and there has never been any suggestion of breeding.

6. Status in East Asia

In East Asia, *Chlidonias hybridus* appears a somewhat enigmatic species. From Japan there are but a few records. Austin & Kuroda (1953: 448) observe that: "After its nesting season in southern China and Indochina the Whiskered Tern seems to wander northward fairly regularly as far as Chihli and Manchuria on the continent. It has occurred in Japan only twice". The problem is, however, that there are no nesting records from southern China and Indo-China. La Touche (1933: 321-322) had no evidence of breeding in southern China but considered it likely that the species would breed "in Eastern China as far [south] as the Yangtse". This is not supported by

Shaw (1936: 464-465), who, writing about Hopei, observed that: "It is believed that this bird breeds somewhere in this region and Mongolia, but so far neither nest nor eggs has been collected". The remarks made by Caldwell & Caldwell (1931: 354) look almost authentic, but they spoil it by concluding their description of distribution, range, and field-characters, with the remark: "We are not personally acquainted with this tern". Fu (1937: 98), who evidently had a good knowledge of the avifauna of Honan, knew *Chlidonias hybridus* as a migrant in that province, arriving in April and May, but had no evidence of nesting. In Manchuria the species is apparently common in summer (Sowerby, 1923: 333; Meise, 1934: 77); records were summarized by Hemmingsen & Guildal (1968: 288), they are all in the summer months, which suggests breeding, and Meise (l.c.) listed the species definitely as a "Brut- und Zugvogel", but proof is lacking. *Chlidonias hybridus* is as yet unrecorded from Korea (Gore & Won, 1971).

Dementiev & Gladkov (1951: map 99) gave the species an overgenerous range in south and east Asia, but took care to exclude all Russian territory east of Kazakhstan from it. Neither Vorobiev (1954) nor Panov (1973) made any mention of its occurrence in Ussuriland. Therefore I was surprised to find that Vaurie (1965: 487) recorded *C. hybridus* as breeding in Manchuria and Lake Khanka in Ussuriland. The distributional map given by Flint et al. (1968: map 127) shows it also as breeding in southern Ussuriland. The literature available to me thus being contradictory, I asked Dr. Nechaev for information; from him I received a book by Polivanova. This author (1971: 177-181) describes in detail breeding colonies she found in 1963 and 1964 near the southern end of Lake Khanka. In each year it concerned some 400-500 pairs. Evidently the species is a regular, probably an annual, breeder in fair numbers. For completeness' sake I further mention that in May 1968 a single specimen was observed and collected on Lake Beloberezovo, near Konstantinovkah (ca. 49°40′ N, 128° E) on the middle course of the Amur (Dymin, 1975).

About breeding in China I can also add a positive paragraph: in the British Museum I found two specimens of *C. hybridus* in breeding plumage, collected near Hankow on 27 June 1911. One is a male, with the gonads drawn on the label: they measure approximately 7 × 7 and 5½ × 5½ mm. Moreover on the label the following notes are given: "One of the birds of a colony of 20 pairs just starting to lay about 6 nests of single eggs". The other is a female from the same colony, with "Huge oviduct & uterus, 2 ripe eggs". A collector's name is not given on the labels, but the birds belonged to the collection of H. F. Witherby. The full information on the labels indicates that these birds have been collected by a person with a serious and scientific

interest in ornithology. Witherby himself has never visited China, but the date and locality immediately suggest Lynes. In his obituary of Lynes, Witherby (1943) has explained why little has been published about the ornithological results of Lynes' stay in China. This then is, to my knowledge, the only proven case of breeding in China.

The many observations in winter in south-eastern Asia and in summer in China to as far north as Manchuria, leave no doubt that the species breeds much more widely in China. The map in Cheng (1976: 242) shows records right up to the Mongolian border and there is an observation of a single individual at the Orog-nur (Orog Nūr), in the heart of Mongolia, suggesting an even wider distribution (cf. Piechocki, 1968: 264; Fischer, 1970: 127).

7. Status in Africa

As in East Asia, two subspecies are found in Africa, the resident Ethiopian *C. h. delalandii* Mathews, and the nominate race which occurs as a winter-visitor from the Palaearctic.

To begin with the nominate race, on present evidence it winters in West Africa, the Sudan, northern Congo, and Ethiopia, south to Kenya (Moreau, 1972: 244; Britton & Brown, 1974). The notion that migrants should not come south beyond Kenya is an old one, already appearing in Sclater (1924: 153). Chapin (1939) examined a specimen from Kabare on Lake Kivu, and it is not clear to me why he adds: "It is doubtful, however, whether the typical form migrates to Kenya Colony, where *sclateri* breeds...". As Kabare (2°28′ S) is on the latitude of southern Kenya, I find it difficult to understand why Chapin and other authors should have doubted the occurrence in Kenya, but suspect that at the root of this was an assumption (based on a misinterpretation of current ecological theory) that the Palaearctic and African races could or should not come together. Such an assumption is unfounded. As explained on a later page, I am unable to distinguish birds in winter plumage of the nominate race and of *C. h. delalandii* [1]) and therefore am unable to prove the occurrence of the nominate race in East Africa south of Kenya. Considering that in East Asia Palaearctic breeding birds migrate to well beyond the equator, I see no reason at all why in East Africa they should not do the same. In West Africa there is a record from Mayoumba, Gabon, 3°23′ S (Bouet, 1955: 395), but the specimen, collected by Rougeot in November 1952, belongs to *C. niger* (Jouanin, in litt., 15.III.1977).

1) Except for the occasional specimen: the bird from Kabare (♂, 14.XI.1912, Mus. Tervuren no. 4497), which I examined, is so conspicuously pale that there can be little doubt that Chapin's identification of it as *C. h. hybrida* is correct.

Another example of an incorrect or at least very doubtful interpretation of ecological theory is provided by Moreau (1972: 245): "The resident African *C. hybrida delalandii* (= *sclateri*) occurs only south of the equator, and in South Africa its mode of feeding is said to be "by diving into the water from a height of several feet". If this means that they feed less from the surface than do the Palaearctic birds they are to some extent ecologically segregated". As it is generally (albeit perhaps incorrectly) assumed that the nominate race does not reach beyond the equator, which would mean a complete geographical separation, there does not appear to be any need for getting involved with ecological separation on the basis of extremely anecdotal evidence.

For the sake of completeness I mention Broekhuysen's (1967: 12) entirely different interpretation of the occurrence of *C. hybridus* in South Africa. He considered it to be: "Another migrant from Europe which during the southern summer occurs locally in considerable numbers near and over vleis in the south Cape. Within the last six years small breeding colonies of this species have been observed at Faure, quite close to Cape Town and in the Bredasdorp district. During the southern winter this species is absent in the Cape and this, therefore, is a similar case as the European Bee-eater, where birds do breed but still migrate north". Curiously, Broekhuysen appears to have been unaware that southern Africa is inhabited by a separate subspecies of *C. hybridus*, and his paper should not be quoted as evidence that migrants from Europe reach so far south.

Birds from western Europe migrate initially in a south-western direction, as returns of ringed birds demonstrate, and along the western coast of Africa to the south coast of West Africa (fig. 1). Admittedly British authors (cf. Moreau, 1972: 244) have maintained that *C. hybridus* is rare in West Africa, but the explanation for this must surely be that birds in winter plumage have not been recognised. Anyway, Wink (1976) observed hundreds of individuals in Ghana in 1972 and 1973. Wink's remark that the species was first recorded in that country in 1970 is, however, incorrect as from 1961 onwards several birds ringed in Europe were recovered in Ghana (see table). The records from the Niger inundation zone (Duhart & Descamps, 1963: 51) and Lake Chad make it likely that trans-Saharan migration occurs also. *C. hybridus* is mainly present in Europe from April to September or the beginning of October, but a few individuals may stay behind until late autumn and early winter: on 19 December 1965 a bird was seen at La Dombes, France (Lebreton, 1967); Keve (1960) mentioned the occurrence of stragglers in Hungary to as late as December; Smith (1965) recorded birds seen in Morocco in November and Januari 1963/1964, and Lebret &

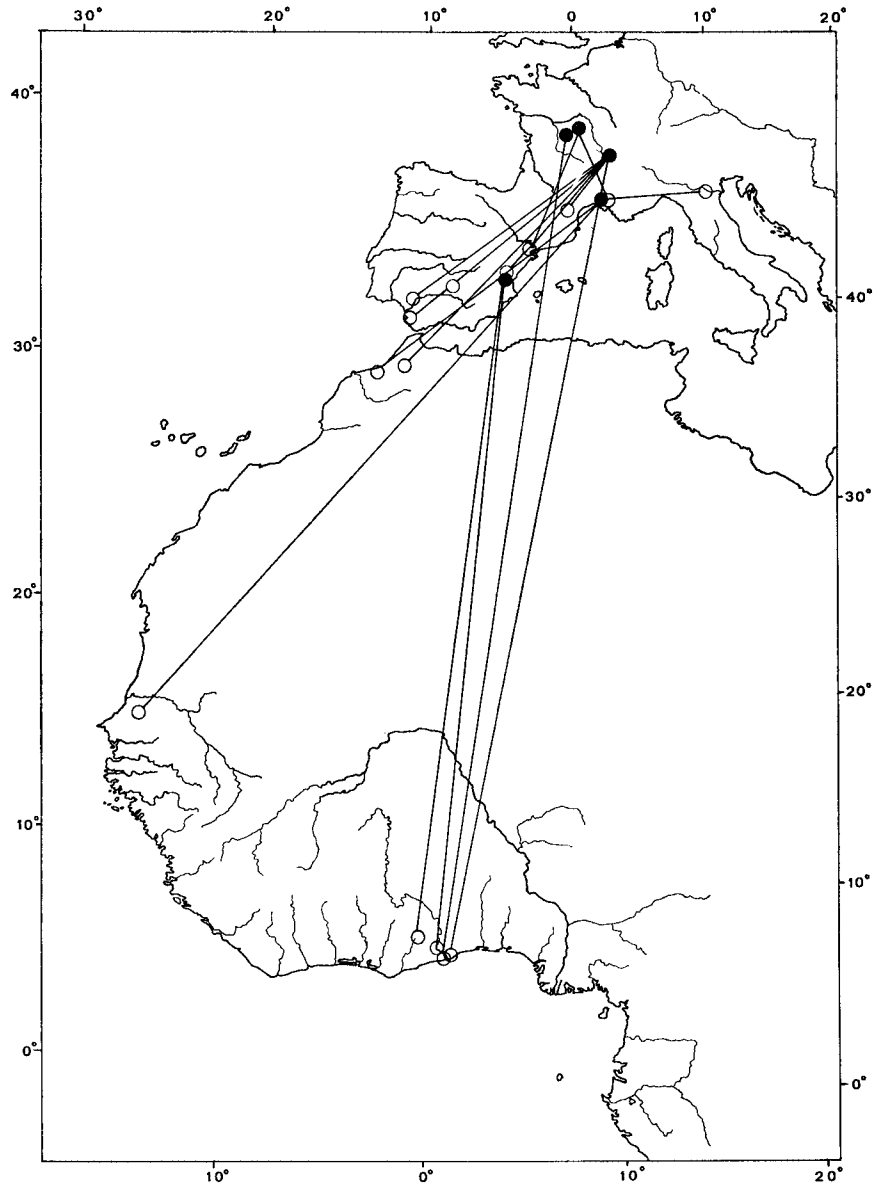

Fig. 1. Long-distance recoveries of European *Chlidonias h. hybridus,* ringed as pulli. Dots indicate places of ringing, circles places of recovery. The recovery from Italy does not indicate movement in an eastern direction as there were ten years between the dates of ringing and recovery.

Ouweneel (1976) published observations made in December 1974 on the Rumanian Black Sea coast.

TABLE 1

Long-distance recoveries of individuals of *Chlidonias hybridus* ringed in south-western Europe

ring no.	sex/age		date	locality
			Schifferli (1951: 207)	
904 063	pull.	○	12.VII.1949	Etang au nord de Montblanc, Dombes, France.
		+	24.XI.1949	Estacion de Baeza, Prov. Jaén, Spain, 38°00′ N, 3°28′ W.
			Schifferli (1953: 204)	
647 635	pull.	○	9.VII.1949	Grand Birieux, ca. 20 km N. Lyon, Ain, France.
		+	13.XII.1951	Meknes, Morocco, 35° 53′ N, 5° 37′ W.
			Bernis & Fernandez-Cruz (1968: 75)	
H 9899	pull.	○	25.VI.1965	La Albufera, Valencia, Spain.
		+	4.XI.1965	Distr. Volta, Ghana, ca. 6°04′N, 0°12′E.
			Fernandez-Cruz (1972: 81)	
H 11566	pull.	○	VI.1965	La Albufera, Valencia, Spain.
		+	ca. 28.XI.1966	near Nkawkaw, Kumasi, Ghana, 6° 36′ N, 0° 43′ W.
			Roux (1964: 28)	
GG 212	pull.	○	20.VI.1948	Tour du Valat, Camargue, France.
		+	6.III.1960	near Casablanca, Morocco, 33° 39′ N, 7° 35′ W.
GH 0615	pull.	○	22.VI.1960	Tour du Valat, Camargue, France.
		+	25.VIII.1960	Amposta, Tarragona, Spain, 40° 43′ N, 0° 34′ E.
			Erard (1964: 31)	
GG 616	pull.	○	12.VI.1950	Tour du Valat, Camargue, France.
		+	28.VI.1961	Senegal, 16° 25′ N, 15° 42′ W.
GG 3634	pull.	○	12.VI.1959	Etang de Gabrian, Brenne (Indre), France.
		+	24.XII.1961	near Anloga, Ghana, 5° 55′ N, 1° 01′ E.
			Erard (1965: 41)	
Sempach	pull.	○	12.VII.1949	Dombes, France.
904 056		+	1962	Aude, France, ca. 375 km SW.
			Erard (1967: 40)	
AX 1167	pull.	○	26.VII.1964	Villars-les-Dombes, France.
		+	23.IX.1964	Amposta, Tarragona, Spain, 40° 43′ N, 0°34′ E.

ring no.	sex/age		date	locality
			Erard (1969: 34)	
GB 4796	pull.	○	17.VI.1956	Etang de Vavres, Ain, France.
		+	27.V.1966	near Sevilla, Spain, 37° 24′ N, 5° 59′ W.
			Erard (1970: 37)	
GC 14330	pull.	○	19.VII.1967	Bouligneux, Ain, France.
		+	10.X.1967	Catarroja, Valencia, Spain, 39° 24′ N, 0° 24′ W.
			Erard (1971: 52)	
GC 14351	pull.	○	19.VII.1967	Bouligneux, Ain, France.
		+	ca. 20.I.1968	Keta, Ghana, 5° 55′ N, 1° 01′ E.
JA 116229	pull.	○	9.VI.1968	Marcilly-en-Gault, Loir-et-Cher, France.
		+	25.VIII.1968	Gimeaux, Bouches-du-Rhône, France, 480 km SE.
JA 116243	pull.	○	9.VI.1968	Marcilly-en-Gault, Loir-et-Cher, France.
		+	25.X.1968	S. Jaime de Enveija, Tarragona, Spain, 40° 43′ N, 0° 42′ E.
			Erard (1973: 77)	
GK 1717	pull.	○	29.VI.1961	Tour du Valat, Camargue, France.
		+	25.VIII.1970	Argenta, Ferrara, Italy, 44° 37′ N, 11° 50′ E.
GC 14267	pull.	○	14.VI.1969	St-Nizier-le-Désert, Ain, France.
		+	14.IX.1969	Pto Sta Maria, Cadiz, Spain, 36° 36′ N, 6° 14′ W.
			Fernandez-Cruz (1974: 84)	
Y 6008	pull.	○	11.V.1969	Marisma de Hinojos, Hinojos (Huelva), Spain.
		+	5.VIII.1970	Ca. 46° 37′ N, 1° 15′ E, Indre, France.

The subspecies *C. h. delalandii* is found in southern and eastern Africa, north to Kenya, and in Madagascar. Its distribution as a breeding-bird was discussed by Benson & Irwin (1963). For recent breeding records, see p. 42.

Breeding at Lake Naivasha, Kenya, was first suggested by Chapin (1939: 133, 134): "I have no doubt that this was really the tern found nesting there by Sir Frederick Jackson in June and July". The record was first published by Bannerman (1931: 273) and subsequently by Jackson (1938: 434), in both cases as pertaining to *Chlidonias leucopterus*, and in more recent publications Bannerman (1962: 101) and Dekeyser & Derivot (1968: 65) questioned Chapin's re-identification, which, after all, was based on no more than surmise, whereas Benson & Irwin (1963) accepted it with reservations, as did Britton & Brown (1974). None of the authors mentioned appears to have been aware that Jackson collected eggs at Lake Naivasha; these are now

in the British Museum, where I saw them (one egg, 6 July 1903, BM no. 1905.9.15.267 and three eggs, 28 July 1903, BM no. 1905.9.15.268-270). They had already been correctly re-identified as belonging to *C. hybridus*, thus putting the breeding-record from Lake Naivasha beyond all doubt. Breeding was again recorded in this locality in May-June 1966 (Britton & Brown, 1974). At the same time Lake Naivasha must be eliminated as a breeding-locality of *C. leucopterus*. As observed by Chapin (1939: 133) there does not appear to be any satisfactory evidence that *C. leucopterus* breeds in Central Africa or, indeed, anywhere else in Africa. It is notoriously difficult to eliminate erroneous records from literature once they have penetrated it, and therefore it is not surprising that even in very recent publications breeding of *C. leucopterus* in Africa is presented as an established fact (see for example Kipp, 1976).

As Clancey (1964: 197) knew of only a single record of the species from Natal, it is worth mentioning that I examined a female in full breeding plumage, collected as long ago as 21 December 1842 at Umsluti Vley north of Durban, by J. A. Wahlberg (Museum Stockholm)[1]). Very soon after the publication of his book, Clancey (1965: 316) referred to breeding on Lake St. Lucia, Zululand. Being unable to find the basis for this record in the available literature, I asked Mr. Clancey about it. From the reply received, I quote: "The reference ... to *Chlidonias hybrida* breeding in northern Zululand stems from my own observations on numbers of birds in transition into breeding dress and in breeding dress made at the north end of Lake St. Lucia in 1964. The birds were in a typical breeding area with inundated reeds and floating vegetation. About this same time I examined a bird in breeding dress from the Maputo R. floodplain taken by a Portuguese mammologist, so there is no doubt that the species breeds in the north-eastern Zululand southern Mozambique border country" (Clancey, in litt., 1.II.1977).

In spite of the doubt expressed by Vaurie (1965: 486) who thought that it might be no more than a visiting migrant, breeding of *C. h. delalandii* in Madagascar has been very well-documented (cf. Milon, 1947 and 1949; Benson & Pitman, 1962), although it may no longer take place now (Salvan, 1972).

Dowsett (1969: 451) has suggested breeding of *C. hybridus* at Lake Chad. As he included this observation in his section "Ethiopian Species", he apparently believed the birds to belong to the African race, but if breeding does in fact occur, it is at least as likely, in my opinion more likely, to be the

1) Umsluti is almost certainly the modern Umdloti, pronounced Umshloti, some little way north of Durban on the coast. Thomas Ayres collected on vleis present there in the middle of last century (Clancey, in litt., 14.III.1977).

nominate race. I am not aware that *C. h. delandii* has ever been recorded north and west of a line connecting Kenya with Angola. In a later paper, Dowsett (1971) did not repeat his suggestion of breeding on Lake Chad and it is unlikely to be correct.

8. Western Palaearctic breeding distribution

For obvious reasons the western Palaearctic breeding distribution of *C. hybridus* is much better known than that in the regions dealt with in preceding sections. Yet even here I found, as the investigation progressed, that much one finds in literature is either based on assumption rather than on hard facts, or is totally antiquated. Originally I had intended to present the Palaearctic distribution in outline only, but gradually it became clear that a survey of the present-day status of the species in the whole region would be worth doing, and that is what I have attempted. A problem was that my notes expanded so much, often with unpublished information which a number of correspondents placed willingly at my disposal, that this section threatened to grow quite out of proportion. Therefore I have decided to limit the discussion of *C. hybridus* in Europe to the essentials, which will be ample to gain an impression of its status, and refer for more complete notes and an estimate of the actual numbers breeding in Europe to a separate paper (Mees, in prep.).

North Africa

To an uninitiated person looking for information on the breeding status of *C. hybridus* in North Africa it would appear that the species is common there, or at least widely distributed, for the map in the well-known recent handbook by Etchécopar & Hüe (1964: 282) gives it an uninterrupted range from the Atlantic coast of Morocco, across the whole Mediterranean regions of Morocco and Algeria, to and including the northern third of Tunisia. Other handbooks indicate a similar range. Presently we shall investigate, country by country, what remains of this rosy picture on closer examination.

Morocco. — The classical breeding-place in Morocco is Ras-el-Douara, where already around the middle of last century *C. hybridus* bred in "immense numbers" (Irby, 1875: 211 and 1895: 292). It was still recorded from there "en nombre" by Heim de Balsac & Mayaud (1962: 150). As the last-mentioned authors did not supply any particulars as to dates and actual numbers involved, I wrote to Professor Heim de Balsac, who provided the following additional information (in litt., 12.II.1976): "En 1942 et 1947 j'ai été effectivement aux lacs Ras-el-Douara et Sidi ben Mansour. J'ai

observé de *petits* colonies de *Ch. hybrida* sur chacun des lacs et obtenu des oeufs". At the suggestion of Prof. Heim de Balsac I further wrote to M. Pineau who informed me (in litt., 22.II.1976) that the lakes mentioned have been drained and that at present no definite evidence of breeding in north-western Morocco is available, although he has a few summer observations (cf. Pineau & Giraud-Audine, 1977: 88). I know of no other breeding-places in Morocco.

Algeria. — In Algeria there used to be large colonies on Lake Halloula near Koléa or Koleah west of Alger (Algiers) and Lake Fetzara near Bône. Breeding in Algeria was first mentioned by Loche (1858). It is true that Loche's record from "Les grands lacs d'Algérie" is not very definite, but from the remainder of his text it is clear that he has visited both the lakes Halloula and Fetzara, and at least at the former he has also collected eggs (Oates, 1901: 175; Newton, 1905-1907: 292). When visited by Tristram in 1856, Lake Halloula was still in its full glory, but draining operations began the next year (cf. Tristram, 1860). The melioration process has probably taken longer than Tristram suggests as in the summer of 1861 von Homeyer (1864) was still able to massacre 14 breeding individuals of *C. hybridus* in five minutes, and found some 50 nests, most of which one gets an impression that he plundered. His paper gives a good idea of the quite ruthless way in which collectors went about their business last century, evidently in complete innocence. Lake Fetzara and its avifauna were still intact in 1913, when Zedlitz's collector P. Spatz obtained eggs of the Whiskered Tern (Zedlitz, 1914a, 1914b, 1926), but it was drained in the nineteen thirties, and nothing remains of it (cf. Steinbacher, 1963).

Tunisia. — Breeding in Tunisia was first recorded with much decision by Koenig (1893: 99): "Diese wunderhübsche Seeschwalbe ist Brutvogel in Tunis. Dem Präparator Blanc wurden von einem Araber die Eier dieser Art zugetragen, wie auch die alten Vögel, die jener beim Eiernehmen geschossen hatte". The remark quoted shows that the natural history dealer M. Blanc of Tunis himself never found the species breeding. The eggs, in the Museum Alexander Koenig, were purchased from Blanc by P. Spatz in the years 1891-1893 (cf. Koenig, 1932: 695); they are without indication of locality and date and were not even claimed to have been taken in Tunisia. These eggs might well have been collected on Lake Fetzara which is not far from the Tunisian border. Blanc did also much collecting for Whitaker (cf. Whitaker, 1905: XV) and if Blanc possessed exact information on breeding in Tunisia, it is strange that he would not have made this available to

Whitaker. In 1905, when Whitaker's book was published, it is unlikely that business-interests could have made Blanc withhold information on breeding in the years 1891-1893. It may be concluded that the eggs are the only piece of exact information, their identification was undoubtedly correct. That these eggs had been collected within the borders of Tunisia is assumption as apparently the Arab who sold them was not even asked from where he got them.

The inclusion of Tunisia in the breeding-range of *C. hybridus* in recent literature, however, appears not to be based on Koenig's record, which at least has some substance, but on a remark made by Whitaker (1905: 359), who wrote: "a certain number breed in the north of the Regency". Lavauden (1924: 225) only gave a translation of that: "Elle niche, en petit nombre, dans le nord de la Régence". Thirty years later we read: "Niche" (Blanchet, 1955), the succinctness of which is really admirable, but it leaves something to be desired in the way of background information. Gouttenoire (1955: 26) gave a slightly expanded version: "Nidificatrice: en petit nombre sur les lacs du Nord et du Centre, sédentaire et erratique"; it is not clear on what basis (if any) central Tunisia was now added. Heim de Balsac & Mayaud (1962: 149-150) had nothing new to say. We end with Vaurie (1965: 486): "Breeds locally in northern and central Tunisia . . .". Even if Whitaker's records were based on more than surmise and assumption, they would refer to last century. I have failed to find any information on breeding in Tunisia of lesser vintage and greater exactness, and therefore exclude the country from the breeding range of *C. hybridus*.

Thus, we may conclude that *C. hybridus* was never widely distributed in North Africa, as only three colonies (Ras-el-Douara, Halloula, Fetzara) were ever known, and that all three have fallen victim to drainage and melioration. On present evidence *C. hybridus* does no longer breed in North Africa.

Western and Southern Europe

In Europe, the real strongholds of *C. hybridus* are the lower courses and deltas of the great rivers, in particular the Gualdalquivir (Coto Doñana), Rhône (La Dombes), Danube, Ewros and Volga, in all of which breeding takes place annually or almost so. Even in many parts of Europe, however, its actual status is poorly known.

Portugal. — In Portugal, the first record of breeding was by Tait (1924: 205), who found a colony near Golega in 1918; the locality was still intact, with three "fairly large" colonies in 1931 (Coverley, 1932). Breeding was

presumed but not definitely established at Comporta, south of Setubal in 1930 (Coverley, 1931). I have been unable to find anything exact about the status in Portugal from a later date, although Reis (1931: 26-27) stated that it was a rather common bird in the southern part of the country, where it bred in a few places in the province of Ribatejo.

Spain. — In Spain, apart from the Gualdalquivir, breeding has been recorded from several places along the Mediterranean coast: Laguna del Hondo near Elche (Martorell, 1966), Lago de la Albufera near Valencia (Pechuan, 1965) and the Ebro delta (Westernhagen & Pons, 1966; Mestre & Ferrer, 1974). Also inland at Gallocanta (Aragüés et al., 1974). In these localities breeding takes place regularly, as mentioned for the Ebro delta by Maluquer (1971: 258-259).

France. — The colonies in the Camargue in France are so well-known, that no documentation is necessary, and the same may almost be said from the region of La Dombes north of Lyon which with a population of 500 to 600 pairs is by far the most important breeding station in France (Meylan, 1938; Cabanne & Ferry, 1955; Vaucher, 1955; Lebreton, 1964, 1973, 1975); the most northern record of breeding in this region is from near Saint-Jean-de-Losne in 1958 (Ferry & Dufour, 1959). The Plaine du Forez, Loire (cf. Guichard, 1956; Lebreton, 1975), Sologne (Reboussin, 1929; Henry et al., 1971), la Brenne, Indre (Olivier, 1929; see also Erard, 1964), and the departments of Loire Inférieure and the Vendée (Kowalski, 1959; Spitz, 1964) are also regular breeding-places, belonging to the normal range of the species. A map of the breeding-distribution in France was recently published by Yeatman (1976: 111).

The documentation for nidification in France outside the area defined above is poor. Labitte (1956) referred to breeding on the étangs de Chantecoq and the Giffaumont (Haute-Marne) in the years 1871-1874, and suggested that the species might still occur in the region (étangs du Der, in the departments Aube and Haute-Marne). d'Hamonville (1890: 343) mentioned having personally observed the species on the étang de Vargevaux (Meuse), and this has sometimes been interpreted as evidence that he found it breeding (cf. Berthet, 1946: 103), obviously in error as otherwise d'Hamonville (1895) would certainly have recorded it.

Holland and Belgium. — In the Low Countries breeding or attempted breeding was recorded nine times in the years 1938-1965; each time it concerned small groups or colonies of between two and eleven pairs. Seven of

these breeding-cases are from the Netherlands (cf. Commissie voor de Nederlandse Avifauna, 1970: 51), two from northern Belgium near the Dutch border (Lippens & Wille, 1972: 440-441). Next to the one record from Lithuania, the Dutch breeding-records are the most northern known, at about 52° 20′ N.

Germany. — From Germany there is only one record in this century, on the Bodensee near the Swiss border in 1931 (Noll, 1932); for a summary of records from Germany and Bohemia in the last century, see Niethammer (1942: 295). Bannerman (1962: 100) mistakenly mentioned breeding in Switzerland, probably on the basis of the Bodensee record listed above.

Austria. — From Austria there is a single observation in 1951 of birds carrying food (Bauer, 1952); this was near Zurndorf, Burgenland. The record is not quite satisfactory as neither nests nor young birds were seen and Whiskered Terns are known to leave the breeding places soon after fledging of the young and to feed the young on migration. Nevertheless in this particular case, where no flying young birds were seen, the interpretation that this concerned a breeding-case seems to me acceptable.

Italy. — It is surprising that in Italy there is only one definite record of breeding; it concerned a small colony near Minerbio, north-east of Bologna, in 1940 (cf. Toschi, 1940).

Eastern-Central and South-Eastern Europe

Poland. — Buturlin (in Dresser, 1910: 741) wrote of *C. hybridus*: "it breeds in large numbers in Bessarabia, commonly in Podolia and the southernmost part of the Kieff government, rarely in the south of Poland . .". Evidently on the basis of this, Hartert (1921: 1687) included southern Poland in the range, and so did Dementiev & Gladkov (1951) and Voous (1960), but there is no evidence that the species has ever bred, either within the Polish borders prevailing in Buturlin's or Hartert's time or in the present ones, before 1968 when a few birds nested near Siemień (Dyrcz et al., 1973).

Czechoslovakia. — Apart from the records in Bohemia in the last century already referred to, the first documented case of breeding in Czechoslovakia dates from 1948, when a colony of 15 pairs was found near the village of Polany in extreme south-eastern Slovakia (Ferianc, 1964: 295). This was followed by breeding near Hodonín in Moravia in 1959 (Štěpán, 1961), near Trnava in western Slovakia in 1968 (Matoušek, 1975) and near Senná in

eastern Slovakia in 1971 (Ferianc, in litt., 1.VI.1976; Hudec, in litt., 1.VI.1976).

Hungary. — In Hungary *C. hybridus* is a regular breeder which after a period of eclipse in the first half of this century appears to have increased somewhat in more recent years (cf. Horvath in Bannerman, 1962: 105). The species now breeds annually in the Hortobágy and in the region around Szeged, sporadically elsewhere. For exact records, see Szombath (1944), Beretzk (1950, 1957), Radetzki (1962), Máté (1962), Makatsch (1964), Nadler (1967), Koncz & Kapocky (1973) and Sterbetz (1975).

Yugoslavia. — From north-eastern Yugoslavia there are recent records from Carskabara (Csornai, 1957; Szlivka, 1957, 1959), Lake Ludas (Mikuska, 1966), lake Kopački in Baranja (Rucner, 1962; Rucner & Rucner, 1972), probably as far west as Slavonski Brod (Šetina, 1968) and Banatska Palanka (Ham & Dimitrijević, 1975); in the last-mentioned locality it concerned breeding "in grosser Menge" as recently as 1974. Observations in the breeding season make it likely that the species also occurs in other places (Matvejev & Vasić, 1973).

Rumania. — On the lower Danube in Rumania, small numbers bred in the region between Giurgiu and Oltenița in the years 1952-1961 (Papadopol, 1963), and in the period 1958-1963 on lakes near Călărași (Vespremeanu, 1966), but all this habitat has been destroyed by hydrotechnical works (Vespremeanu, 1967). In 1966 there was a colony of 32 nests on Lake Cernaghiol in the Dobroudja (Vespremeanu, 1967) and in 1972 Papadopol (1974, 1975a) found a colony of at least 25 pairs at Lake Roșiori and one of about 15 pairs at Lake Zaman, lakes of recent origin in the lowlands between the lower courses of the Călmățui and Ialomița rivers. These few records of small colonies give one an impression that *C. hybridus* is not a common bird in Rumania. In the Dobroudja it has apparently never been more than an accidental breeding-bird (Alléon, 1886). Of several ornithologists from Western and Central Europe who have visited the Danube delta in recent years and recorded their observations, only one has found the species breeding, and some did not even observe it. The one exception is Lebret (1973) who recorded a colony of ca. 100 pairs on *Stratiotes aloides* near Mila 23 in the central part of the delta, in May 1972. Papadopol (1968), on the other hand, who as a resident would be in a better position to judge the status of the species, gives a much brighter picture, mentioning of *C. hybridus* and *C. niger*: "... ces deux espèces sont les plus nombreuses du genre

Chlidonias et elles se trouvent dans toutes les régions avec des marais plus grands (dans la Dobroudja, dans le sud de l'Olténie, puis Mostistea, Comana etc.), les marécages qui longent le Siret, dans la dépression de la Jijia, etc. Dans les marais de Tarcea-Otomani-Sălacea etc. d'après R. Polis — informations datant de 1965, et après nos observations prédominant *Ch. niger*". In addition, very recently Papadopol (1975b) listed *C. hybridus* as breeding along the river Bîrlad in the district of Vaslui, Lower Moldavia, and as an "espèce nombreuse" in the plain between the Siret and Ialomița rivers (Papadopol, 1976): I do not know if this means that he has found more birds breeding than the two small colonies at Lakes Roșiori and Zaman mentioned in his previous papers (see above), for these forty pairs would not in my opinion justify the expression "nombreuse". Vespremeanu (1964) stated that *C. hybridus* occurs also much higher up in the flood plain of the Danube, between Calafat and Bechet. As mentioned above, *C. hybridus* still breeds albeit irregularly in the Hungarian and Yugoslavian parts of the Banat, but apparently no longer in the Rumanian Banat (Vasiliu, 1968). It appears justified to conclude that in Rumania the species may still be called common and widely distributed, although threatened by agricultural and other development.

Bulgaria. — On the Bulgarian side of the Danube, the only known recent breeding-place is the reserve Srebărna near Silistra (Paspaleva, 1961); breeding does not, however, take place annually (Geissler, 1962). In 1890 Reiser (1894: 195-196) established breeding on Lake Svistov.

Albania. — The occurrence in Albania, indicated as an established fact on all recently-published maps of distribution, can be traced back to Powys (1860: 357), who stated: "breeds in the marshes of Durazzo". Reading of his article reveals, however, that Powys lived on Korfu, and was unable to visit Albania in summer: "My observations were chiefly made during shooting expeditions in the winter, as I had not become sufficiently inured to the summer heats in 1857 to explore the marshes of the mainland... and during the same season of 1858 I was prevented from doing so by indisposition" (Powys, 1860: 1). It is clear, therefore, that his information was not first hand. At present, Albania is the least accessible of all European countries to ornithologists, but in the years between 1920 and 1944 is has been visited a number of times, and there is no evidence of breeding in this century. Note in particular that Kattinger (1960) during a stay of thirteen months in the coastal regions found no trace of *C. hybridus*.

Greece. — The first record of breeding in Greece dates from 1965 when about 40 nests were found on Lake Nitrikoy or Mitrikoy in Greek Thrace (Kraus & Conradty, 1965). In 1966 breeding took again place (Conradty & Hohlt, 1967), and in 1967 about 50 pairs bred in the same locality, whereas a second colony of some 100 pairs was found at Lake Kerkini in Greek Macedonia (Kraus et al., 1969). Breeding on Lake Mitrikoy evidently takes place annually, or almost so, for in addition to the published records G. Müller (in litt., 4.V.1976) found at least 100 pairs breeding in 1969 and a fair-sized colony (number of nests not counted) in 1975.

European Turkey. — In Turkish Thrace there are records from the Ewros/Meriç delta in 1966 (a small colony, G. Müller, in litt., cited by Bauer et al., 1969: 78, under Kussmaul & Müller), in 1967 when 150-180 pairs were counted in four colonies (Bauer & Müller, 1969; Rokitansky & Schifter, 1971), and in 1969, when in the delta lakes (Pamuklu Gölü and Sigire Gölü/Kücük Gala Gölü) there were several colonies with altogether 100-150 breeding pairs (Müller, in litt.), whereas higher up along the lower course of the Egerne, a tributary of the Ewros, another 150-200 pairs were estimated (Bauer et al., 1973), giving for Turkish Thrace a total of about 300 pairs. In 1973 about 40 pairs bred on the Gala Gölü (Beaman et al., 1975: 137).

Soviet Union

In the western Soviet Union, *Chlidonias hybridus* is rare. There is a remarkable record from Lithuania at Lake Tuvintas, where in 1959 eleven pairs bred successfully (Ivanauskas, 1961). This was at 54° 28′ N the northernmost case of breeding on record.

There are no reliable records from Bessarabia (Heer, 1971) although I am inclined to credit Haviland's (1918) rather casual remark about numerous breeding in the Pruth marshes near Reni in 1917. In view of its proximity to the Rumanian colonies one would expect at least occasional breeding in southern Bessarabia. Kistyakyvski (1957), in a comprehensive review, rejected all records of breeding in Ukraïne, with a single exception. The single exception concerns nesting on the Konskaya near the village of Skelka in 1942. Note that the maps published by Dementiev & Gladkov (1951: map 99) and Voous (1960: map 200) are quite misleading as regards distribution in this region. The authors concerned must have been led astray by Buturlin's assertion of common occurrence in Podolia and the southern part of the Kieff government, quoted on a previous page.

Farther east, along the lower course of the Volga and in the Volga Delta,

C. hybridus is common (Hudec, 1964). It has also been recorded breeding in the valleys of the Medvedista and Ilovlya rivers, tributaries of the Don (Vaurie, 1965: 486), and in the Ciscaucasion steppe along the Kuban, the Sulak and probably also the Terek rivers (Ivanov, in litt., 13.X.1976).

For mapping the distribution in the Asiatic part of the Soviet Union, I have followed Dolgushin in Gavrin et al. (1962: 258-261), and Flint et al. (1968: 308-309). The most eastern certain record is from Semipalatinsk (cf. Johansen, 1960). It should be realized that many records in this area date back to Sarudny (Zarudny), around the beginning of the century, and the picture may be very different today. In the case of breeding on lakes in the Firgana district, reported by Sarudny, Ivanov (1969) observed that intensification of agriculture makes it doubtful that anything remains of these lakes and that suitable habitat still exists.

About a number of the older records from central Asia one would dearly love to be better informed. For example, Radde & Walter (1889: 127), who travelled in Turkmenia in 1886/1887, listed *C. hybridus* as: "Aeusserst gemeiner Brutvogel in der Merw-Oase und im Endverlaufe des Tedshen". This would seem clear and exact, and I had fully accepted these records until I happened across the table of species actually found breeding by the same authors (l.c.: 175-181), in which *C. hybridus* is conspicuous by its complete absence.

Asiatic Turkey and the Middle East

Asiatic Turkey. — Thanks largely to the tireless efforts of Dr. Kumerloeve, documentation for breeding in Asiatic Turkey is excellent and of recent date. It should be realized that before 1962 *C. hybridus* was not yet known to nest in Turkey.

The localities are: Amik Gölü (Lake Antiochia), where in 1964 about 70 pairs (Kumerloeve, 1967); Abuliond or Apolyont Gölü in 1962 three pairs (Kumerloeve, 1964), in 1963 several (Bezzel, 1964), and in 1964 two pairs (Kumerloeve, 1970), but in 1966 and 1967 each about 100 pairs (Thiede, 1972); Aynaz Gölü south of Tarsus in 1965 ca. 25 pairs, but no breeding in 1967 (Kumerloeve, 1970; Lehmann, 1971). The species is likely to be more widely distributed in Anatolia, as suggested by a number of observations, for example by Philippona (1973) who saw old and young birds near Hotamis in July 1972. In the preceding year, 1971, up to 100 pairs had been seen at Hotamis Gölü, and in 1972 there were 10 pairs present at Gogenc Gölü; breeding at both these localities has now been confirmed (Beaman et al., 1975: 138). Observations of adults feeding fledgelings

further suggest breeding in the marshes near Yarma and at Aksehir Gölü (Beaman et al., 1975).

Syria and the Lebanon. — On the distributional maps published by Dementiev & Gladkov (1951), Voous (1960), and in particular Hüe & Echécopar (1970), Syria and the Lebanon are included in the range of the species, but according to Benson (1970: 205) it had then not even been recorded from the Lebanon; there are a few recent observations (Tohmé & Neuschwander, 1974). The only Syrian breeding record known to me is from near Tell el Abiad, in the north almost on the Turkish border. This record, published by Hüe & Etchécopar (1970), was derived through Kumerloeve (1968) from Misonne (1956), who has this to say about his observations near Tell el Abiad: "La Sterne caspienne (*Hydroprogne caspia*) et la Guifette moustac (*Chlidonias hybrida*) se voyaient régulièrement sur les pièces d'eau mais ne nichaient que plus bas sur la rivière, non loin de son confluent avec l'Euphrate". He does not even give the name of the river, but it must be the Belikh, and if so the actual breeding would have taken place near Raqqa. The vague wording makes me suspect strongly that the breeding of the two species of terns mentioned by Misonne was based on nothing more than hearsay. Breeding at Lake Antiochia in the Levantine Turkey, not far from the Syrian border, is well established and apparently takes place regularly (cf. Kumerloeve, 1967). In rejecting the Syrian breeding record, I do not for a moment suggest that it is unlikely, for indeed it is very likely that *C. hybridus* breeds in Syria, but there is a difference between the assumption and the definite proof.

Israel. — Breeding in Palestine (Israel) was recorded in a rather offhand way by Tristram (1888: 136): "The Whiskered Tern is seen in winter about the Sea of Galilea, and breeds in the marshes of Huleh". This must have been based on second hand information as according to Zahavi (1957), Tristram himself did not succeed in penetrating the swamp. Moreover, I note that Zahavi recorded *Chlidonias niger* as breeding at Lake Huleh, and made no mention of *C. hybridus*. It appears possible that Tristram's spokesman confused the two species, and anyway the record is from last century. It is true that in more recent publications (Bodenheimer, 1935: 178 and 1937: 67) there is still mention of breeding on Lake Huleh, but it is fairly evident that this is not based on any new information and only repeats Tristram's record. Except for a reserve of 400 ha, protected by dykes, Lake Huleh was drained for agriculture in 1953/1958. A depressing picture of "progress" in this period was presented by Karmon (1960). Merom (1962?) gave a

moving account of the lake and its final destruction, showing that at least amongst a section of the local population sentiments were entirely different from those ascribed to them by Karmon.

Iraq. — In the marshes of central Mesopotamia *C. hybridus* was evidently common in the years 1915-1923; it was found breeding near Babylon, Kerbela and Museyib, on both banks of the Euphrates, during the first world war (Ticehurst et al., 1922: 939), and in the Ruwayieh marshes near the Iskandariyeh canal in 1923 (Ticehurst et al., 1926). The last-mentioned record is over fifty years old, and no further information has become available since then. Allouse's (1953, 1961) assessment of status is based on Ticehurst, and therefore is equally out of date. It is true that in recent years several observations have been published, but without evidence of breeding. Allouse refers also to breeding near Fao on the basis of two papers by Sharpe (1886, 1891), but in neither is there any clear mention of breeding. If Sharpe's collector W. D. Cumming had found the species breeding he would almost certainly have collected its eggs, as he did of other birds.

Iran (Persia). — Sources agree that in Iran *C. hybridus* is common. Schüz (1959): "Ein ungemein häufiger Durchzügler und auch örtlicher Brutvogel", Passburg (1959): "Commonest black tern in the Tehran area", etc. Records of breeding are far less plentiful, in fact documentation is poor. Many or perhaps all of the breeding records given in recent literature (Voous, 1960; Vaurie, 1965; Hüe & Etchécopar, 1970) can be traced back to Sarudny (1911). In the mentioned publication, *C. hybridus* is listed as a breeding bird of the following parts of Persia: "Südkaspisches Gebiet", "Parapamisisches Gebiet", "Beludschistanisches Gebiet (Südlicher Teil)" and "Seistanisches Gebiet" (where especially common). Unfortunately, there is no way of verifying whether Sarudny's table is based on actual nestfinds or only on observations in the breeding-season. Many of the latter might concern late migrants from the North. Stresemann (1928: 326) gave the following comments on Sarudny's table: "Derartige Tabellen (wie sie seit langem in Russland beliebt sind) erwecken, wenn sie nicht durch zahlreiche Zusätze erläutert werden, sehr leicht falsche Vorstellungen über die Verbreitung, und so ist denn auch Sarudny's Liste daran schuld geworden, dass sich in den Köpfen ihrer Benutzer Irrtümer festsetzten".

Professor Schüz (in litt., 30.III.1976) has informed me as follows about his record quoted above: "Offenbar habe ich nur auf Grund der Literatur und auf Grund des häufigen Mai-Vorkommens die Brut von *Chlidonias hybrida* angenommen; ein Nest fand ich nicht. Ich muss also meine Angabe

zurückziehen, ... Ich meine auch, die Art MUESSE dort brüten, aber das wäre natürlich näher zu begründen". Dr. Haffer (in litt., 4.VI.1976) knows of no breeding records either.

I believe therefore that the supposed common occurrence of breeding *C. hybridus* in Iran is based on assumption rather than on fact and requires verification. The occurrence of birds in breeding plumage in May does not necessarily indicate local breeding, as the species is known to be a late migrant; in Iran it can be seen on migration as late as the second week of June (Gyllin, 1970).

It should be clear that I am not trying to disprove the breeding of *C. hybridus* in Iran: I only want to draw attention to the complete lack of reliable records. Actually its occurrence as a breeding bird is very likely. In Turkey the species was not known to breed until 1962 but has since been found to be widely distributed and there is no reason why in neighbouring Iran the situation would be different. I believe, however, that stressing this gap in actual knowledge is more likely to lead to the publication of records than a perpetuation of the on present evidence unfounded assumption of common occurrence. It is obvious that when the handbooks continue to treat *C. hybridus* as a common breeder in Iran, few ornithologists will bother to publish records in support of what is believed to be generally known.

Afghanistan. — It is due to insufficient ornithological exploration rather than to scarcity of the species that Paludan (1959: 308) could list only two records of *C. hybridus* from Afghanistan, for later visitors found it common in late spring (J. Niethammer, 1967: 144-145; G. Niethammer, 1971). There is no evidence of breeding.

9. Geographical variation

In this section a short review of the geographical variation of the species over its whole range will be given. From this review *Hydrochelidon albostriata* of New Zealand, which Sibson (1948) proposed to place as a race of *C. hybridus*, has been excluded for reasons given in section 14.

Chlidonias hybridus fluviatilis is characterized by small size and by it pale upperparts. As a breeding-bird, it is, on the evidence just presented, confined to southern Australia, but in its winter-quarters its distribution extensively overlaps that of the following subspecies, reason why it is desirable to give more extensive notes on their discrimination.

In Bartels's material from Java — excellent skins, moreover all prepared in the same manner, which makes them especially suitable for comparison in

series — birds in full breeding-plumage of the two subspecies can easily be distinguished, *fluviatilis* being conspicuously paler on the upperparts than *javanicus*. However, it has been known for a long time that birds in off-season plumage are distinctly less dark on the mantle than birds in breeding-plumage (cf. Saunders, 1896: 14). As a consequence of this, specimens in off-season plumage of *javanicus* may have the mantle almost as pale as specimens in breeding-plumage of *fluviatilis*, and when one lacks good reference-series, the identification of single specimens from areas where both subspecies occur will not always be easy.

In our collection, the specimens in full breeding-plumage from Celebes are similar to two specimens from New South Wales in the same plumage, but it is curious that birds from these localities are distinctly darker above than birds from Java. The most likely explanation for this is that the old material from Celebes and New South Wales, consisting of mounted individuals which have been on display for many years, has darkened as a result of the influence of light, dust and frequent handling. Even the darkest specimens of *fluviatilis* can be distinguished from nominate *hybridus* and from *javanicus* by having the grey of the nape and the sides of the breast paler.

It is really rather surprising that *C. h. fluviatilis*, although mainly breeding in south-eastern Australia, is nevertheless an apparently not uncommon migrant to West Java and West Borneo (Pontianak). This indicates a north-western direction of migration [1]). That this subspecies is commonly found in Celebes and New Guinea is, on the other hand, as one would expect, and indicates a migration directed South-North. The one ringing record available and already referred to, concerned a bird ringed at Port Fairy, Victoria, and recovered on the Sepik River, which had migrated almost due north. Although Parkes (1973: 26) has rightly criticised duPont (1971: 105) for his unqualified inclusion of Luzon in the range of *C. h. fluviatilis*, the fact that in northern Celebes this subspecies has been found much more numerous than *C. h. javanicus*, makes it likely that at least in the southern Philippines it will be found to be a regular visitor. Hitherto, and in spite of the records published by Parkes (1958) it does not appear to have been recognized how strongly migratory *C. h. fluviatilis* is, see for example the comments made by Vaurie (1965: 486 footnote) and Parkes (1973: 26).

Chlidonias hybridus javanicus is in size similar to *C. fluviatilis* or a little

1) A bird ringed as a pullus near Ivanhoe, N. S. W., in November 1974, was captured in the neighbourhood of Cheribon, Java, in the first week of February 1976 (cf. Hobbs, 1976). The date of recovery, in the middle of the southern summer, supports the suggestion made on a preceding page that one year old birds may stay in their winter quarters.

larger and the points of difference have been listed under that subspecies. The breeding distribution includes the lowlands of northern India, as discussed in preceding chapters, extra-tropical China and Ussuriland; in winter it ranges down to Ceylon, South-East Asia, the Greater Sunda Islands and the Philippines. It does not, apparently, range very far east, for at present there are no records from the Moluccas, and in Celebes it appears to be greatly outnumbered by *C. h. fluviatilis.*

Within the range here ascribed to *C. h. javanicus*, geographical variation has often been suggested. For example, Stuart Baker (1929: 111) recognized no less than three resident races from within the limits of the British Indian Empire, under the names *C. leucopareia indica* ("intermediate in colour"), *C. l. leggei* ("palest of the three forms") and *C. l. javanica* ("darkest of the three forms"). Later (Stuart Baker, 1935: 361) he changed his opinion and, ignoring the fact that previously he had called birds from Ceylon palest, claimed that: "A fine series of skins sent me from Ceylon shows that the Ceylon form, though darker than the Indian, cannot be separated from the Javan bird". On a previous page I have already discussed the name *leggei* and suggested that it was based on birds in winter plumage, which is paler than the breeding plumage, and similar factors would account for the differences which Baker found between *indicus* and *javanicus*. Ali & Ripley (1969: 39) admitted only one race from within the limits indicated above, under the name *C. h. indica.*

Mathews (1912: 320) described birds from China (type from Foochow) as similar to birds from India but with: "the throat much lighter — almost white, and ... constantly shorter in the wing". The character of the pale throat was repeated by Hartert (1921: 1688), but in a way which makes it likely that he only quoted Mathews: "die Kehle scheint bedeutend heller zu sein". The same can be said of Witherby (in Witherby et al., 1941: 9), who recognized *C. h. swinhoei* from East Asia as being: "like *indicus* but throat is usually whiter in summer". All this does not sound very convincing, and is not supported by the material I examined (there is some individual, non-geographic variation in the extent of white on cheeks and throat). That a difference in size would exist was already denied by Hartert, and it is generally known that Mathews was not always sufficiently careful in his descriptions of new subspecies. Witherby also recognized *C. h. javanicus* which he gave a breeding range of Assam, Burma, Malaya, but only in the first of these countries is the species known to breed.

Chlidonias hybridus hybridus differs from *C. h. javanicus* merely in its somewhat larger size, there are no colour differences. As a breeding-bird

this subspecies ranges from Mediterranean Europe and (formerly) the opposite coast of Africa, through south Russia to Kazakhstan, and to Mesopotamia; birds breeding in Kashmir (and Pamir), perhaps also those from Kazakhstan seem to be intermediate between the nominate race and *C. h. javanicus*.

The measurements show that *C. h. javanicus* is not a very satisfactory subspecies, as large birds, indistinguishable from the nominate race, have been recorded from as far east as Calcutta and Central Siam. There is a lack of breeding-birds however, and it is just possible that these large birds from so far east represent genuine migrants of the nominate race. A similar explanation can hardly be given of the presence of rather small birds in breeding-plumage in Europe in spring. Measurements of the Eurasian population will be more fully discussed and evaluated in the next section.

There is no agreement in literature where the boundary between the smaller *C. h. javanicus* and the larger *C. h. hybridus* should be drawn. Hartert (1921) included Transcaspia and Turkestan in the range of the nominate race, but observed under the caption *Hydrochelidon leucopareia indica*: "Nach dem geringen untersuchten Material scheinen auch die Vögel vom Persischen Meerbusen und Persisch-Beludschistan hierbei zu gehören". Vaurie (1965) followed Hartert in ascribing all birds from Russian territory as well as those from northern Persia to *C. h. hybridus*, and including eastern Persia in the range of *C. h. javanicus*. Erard & Etchécopar (1970) confirmed that birds from Seistan are small. The same division between the two subspecies was given by Dementiev & Gladkov (1951: map 99), Ivanov et al. (1953: 166-167), and other Russian authors. I note, however, that Snigirewski (1928), who studied the material of the Zoological Museum of Leningrad, concluded that the nominate race only ranges east to the mouth of the Ural River and that all birds from farther east are smaller: "Besonders klein sind die Exemplare aus Zentralasien". Unfortunately, Snigirewski gave no measurements except of a single bird procured by himself at Kisyl-Ajak in eastern Turkmenistan: this bird had a wing-length of 220 mm. Birds collected by Schüz (1959: 79) were larger: wings (7) 229-238 mm. These birds would conceivably have been migrants from the Volga delta.

When it is kept in mind that *C. h. javanicus* differs from the nominate race only in one "average" character, an on the average smaller size, it will be evident that the controversy just noted is more apparent than real.

The African subspecies *C. h. delalandii* Mathews (1912: 320), of which *C. h. sclateri* Mathews & Iredale (1921: 84) is an objective synonym, is large like European birds, but in breeding plumage is a little darker,

especially on the upper back. Chin and throat are tinged with grey, against which the white lateral bands of the head show up distinctly: in the nominate race, chin and upper throat are white or almost white. I do not find the differences as marked as published descriptions had made me expect and doubt that identification in the field would be possible. Museum material should, however, be fairly easy to identify. The same cannot be said of birds in winter plumage; indeed, after careful comparison of an admittedly somewhat inadequate material, I have reluctantly come to admit my inability to distinguish between the two races. This means that unless someone with a more astute sense of perception than I possess finds differences that have escaped me, subspecific identification of birds in winter plumage observed or collected in East Africa is impossible, and that we have to wait for ringing results to learn how far south the nominate race migrates.

Finally it deserves mention that there is a difference in periodicity of plumages. The two subspecies inhabiting the Southern Hemisphere usually assume their breeding plumage in the southern spring (for a discussion of exceptions, see section 11), the two subspecies inhabiting the Northern Hemisphere assume their breeding plumage in the northern spring.

The material examined shows that in the various subspecies birds in full breeding plumage are found in the following months. *C. h. fluviatilis* from the end of August and early September onwards; not enough material was available from the early months of the year, but by April all birds are distinctly changing in winter plumage. *C. h. javanicus* from April to August, occasionally to September (a specimen from Hue, 28.IX.1925, BM no. 1927.6.5.230, is still in almost full breeding dress). *C. h. hybridus* from April to August. *C. h. delalandii* from November to February (not enough material was available).

Field-observers in the area of overlap should be aware that it will not always be simple to distinguish between the northern and the southern subspecies on the basis of plumage condition, as in the same time that one subspecies is moulting into breeding dress, the other is moulting out of it, and in the field it would be difficult to distinguish between the two conditions. Even in skins it is not always easy to see, as *Chlidonias hybridus* may have as many as three generations of primaries simultaneously (Staffelmauser of Stresemann & Stresemann, 1966), a new cycle of moult beginning before the previous one has been completed.

10. Measurements

As indicated in the preceding section, the only difference between the

nominate race and *C. h. javanicus* is one of size, the latter being smaller. Measurements of a part of our material have been given in the sections 2 and 3; wing-measurements of the material listed in section 4 are as follows.

C. h. fluviatilis: Java ♂ 228. Borneo ♂ 197, unsexed 215. Celebes ♂ 195, 206, 211, 213, 219, 225, 229, ♀ 178, 187, 200, 205, 205, 210, 210, 220, 224, unsexed 193, 212, 217, 217, 219. Philippines ♂ 220.

C. h. javanicus: Java ♀ 217, unsexed 216, 227. Celebes ♀ 213. Philippines ♀ 212, unsexed 218.

Additional material from the various institutions listed in the acknowledgements yielded the following measurements.

C. h. javanicus

China with Formosa: ♂ 217, 224, 227, ♀ 215, 217, unsexed 210, 211, 223, 227.

Togian Islands: unsexed 230.

Thailand and Indo-China: ♂ 216, 218, 222, 224, 225, 225, 227, 230, 239, ♀ 210, 216, 217, 218, 220, 220, 220, 222, 223, 224, 233, 233.

Burma: ♂ 223, 234, ♀ 222, unsexed 229.

India and Kashmir: ♂ 220, 221, 229, 230, 231, 231, 232, 232, 232, 232, 235, 236, 236, ♀ 217, 220, 222, 225, 225, 227, 227, 228, 230, unsexed 212, 220, 229, 232, 233, 235, 241, 243 [1]).

Ceylon: ♀ 226.

C. h. hybridus

Europe, North- and Northeast Africa: ♂ 224, 228, 230, 233, 234, 234, 235, 235, 236, 236, 240, 244, 245, ♀ 220, 224, 225, 226, 228, 230, 236, 241, unsexed 231, 232, 233, 240, 240, 245, 247, 248.

Iraq: ♂ 232, ♀ 229.

Gambia: ♂ 232.

Congo: ♂ 229.

C. h. delalandii

Africa (mainland): ♂ 238, 240, ♀ 235, 237, 240, unsexed 219, 226, 228.

Madagascar: ♂ 225, 241, 243, ♀ 225, 240.

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1) The bird with a wing of 243 mm is from Calcutta, April 1877 (BM no. 98.12.12.284), it is probably the specimen for which Hartert (1921: 1688) mentioned a wing-length of 245 mm. The next largest specimen and several of the others with large measurements are from Kashmir.

C. h. fluviatilis

Togian Islands: ♂ 203, 205, 212, ♀ 200, 206.
New Guinea: ♂ 210, 211, 211, 220, 222, ♀ 200, 200, 220, 221.
Australia: unsexed 217, 220, 222, 223, 228.

In the evaluation of measurements it should be realized that, as mentioned on a previous page, *C. hybridus* shows almost continuous moult in the wings; in other words, many of the specimens measured were in moult. Although birds which had lost their longest primaries were not measured, many specimens in which the longest primaries were fullgrown had them strongly abraded or even with broken tips. For practical reasons such specimens were not excluded from the series measured — had I done so, very few would have remained. This means that more value should be attached to maximum values than to minimum values, and that there is not much point in giving averages. The maximum wing-length found in each race is: *javanicus* 243, *hybridus* 248, *delalandii* 243, *fluviatilis* 232 mm.

A point that became evident in the examination of this material is that birds in breeding-plumage, which tend to have the outer primaries in fairly good condition, are usually larger than birds in winter plumage, the latter being often in very worn plumage and in heavy moult.

When all this is kept in mind, the figures show even more clearly that *C. h. javanicus* is a very weakly differentiated race; its average wing-length is perhaps about 10 mm shorter than that of the nominate race (see also Vaurie, 1965: 487) and there is an almost complete overlap in measurements.

Professor Ivanov (in litt., 29.XI.1976) has supplied me with a particularly valuable set of measurements of material in the Zoological Institute, Academy of Sciences, Leningrad; only birds of known sex, with unworn wing-tips were measured.

Sex	Date	Locality	Wing (mm)
		Western Palaearctic	
♂	21.VI.1949	Valuevka in Volga-Ural steppe	238
♂	16.VI.1861	Guriev (Ural mouth)	240
♂	1.VI.1861	„ „	242
♂	2.VI.1926	North Daghestan (Lower Terek?)	224
♂	10.V.1937	Kumbashi, S.W. shore of Caspian Sea	238
♂	„	„	240
♂	17.V.1937	„	232
♂	4.VIII.1858	Lower Syr-Darya	232
♂	5.IX.18...	Lower Amu-Darya	225
♂	8.IX.18...	„	222
♂	„	„	223
♂	9.IX.18...	„	226
♀	17.V.....	Merw, Turkmenistan	238

Sex	Date	Locality	Wing (mm)
♂	16.IV.....	Merw, Turkmenistan	240
♂	17.VI.....	,,	238
♂	18.VI.....	,,	238
♂	9.VII.1893	Azerbaijan	235
♂	23.VIII.1910	Erzurum, Turkey	230
♂	9.V.1869	The Crimea	230
♀	16.VI.1862	Guriev	238
♀	7.V.1937	Kumbashi	232
♀	,,	,,	234
♀	15.V.1925	North Daghestan	220
♀	V.1869	The Crimea	215
		North-East Africa	
♂	VI.....	Khartum	222
♂	,,	,,	235
♂	Spring	Nile	233
		East Asia	
♂	2.VI.1908	S.E. China	230
♂	,,	,,	234
♀	4.VII.1969	Lake Khanka, Ussuriland	223
♀	VI.....	Russky range, China	229
♀	—	Ordos, China	213
♀	—	,,	222

These measurements do not support Snigirewski's (1928) conclusion (based on the same material) that specimens from Turkestan are especially small; it is true that the four birds from the Amu-Darya with wing-lengths of 222-226 mm are rather small, but four from Merw, in the same region, measure 238-240 mm.

In my opinion the figures presented in this section demontrate convincingly that, although birds from south and east Asia average a little smaller than Western Palaearctic birds, there is an almost complete overlap in measurements. Even assuming that a certain mixing of populations in the winter quarters occurs as suggested on a previous page, the size difference is much too small to find expression in nomenclature. I am bound to conclude that all Whiskered Terns inhabiting Eurasia belong to the nominate race.

II. Breeding season and nuptial plumage

The breeding season of *Chlidonias hybridus* in the whole Northern Hemisphere is strictly limited to the summer months, from May or June to September. This is not only true for more northern localities, but also for North Africa (Zedlitz, 1926; Heim de Balsac & Mayaud, 1962: 150), Kashmir (Bates & Lowther, 1952: 306) and India (Donahue & Ganguli, 1965).

Similarly, a search in Australian literature showed that in southeastern

Australia breeding takes place in the Australian summer, from October to February.

In striking contrast, the Ethiopian subspecies *C. h. delalandii* has a very extended breeding season; according to literature: April in Rhodesia (Smithers et al., 1957: 63), May to September in South Africa and Bechuanaland (McLachlan & Liversidge, 1957: 162), June in Tanzania (large young early August, which means laying in June: Reynolds, 1971), May to July in Kenya (Jackson as discussed on a previous page; Britton & Brown, 1974), August and September in Nyasaland (Belcher, 1928; Wilkes, 1928), October to November at the Cape (Steyn, 1960 and 1966), November in Madagascar (Milon, 1947, 1949 and 1950; Benson & Pitman, 1962), December and January in Tanganyika (Fuggles-Couchman, 1962), December, January and February at Chrissiesmeer, eastern Transvaal (Little, 1970), mainly February near Witbank, about 100 km N.W. of Chrissiesmeer (Tarboton et al., 1975), and March 1975 at Elandsfontein Vlei near Johannesburg, Transvaal, but in 1976 there were already young in January at the same locality (Elwell, 1976).

There are many recent records from Rhodesia which have been made available to me by Mr. Stuart Irwin (in litt., 3.II.1976) as follows: "With us in Rhodesia this tern is largely confined to pans or similar seasonal inundations where it breeds in the western Gwaai area, at Ngamo, the Wankie National Park and the Kazuma Depression. It is less common than the migratory *C. leucopterus* and unlike that species in unknown in the Middle Zambezi Valley or on Lake Kariba... Its precise seasonal status remains uncertain, but allowing for considerable local movement, particularly between the larger areas of suitable habitat as in northern Botswana, it is perhaps present throughout the greater part of the year".

Breeding data from Rhodesia based on the estimated date of egg-laying are as follows: December (7), Januari (23), February (13), March (1), April (1).

When these Rhodesian records are combined with previously published information, breeding is seen to be known from all months of the year. In those instances where the plumage of breeding birds was recorded, they were always said to be in full breeding-plumage, except once: Wilkes (1928) especially noted that in a colony of some sixty pairs at Lake Chilwa, visited by him on 6 September 1924: "A number of the breeding birds were in immature plumage" [1]). Unfortunately, Wilkes did not describe the plumage

1) The same has been reported from Europe by Westernhagen & Pons (1966: 164): "Unter den Brutvögeln befanden sich eine Reihe einjähriger, jedenfalls noch nicht in das Alterskleid umgefärbter Tiere". In this case, too, I wonder whether the inter-

observed, and I wonder whether the birds seen were really in immature plumage or in winter plumage.

Of perhaps even greater interest is the situation in Western Australia. In contradistinction to eastern Australia, where large numbers breed annually, there are only three records of breeding in Western Australia, but these are in the months April, August and September (cf. Serventy & Whittell, 1967: 225).

In respect to the September date some caution may be necessary. When the first edition of their book was published, Serventy & Whittell (1948: 123) knew of no breeding records in Western Australia: "although, of course, it must do so — probably on fresh-water swamps and lakes". In the next edition (Serventy & Whittell, 1951: 128) this was changed to: "There are few actual observations of the nesting of this bird in Western Australia. On September 28, 1917, Mr. C. L. E. Orton found a colony of 12 pairs nesting in a swamp 2 miles west of Moora". The description has the ring of authenticity. The Orton egg collection is now in the Western Australian Museum. Dr. Storr (in litt., 22.VI.1976) informed me that this collection contains three clutches of *C. hybridus;* two of the clutches have dates written on the eggs (but no other information): 22.XII.1912 and 6.VI.1918. "The third clutch had no date marked on the eggs and therefore was the only one that could possibly be correlated with a scrap of paper (you could hardly call it a label) that referred to three eggs collected 2 miles west of Moora on 28 September 1917 . . . So I think you can safely say that Orton collected 3 clutches of 3 at 2 miles west of Moora on 28 September 1917. Whether any of these clutches remain in his collection is of course very doubtful".

About the breeding near Dowerin in August 1948 nothing more is known to me than what Serventy & Whittell wrote, but Fuller (1963) supplied full particulars about breeding in 1960: "the Marsh Tern occurred in abundance throughout the whole lake system between Austin, Nannine and Polele Station, during the period from April 15 to 17, about 250 birds being noted near Nannine and about 300 on Polele Station. All birds observed were in nuptial plumage . . . A small nesting colony of about 30 pairs was found on

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pretation was correct; this concerned very late breeders, who started building early July and laid their eggs a week later. Local conditions apparently prohibit earlier breeding. It seems to me that under those conditions birds which were not in full nuptial plumage might have been adults already changing back in winter plumage, rather than young which were still to assume the breeding plumage. It is well known that the summer moult in the genus *Chlidonias* starts early.

clumps of samphire growing in about 2 ft. 6 in. of water in Lake Nannine . . .".

In the collection of the Western Australian Museum there is furthermore a juvenile bird, collected near Port Hedland on 19 September 1975 (WAM no. A 14421), which had been begging for food from an adult male collected with it (WAM no. A 14420). As development from the beginning of incubation to fledging takes about six weeks and young remain dependent for another two or three weeks (Niethammer, 1942: 297), perhaps longer, this points to breeding having started in the first half of July.

Meagre as these data are, they show that in Western Australia *C. hybridus* may breed in winter, in a season entirely different from that in which breeding takes place in eastern Australia. It is also a season in which a large proportion of the Australian population has left that continent for the tropical islands to the north. It is now generally known that in the arid interior of Australia where rainfall is erratic, the reproduction of many bird species depends on rainfall and therefore is highly irregular (Keast & Marshall, 1954). In bird species with a normal annual breeding cycle the main moult usually takes place outside the breeding season, so that the two energy-consuming processes of rearing a family and moulting do not take place simultaneously. It will be evident that in the case of opportunistic breeders, are they not to miss chances of breeding, an overlap between breeding and moult cannot be avoided, and it does in fact occur (cf. Keast, 1968). Much about the relation between moult and gonadal activity under such circumstances remains to be elucidated but it is likely that birds in moult would, under conditions favorable for breeding, interrupt the process, and start nesting (cf. Serventy, 1971: 312). Keast (1968), on the other hand, did not find much evidence that the moult was slowed down or interrupted in these circumstances. It is dangerous to speculate too much on the basis of as yet very insufficient knowledge; nevertheless, on the evidence provided by Fuller (1963) and others, it looks as if *C. hybridus* reacts differently in Western Australia (and probably in Africa). Note that birds breeding in winter, when they ought to have been in winter plumage, were actually in full nuptial plumage. This might suggest the following sequence of events: under unseasonal favorable conditions the birds first "rush" into the nuptial plumage, and then start breeding. The interesting point is that the increased gonadal activity following favorable conditions would not, as in other species, immediately inhibit moult, but in the initial stages would stimulate it to a certain extent. This would, at least, be true for the contour feathers. The matter of the flight feathers would be different in a species which, as already noted, shows almost continuous moult. I present these

speculations with the greatest diffidence, but as far as I can see they provide the most logical explanation of the fact that in any time of the year nesting birds have been recorded as being in full nuptial plumage. Further investigations, in the field and in the laboratory, might yield fascinating results.

12. The identity of Sterna javanica Horsfield

As long as only one subspecies of *Chlidonias hybridus* was known to visit Java, there was never any question about the subspecific identity of the bird described as *Sterna Javanica* by Horsfield (1821). Even when a single specimen of the Australian race was recorded, this did not seriously affect the picture. Now that it has been found, however, that two subspecies visit Java in about equal numbers, the question arose to which one the name *javanica* was applicable.

The difference between the two subspecies being comparatively slight, it is not surprising that Horsfield's description gives no indication of the subspecies concerned. Warren (1966: 147) has, however, listed a specimen in the British Museum as holotype of *Sterna javanica* Horsfield (BM reg. no. 1880.1.1.3452).

Before discussing this specimen, I quote here Horsfield's (1821: 198) original description:

> Spec. 2. Sterna Javanica mihi
>
> S. glauca, gula malis cervice postice alis caudaque infra albis, capite supra nigro, remigibus griseo fuscescentibus interne plaga albida notatis, rostro pedibusque flavis. Longitudo 11 poll.

The specimen was first examined for me by Mr. Galbraith, who expressed the opinion that it was referable to the paler-mantled subspecies currently known as *fluviatilis*, and not to the subspecies *javanica* as at present understood. Later the specimen was forwarded to me, and notwithstanding the fact that it is dirty and therefore looks a little darker on the upperparts than birds in fresh and clean plumage, it represents ondoubtedly the Australian subspecies.

Apart from ascertaining its subspecific identity, Mr. Galbraith also thoroughly investigated the claim to type-status of the specimen. He noted that the specimen, although largely in summer-dress, shows many white feather-edges on the cap. Although the cap is mainly black, this lends it a mottled appearance, and one would expect Horsfield to have mentioned this in his description. Thus, the question of the authenticity of the specimen kept as holotype of *Sterna javanica* arose. It is not necessary to record here in detail the whole of Galbraith's painstaking investigations, but the results

can be summarized as follows: no. 1880.1.1.3452 is certainly an India Museum, and probably a Horsfield specimen. It is also probably the one which Saunders (1876, 1890) examined and recorded as the type of *S. javanica*, though he may have been wrong. It is impossible to say whether Horsfield had only one, or several specimens. If Horsfield had only one specimen, the present specimen would probably be the holotype, if he had more than one specimen it would probably be a syntype, and finally there is a possibility that his description was exclusively based on a different specimen, in which case the present one would be not even a syntype.

Weighing all the evidence, my own opinion is that specimen no. 1880.1.1. 3452 is at least a syntype and probably the holotype of *Sterna javanica*.

13. Nomenclature

In the sections 2-11 of this paper, the nomenclature used complies with the current assumption that the valid name of the Australian race is *C. h. fluviatilis* (Gould). The name *C. h. javanicus* was used for birds from southern and eastern Asia, although it was made clear that this race is no more than a winter visitor in most of the range usually ascribed to it and moreover is of very problematical validity. In section 12, evidence was provided that actually the current nomenclature is erroneous, as the type of *C. h. javanicus* (a name having 21 years priority over *C. h. fluviatilis*) belongs to the Australian subspecies. At the same time it proved possible to cast just enough doubt on the authenticy of the type-specimen to make it possible to retain the previously-used nomenclature, in case the changes otherwise involved would be regarded as very undesirable, because upsetting stabilized nomenclature. In this connection it is necessary to state that originally my feelings were strongly in favour of retaining the presently current nomenclature, and so was Mr. Galbraith. It is the reason why we took some trouble trying to discredit the type specimen.

Further consideration has made me incline to the view that it is just as well to accept the change, an opinion that I shall try to explain and perhaps defend here. The first reason is obviously that there cannot be much doubt about the type-status of BM no. 1880.1.1.3452, either as holotype or as only surviving syntype. The second reason is that, whichever name is accepted, about half the published records from Java (and Borneo) have been ascribed to the wrong subspecies anyway so that there cannot be much of an argument in favour of either name where literature on these islands is concerned. The third reason is that following Moynihan (1959: 32) several Australian authors have rejected the genus *Chlidonias* and included it in *Sterna*, using the trinomial *Sterna hybrida fluviatilis* (Gould), see for example Storr

(1973: 11) and Macdonald (1973: 194). This combination, however, is nomenclaturally invalid, being a secondary homonym of *Sterna fluviatilis* Naumann, 1819, itself a formerly much-used synonym of *Sterna hirundo* L. Although I am not in favour of combining these genera, this threatens to become a permanent source of instability under art. 59c of the International Code (Stoll et al., 1961). It will be clear that there is no point in trying to save *C. h. fluviatilis* from being replaced by *C. h. javanicus*, when the former is going to be dismissed as a homonym anyway. The last reason is that, as demonstrated in preceding sections, the race of southern and eastern Asia is of doubtful validity. In my opinion it is not worth recognition. The results would be a disappearance of the name *javanicus*. Note also that the species does not, apparently, breed within the breeding-range usually ascribed to "*javanicus*" and that in recent major works on India the name *C. h. indica* has been used for this same subspecies (Ripley, 1961: 142; Ali & Ripley, 1969: 39).

If the classification and nomenclature here outlined are accepted, the races and their distribution will be as follows:

C. h. delalandii (Mathews, 1912): breeding range southern and south-eastern Africa and Madagascar. Synonym: *Chlidonias leucopareia sclateri* Mathews & Iredale, 1921. As White (1965: 146) has pointed out, according to present rules of nomenclature, *Hydrochelidon leucopareia delalandii* Mathews, 1912, is not preoccupied by the nomen nudum *Hydrochelidon delalandii* Bonaparte, 1856.

C. h. hybridus (Pallas, 1811): breeding range the warm-temperate and subtropical Palaearctic region, and the Ganges plain in India and Bengal. Synonyms: *Sterna leucopareia* Temminck, 1820, *C. h. javanica* Auct. nec Horsfield (pro parte), *Viralva Indica* Stephens, 1826, *Hydrochelidon leucopareia swinhoei* Mathews, 1912. For additional synonyms, see Hartert (1921: 1686, 1688).

C. h. javanicus (Horsfield, 1821): breeding range extra-tropical Australia. Synonyms: *Hydrochelidon fluviatilis* Gould, 1842, and *Hydrochelidon leucopareia rogersi* Mathews, 1912.

This is the nomenclature I shall use in future publications, unless somebody persuades me that a more elegant solution is possible.

A fact I have always found particularly irritating is the consistent inconsistency with which most authors have treated the gender of *Chlidonias*. When one looks at the Belgian, Dutch, English and German lists, at Vaurie

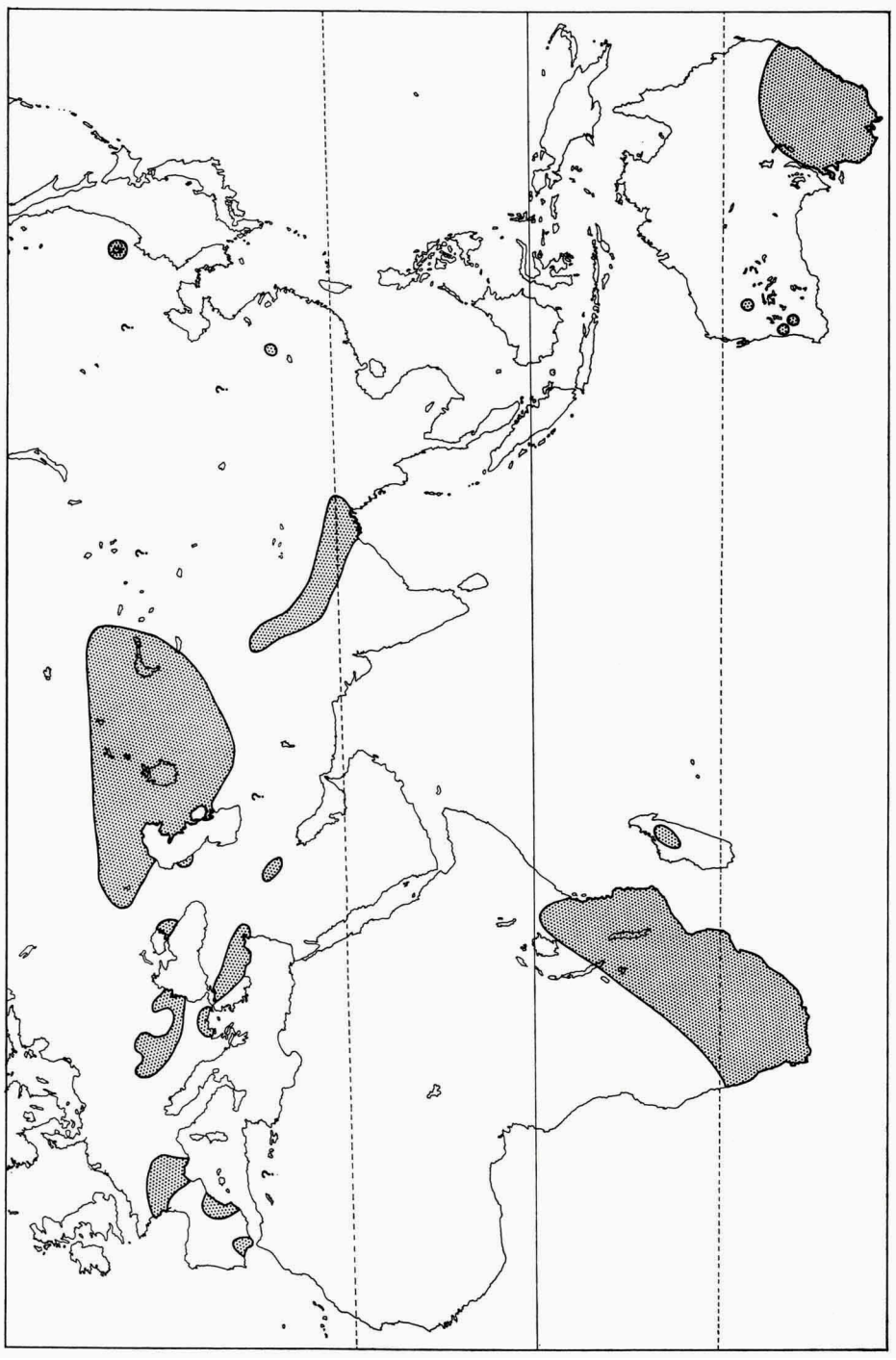

Fig. 2. The breeding-distribution of *Chlidonias hybridus*: *C. h. hybridus* in Eurasia, *C. h. delalandii* in Africa, and *C. h. javanicus* in Australia. In Europe, Africa and eastern Australia, the ranges indicated are those within which more or less regular breeding is known to take place, but the range indicated in Central Asia and India is partly based on very old records. In East Asia and in Western Australia breeding has been observed very few times and the localities are shown individually. The species is likely to be much more widely distributed in Asia, in the areas marked with queries, and may still occur in North Africa where it bred formerly in several places.

(1965), in short at the European ornithological literature of the past forty years, one will find two of the species of *Chlidonias* treated as if the generic gender is masculine (*C. niger, C. leucopterus*), but the third always treated as if the generic gender is feminine (*C. hybrida*).

Lacking the necessary classical background to form a considered opinion, I asked the advice of Drs. Kraak and Steyskal. These two authorities agree that *Chlidonias* has to be considered masculine. There is no need here to repeat all their arguments, but some of their comments have to be recorded. They both mentioned their dislike of the poorly-constructed, non-classical word *Chlidonias*. Dr. Kraak in particular expressed regret that the classical name *Hydrochelidon* has been replaced by *Chlidonias*: both names date from 1822, and the first one was in general use for a century until *Chlidonias* was unearthed by Prioritätsschnüffler. Moreover, as late as 1921 Hartert rejected *Chlidonias* because the description of its type-species was so poor that he felt unsure of its identity. Only much later does he appear to have accepted it without enthusiasm (cf. Steinbacher, 1938: 487).

As regards the name *hybrida*, Dr. Kraak suggested that it should be regarded as a *substantivum* and not as an *adjectivum*, and that could be the reason why the spelling *hybrida* has been retained. This, however, is improbable for two reasons. The first is that the subspecies have always been called *C. hybrida indica, C. hybrida javanica*; also *C. leucopareia*. In addition I checked the original description of *Sterna hybrida* by Pallas (1811: 338) and found that Pallas, who unlike Rafinesque was a good Latinist, invariably gave an initial capital to specific names he regarded as *substantiva*. The name *hybrida* is printed without a capital, and therefore clearly was meant to be an *adjectivum*. In a way this is fortunate, as otherwise we might have to accept the somewhat bizarre combinations *C. hybrida indicus* and *C. hybrida javanicus*, which are sure to puzzle ornithologists not well versed in the classical languages.

14. The systematic position of Hydrochelidon albostriata

G. R. Gray

When Sibson (1948) united *Hydrochelidon albostriata* with *Chlidonias hybridus* under the name *C. hybrida albistriata*, his arguments for this change were rather poor; I quote: "Both *C. niger* and *C. leucopterus* are fine-billed species, but *C. hybrida* has a much robuster bill, as has also *albistriata*... The morphological similarity between *hybrida* and *albistriata* is obvious at a glance in the field, and it is worth noting that the black-fronted tern was called *hybrida* as long ago as 1867 in the Journal für Ornithologie by Finsch... *Hybrida* has an extensive range, and is represented in Austra-

lia by the subspecies *fluviatilis*. I would therefore suggest that the black-fronted tern be recognised as a subspecies of the whiskered tern, and that its full name is *Chlidonias hybrida albistriata* Gray".

Thus, Sibson's arguments are only two, both morphological: one is that *C. hybridus* and *H. albostriata* both have robuster bills than *C. niger* and *C. leucopterus*, the other that there is an obvious morphological resemblance between them.

The added argument that over a century ago a German ornithologist mistook one for the other can scarcely be given much weight. Nevertheless I have also followed this line of investigation and found that the matter was misrepresented by Sibson. What Finsch (1867: 339) wrote was: "*Hydrochelidon albostriata* ist nach Schlegel und Blasius nichts anderes als unsere *hybrida* Pall. (= *fluviatilis* Gould)". From this it is evident that Finsch himself never examined *H. albostriata*, and in accepting the synonymy only followed Schlegel and Blasius. Schlegel (1863: 33) had not seen authentic *H. albostriata* either and moreover laboured under the misconception that the name was based on a specimen from India, as is clear from the way he quoted it in the synonymy of *C. hybrida*: "*Sterna albostriata* et *similis*, Gray (spec. Ind.)", and from the fact that he did not include New Zealand in the range of the species. With Blasius (1866: 83) it is the same; under *Hydrochelidon hybrida* he notes: "Eine vielfach verkannte, aus Indien, Neuholland und Süd-Afrika wiederholt als neu aufgeführte Art. *St. leucopareia* Natt., *St. grisea* Horsf., *St. indica* Steph., *St. Delamottei* Vieill., *St. albistriata, similis* Gray, *St. fluviatilis* Gould, *St. Dalalandii* Bonap.". When later Finsch (1870: 369) received authentic specimens, he corrected the error: "Schlegel ... und Blasius ... haben diese ausgezeichnete Art, jedenfalls aus Mangel autoptischer Untersuchung, durchaus verkannt ... welchem irrtümlichen Vorgange ich ... folgte. Die Untersuchung der vorliegenden Reihe lässt aber nicht mehr den geringsten Zweifel an der artlichen Selbständlichkeit von *St. antarctica* [= *H. albostriata*]. Dieselbe weicht total von *St. hybrida* ab ...". In justice to Finsch, I thought I should quote this.

Sibson (1948) has not been generally followed: Oliver (1955: 327-330) and Falla et al. (1966: 157) retained *H. albostriata* as a species, under the name *Chlidonias albostriatus*. On the other hand, in the most recent list of New Zealand birds available to me (Kinsky et al., 1970: 54), the combination *C. hybrida albostriatus* is used and that is why I consider it useful to present here my reasons for excluding *H. albostriata* from the species *C. hybridus*. This comment is also timely as the combination *C. h. albostriatus* threatens to become internationally accepted (cf. Vaurie, 1965: 486; Wolters, 1975: 30).

The very poor material of *H. albostriata* available to me (three mounted birds in the old collection, of which two are in breeding dress and one is in winter plumage) shows several clear differences from *C. hybridus*, such as a white rump, grey chin and cheeks with only a narrow white line separating the grey cheeks from the black cap, a more deeply forked tail, even grey underparts without a blackish belly in breeding dress; the bird in winter plumage has an even grey cap and nape, instead of a white head striated on the nape with blackish, and there are apparently no other seasonal changes in plumage (cf. Buller, 1888: 70); the birds appear also to be more heavily built (unfortunately no weights are available). The bill of *C. hybridus* in

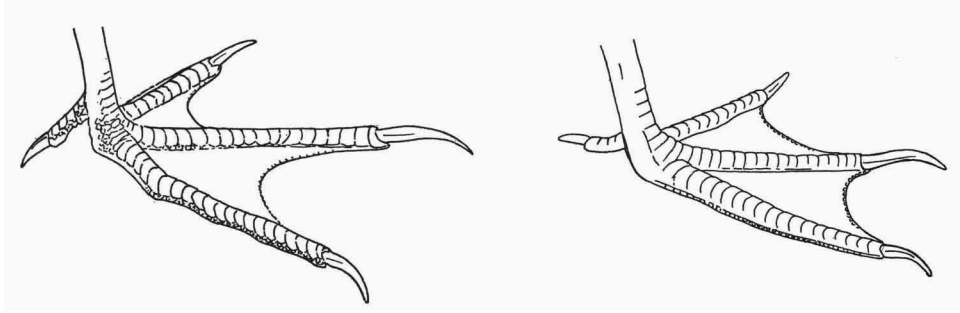

Fig. 3. Right feet of *Chlidonias h. hybridus* ♂ ad. (left) and of *Sterna albostriata* ♂ ad. (right), showing differences as described in the text. Ca. × 1.5.

breeding plumage is dark red and the feet are only a little lighter red; bill and feet of *H. albostriata* are reddish orange. The webs of the feet are much better developed in *H. albostriata*, especially the one between middle and inner toe. This is the character that made earlier authors place it in *Sterna*, for example Saunders (1896: 47) who remarked: "it is not a Marsh-Tern, its toes have not indented webs". In addition, the feet of *H. albostriata* are smaller, the toes are shorter, the hallux is almost rudimentary (fig. 3).

The Sterninae are a remarkably uniform group, and morphological differences between forms generally accepted as good species are often slight (cf. *Sterna albifrons* and *S. nereis*, *S. paradisaea* and *S. vittata*). The differences between *C. hybridus* and *H. albostriata* are certainly not less, and rather more, than those between the two pairs of species just mentioned, so that the morphological argument for uniting them is weak and certainly not conclusive.

It is surprising that in the discussion of the relationship between the two species the ecological differences have not been considered. Even a superficial scanning of literature revealed at least two important differences. *C. hybridus*, over its whole range, breeds in shallow lagoons, often it builds its

nest on floating vegetation or at least in swamp vegetation, even though during incubation such places may happen to fall dry. *H. albostriata*, on the other hand, breeds on shingle banks and flats along rivers, see for example the beautiful photograph of a bird alighting on its nest between the rolling stones in Heather (1966: 17). In this connection I regret that no eggs of *H. albostriata* have been available to me; the description and figure by Oates (1901: pl. XIII fig. 1) show that the eggs of *H. albostriata* are very similar to those of *C. hybridus*, but are browner, less green. As Oliver (1955: 329) observes of *H. albostriata* that: "The young birds also harmonize with the shingle and from their habit of squatting down and keeping still are difficult to detect", it looks as if a comparison between the pulli of the two species might be rewarding, but none have been available. I have compared Oliver's short description of the nestling of *H. albostriata* with the description and the excellent sketches of pulli of *C. hybridus* provided by Volkers & de Vries (1946) and with a pullus in our collection, but found Oliver's description not sufficiently exact for a comparison to be meaningful; the photograph published in his earlier work (Oliver, 1930: 237) is also rather vague.

The second obvious and important difference between the two species is in their movements. *C. hybridus* is mainly a breeding-bird of the subtropics and even of the tropics, and wherever it breeds at greater latitudes it is strongly migratory; in places where its movements are not yet well understood, as in Africa, it is at least strongly nomadic. *H. albostriata*, on the other hand, does not only breed at a latitude where *C. hybridus* is not found (as a breeding-bird it is confined to the South Island of New Zealand), but moreover is almost sedentary. It is true that it shows some seasonal movement from the breeding-places downriver to the coast and in winter visits the coasts of North Island to as far north as Auckland (Sibson, 1948), but it has never been recorded from outside New Zealand. It is justified to assume that these differences in migratory behaviour are correlated with further differences in methods of feeding and in food, which enable *H. albostriata* to survive under conditions apparently not suitable for *C. hybridus*, but a comparative study of ecology and behaviour would be required to prove this.

It seems to me that all the evidence at present available points to *C. hybridus* and *H. albostriata* being different species and, moreover, being, within the Sterninae, not even closely related.

A reconsideration of the generic position of *H. albostriata* becomes also necessary. In recent years several authors have questioned the validity of the genus *Chlidonias* (as different from *Sterna*). I agree that it is largely

a genus of convenience, but believe that it can be maintained on the basis of mainly two characters: the habit of building floating nests combined with the general ecology which have given these birds the name marsh terns, and the extreme reduction of the webbing between the toes. In both these characters *H. albostriata* agrees with the terns, genus *Sterna* and not with the marsh terns, genus *Chlidonias*. Sibson's (1948) reasons for placing it in *Chlidonias* read as follows: "Its habits, manner of flight and general morphology group it with the marsh terns". As regards some of its habits and morphological characters this is simply not true. I am therefore of the opinion that the correct name for *H. albostriata* is *Sterna albostriata* (G. R. Gray).

It is perhaps relevant to mention that in the older literature this species is often found under the name of *Sterna antarctica* Wagler, 1832. The name has been dropped as a primary homonym of *Sterna antarctica* Lesson, 1831, and that is why the name next in seniority, *Hydrochelidon albostriata* Gray, has been substituted.

15. Acknowledgements

For the loan of material I am indebted to Dr. C. Edelstam (Naturhistoriska Riksmuseet, Stockholm), Mr. I. C. J. Galbraith (British Museum (Natural History), Tring), Mrs. M. K. LeCroy (American Museum of Natural History, New York), Mr. M. Louette (Koninklijk Museum voor Midden-Afrika, Tervuren), Mr. M. P. Stuart Irwin (National Museum of Rhodesia, Bulawayo), Dr. J. Wattel (Zoölogisch Museum, Amsterdam) and Dr. H. E. Wolters (Museum Alexander Koenig, Bonn).

Information was received from Mr. P. A. Clancey (Durban Museum, Durban), Mr. J. Delacour (American Museum of Natural History, New York), Mr. E. C. Dickinson (Manilla), Prof. O. Ferianc (Bratislava), Mr. I. C. J. Galbraith (address given above), Dr. J. Haffer (Tehran, now Wiesbaden), Prof. H. Heim de Balsac (Paris), Miss N. Hopkins (Wavell Heights, Queensland), Dr. K. Hudec (Brno), Mr. M. P. Stuart Irwin (address given above), Prof. A. I. Ivanov (Zoological Institute, USSR Academy of Sciences, Leningrad), Dr. Chr. Jouanin (Muséum National d'Histoire Naturelle, Paris), Dr. W. K. Kraak (Bussum, N.H.), Dr. H. J. Lavery (Queensland National Park and Wildlife Service, Brisbane), Dipl.-Ing. G. Müller (Karlsruhe), Dr. V. A. Nechaev (Institute of Biology and Pedology, Far-Eastern Scientific Centre, USSR Academy of Sciences, Vladivostok), Mr. J. Pineau (Tanger), Prof. E. Schüz (Ludwigsburg), Dr. G. Steyskal (Washington, D. C.), Dr. G. M. Storr (Western Australian

Museum, Perth) and Mr. J. G. Walmsley (Station Biologique de la Tour du Valat, Camargue).

Many persons have assisted me to obtain a picture of the distribution and status of *C. hybridus* in Europe; their help will be acknowledged in my forthcoming paper (Mees, in prep.).

Finally I want to thank my colleague Dr. A. Diakonoff (Leiden) for making translations from Russian and Ukrainian, and my father, Dr. C. A. Mees (Pymble, N. S. W.), who translated an Arabic text for me.

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