

Chapter 4

THE BIRDS OF ALDABRA AND THEIR STATUS

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1. HISTORICAL INTRODUCTION

Prior to 1892, the one and only piece of ornithological activity pertaining to Aldabra seems to have been the collecting by Commander Wharton, during the visit of H.M.S. Fawn to the atoll in July 1878, of two specimens of the rail Dryolimnas cuvieri aldabranus, described by Günther (1879). They are in the British Museum (Natural History). It is true that Sclater (1871) had described a turtledove as Turtur aldabranus from two specimens allegedly from Aldabra, but as will be shown their origin was almost certainly in the Amirante Islands. Although during the course of her voyage in 1881-82 H.M.S. Alert visited the Amirantes and Gloriosa, together with Providence, Cerf Islands, and St Pierre, she did not visit Aldabra or the nearby islands (Coppinger 1883; Coppinger and others 1884).

Dr W. L. Abbott spent three and a half months, from September to December 1892, on Aldabra, and made a thorough survey of the avifauna. His collections were sent to the Smithsonian Institution, United States National Museum. The new forms collected were described by Ridgway (1893, as amended 1894a; 1894b), certain nests and eggs by Bendire (1894), and finally Ridgway (1895) gave an account of Abbott's ornithological activities in the western Indian Ocean generally, quoting many field observations.

Dr A. Voeltzkow spent from 21 May to 21 June 1895 on Aldabra,¹ and collected 59 specimens, now in the Natur-Museum und Forschungs-Institut Senckenberg, Frankfurt. The collection was catalogued by Berlepsch (1899). Voeltzkow (1917, 457-459) himself drew up a list of Aldabra birds, but it provided no new information. The yacht Valhalla, on which M. J. Nicoll was naturalist, arrived at Aldabra on 13 March 1906, and stayed there three days. The birds collected were reported on by Nicoll (1906), and are in the British Museum. There is also a more general account of the visit by Nicoll (1908).

J. C. F. Fryer spent from August 1908 to February 1909 in the archipelago--that is, including Assumption, Cosmoledo and Astove as well as Aldabra. He wrote a general account of the visit, including notes on the flora and fauna (Fryer 1911). These notes contain few references to birds, none of which were apparently collected. But Fryer (1911, 399) states that a bird collector for the Tring Museum spent a year there. No general account of this collection has been traced. There are merely incidental references in the literature to particular species, as by Lowe (1924). Two collectors appear to have been involved, namely F. R. Mortimer and a gentleman named Thibault. The bulk of the collection must now be in the American Museum of Natural History, to whom in 1932 Lord Rothschild sold the majority of the birds in the Tring Museum. But a few specimens formed part of a Rothschild Bequest to the British Museum in 1939. Two other small collections in the British Museum from Aldabra include one of 26 specimens presented as a Howard Saunders Bequest, collected in October and November 1906, the collector's name unrecorded, and one of 12 specimens collected and presented by R. Dupont, of the Botanic Station, Seychelles, and also dated October 1906.

¹Voeltzkow (1897, 42-43) says he arrived on Aldabra on 21 April 1895, and (1897, 55) that he stayed for over one month, but this cannot be reconciled with his specimen labels - Editor.

Dupont (1907) has given an account of his visit to the archipelago, which was primarily an agricultural reconnaissance, and which lasted from September 1906 to January 1907. Two paragraphs (Dupont 1907, 23) are devoted to birds, and appended is a bare list of species for various islands in the western Indian Ocean, Astove, Cosmoledo, Assumption and Aldabra all being shown separately. It is not stated what is the basis for this list, and it is not referred to in Section 3 below except in the case of those records which are unavailable in any other source of information.

I have no knowledge of any further ornithological activity until 1937, when L. D. E. F. Vesey-FitzGerald visited the Aldabra archipelago. Few specimens were collected, but for accounts of the land and sea birds respectively, see Vesey-FitzGerald (1940, 1941). Vesey-FitzGerald also obtained specimens of the sunbird Nectarinia sovimanga buchenorum from Cosmoledo in April 1952 (Williams 1953a).

In May 1954 the French ship Calypso visited Aldabra. Thirty-one birds were collected by G. Cherbonnier, between 10 and 26 May. The collection is now in the Muséum National d'Histoire Naturelle, Paris, and Dr G. Roux has kindly provided a list of the species and numbers of specimens of each. During 1959-64 there were several visits to Aldabra by British warships, and accounts have been published of the observations made. The first was by H.M.S. Leopard, in November 1959, for a brief account of which see Boulton (1960). In January 1962 a party from H.M.S. Owen spent three days ashore on Aldabra, the ship returning for twelve hours at the end of the next month (Morris 1963, as annotated by Bourne). In March 1964 H.M.S. Owen again visited Aldabra (and also Cosmoledo, Astove and Assumption). The observations made by the ship's personnel were written up by Bourne (1966).

The Bristol Seychelles Expedition 1964-65 spent part of November and December 1964 on Aldabra, as a result of which there are already several publications. There is a general account of the birds by Penny (1965), the expedition's leader. Dawson (1966a) has reported on the sea birds of the Seychelles generally, including also the Aldabra archipelago, while Gaymer (1966) has presented a case for the conservation of Aldabra. They caught, measured, weighed and released many land birds, the results of which Gaymer has been kind enough to place at my disposal. They also collected 19 specimens, which he has allowed me to use in the writing of this paper, and which are to be presented by the Expedition to the British Museum.

2. ACKNOWLEDGMENTS

Dr D. R. Stoddart, of the Department of Geography, Cambridge University, who invited me to write this paper, has readily responded to various requests for assistance. Dr W. R. P. Bourne has made available papers from Sea Swallow, examined various specimens with me in the British Museum, and criticised part of the original draft of this paper. As already mentioned, R. Gaymer has placed certain information and specimens which he collected at my disposal. I am most grateful for his generosity in these matters. I must also thank D. Goodwin for examining with me in the British Museum material of the turtledove Streptopelia picturata.

The specimens studied at first hand are mostly in the British Museum (Natural History), London, where J. D. Macdonald and his staff have provided every possible facility. I have also been fortunate to have had available at my place of employment, in the Department of Zoology, Cambridge University, a collection of over 1,000 specimens from the Malagasy Region (for a definition of which, see Section 3). It was assembled by Professor A. Newton, in charge of the Department from 1866 until his death in 1907, and his brother Sir Edward Newton, resident on Mauritius from 1859 to 1877. It includes a few of Abbott's Aldabra specimens, obtained in 1894 by exchange with the Smithsonian Institution.

In May 1966 I spent a week in the Muséum National d'Histoire Naturelle, Paris, in pursuance of a long-term study of the origins of the land avifauna of the Malagasy Region, and received all possible help from Drs J. Dorst, C. Jouanin and F. Roux. At this time I had no special interest in Aldabra, though I did take some note of a few of the specimens collected by Cherbonnier. As already recorded, Roux has now provided a complete list of them, and has moreover lent me several of particular interest.

Special thanks are due to Dr George E. Watson, of the Smithsonian Institution, who lent me at short notice by air mail a number of Abbott's specimens, including the complete skin of a flamingo. He has also quickly responded to inquiries about some other specimens. I am also most grateful to Dr J. Steinbacher for lending me some of Voeltzkow's specimens and for information about others.

Finally, I thank R. E. Moreau, W. R. P. Bourne, R. Gaymer and D. R. Stoddart for their comments on this paper.

3. SYSTEMATIC LIST

This list is divided into (1) land birds and (2) sea birds. The latter heading includes consideration of species occurring (or likely to occur) on Aldabra included in Alexander (1955). The land bird list is subdivided into (a) species which breed on Aldabra and may be presumed resident; (b) migrants, (i) already recorded, and (ii) not yet recorded but likely to occur; and (c) species whose status is still uncertain.

The term Malagasy Region is employed in the same sense as by Moreau (1964), and includes Madagascar, the Mascarene Islands (Réunion, Mauritius and Rodriguez), and other oceanic islands in the western Indian Ocean to as far north as the Seychelles. The term Aldabra archipelago includes Aldabra, Assumption, Cosmoledo and Astove, though not Gloriosa.

In general, the nomenclature, both scientific and English, follows that of Watson, Zusi and Storer (1963). Subspecific names are not used except where they seem to have been reasonably satisfactorily established. English names are the equivalent of scientific specific, rather than subspecific, names.

A sign "o" indicates an unsexed specimen. The average of measurements is often given in brackets following the extremes.

It should be well-known that Bergmann's Rule is to the effect that in warm-blooded vertebrates the smaller-sized geographic forms of a species are found in the warmer parts of the range, the larger-sized in the cooler parts of the range.

(1) Land Birds

(a) Breeding Residents (or presumed so)

Dawson (1966a, 7) records the Indian Reef Heron *Demiegretta asha* as breeding exclusively on Astove. But if this is so, it could also do so on Aldabra. However, in the absence of supporting details one cannot be convinced that it breeds even on Astove, especially as according to Watson, Zusi and Storer (1963, 24) it is not known to breed otherwise nearer to Astove than Ceylon. It may also be mentioned here that Vesey-FitzGerald (1940, 488) found the Madagascar Grass-Warbler *Cisticola cherina* abundant on Cosmoledo and Astove, though he did not see it on Aldabra. Unfortunately the specimen which he collected and sent to the British Museum cannot be traced.

Ardea cinerea cinerea Linnaeus Grey Heron

According to Abbott (in Ridgway 1895, 530), this species breeds on Aldabra, and nests with young were seen in November. One specimen was collected, and likewise by Voeltzkow (Berlepsch 1899, 495). Nicoll (1906, 695) records it from both Aldabra and Assumption. Morris (1963) saw a few on Aldabra, but Bourne (1966) records "hundreds". Dupont (1907) lists it from throughout the archipelago.

Benson (1960a, 31) considers that two specimens from the Comoros are better placed with *A. c. cinerea* than *A. c. firasa* Hartert of Madagascar, the latter distinguishable by longer measurements for the culmen and tarsus (respectively 131 - 145 as against 110 - 133, and 185 - 200 as against 155 - 182 mm.). He thought that four immature specimens from Aldabra and Assumption were also best placed with *A. c. cinerea*, though possibly not fully grown. Berlepsch (1899, 495) gives the wing of Voeltzkow's specimen as 465, culmen 140, tarsus 165 mm. The tarsus measurement is well within the range of *A. c. cinerea*. That for the culmen agrees better with *A. c. firasa*, but may have been taken from the base of the skull instead of the end of the frontal feathering as in Benson's measurements. A specimen in Cambridge from the Amirante Islands, collected in December 1864, has wing 424, culmen (from frontal feathering) 120, tarsus 170 mm., thus agreeing with *A. c. cinerea*. It is concluded that the populations frequenting all of the above-mentioned islands are best attributed to this subspecies, and are accordingly of African rather than Madagascan origin.

Butorides striatus crawfordi Nicoll Little Green Heron

B. s. crawfordi, of which I have seen the type, an adult male in the British Museum from Assumption, and another adult male therein from Aldabra, can easily be distinguished from *B. s. rhizophorae* Salomonsen, of the Comoros, by the paler grey of the underside. I have also been lent the specimen collected by Abbott on Aldabra (Ridgway 1895, 531). It is a male in immature dress, and cannot be used in considering subspecific differences based on colour. The same applies to a female in Paris collected on Aldabra by Cherbonnier, which I have also seen. But all four specimens are smaller than

rhizophorae, see below. Presumably there is the same sexual colour difference in the adult of crawfordi as in rhizophorae and B. s javanicus (Horsfield), that is, the female has the sides of the neck, chest and abdomen washed with brown, and the spotting on the throat more strongly pronounced (Benson 1960a, 34).

Benson (1960a) gives the wing-length of 16 specimens of rhizophorae as 170 - 180 mm. Thirteen specimens in London, Paris and Cambridge from Reunion, Mauritius and Rodriguez, doubtfully separable from the Asiatic javanicus, measure 167 - 181 mm. On the other hand, 10 specimens from the Seychelles (Mahé, Cousin, Praslin, La Digue), attributable to B. s. degens Hartert, measure 159 - 168 mm. only. Like degens, crawfordi is also small, as the following figures show:

Adult ♂	159, 161 mm.
Immature ♂	159 mm.
Immature ♀	157 mm.

An immature male collected by Voeltzkow which I have been lent has wing 152 mm., and may not be quite fully grown. This certainly applies to an immature specimen in Cambridge from the Amirantes, with wing 140 mm. only.

Benson (1960a, 34) accepts the contention of White (1951, 460) that rhizophorae is of Asiatic origin, and there is no reason to suppose that this does not also apply to crawfordi. On the other hand, B. s. rutenbergi (Hartlaub) of Madagascar is very close to B. s. atricapillus (Afzelius) of Africa, whence White suggests that degens of the Seychelles is also derived.

Abbott (in Ridgway 1895, 531) found this species quite common on Aldabra, breeding among mangroves in November and December, laying two eggs. Probably the breeding season is fairly extensive, since in the Comoros Benson (1960a, 35) obtained data pointing to egg-laying in August and September. Abbott also noted that the birds stand for hours on the backs of turtles, catching the blue-bottle flies which swarm on the turtles' backs and heads. Dupont (1907) lists this species from throughout the archipelago.

Egretta garzetta dimorpha Hartert Little Egret

E. dimorpha has often been regarded as a full species, as by Watson, Zusi and Storer (1963). However, I see no reason to differ from the opinion of Grant and Mackworth-Praed (1933) and Berlioz (1949, 20), for example, that dimorpha is conspecific with E. garzetta. Dimorpha inhabits Madagascar and the Aldabra archipelago, and is notable for the common occurrence of a dark blue-grey phase as well as a white phase. A grey phase also occurs in coastal eastern and north-eastern Africa and in coastal West Africa (White 1965, 25), but is rare or quite absent in the interior of Africa. Grant and Mackworth-Praed (1933) have separated the populations of Aldabra and Assumption as E. g. assumptionis, differing from dimorpha by its longer bill. This was on the basis of material in the British Museum. There is no further material available therein. While due note must be taken of this difference, the measurements presented show an appreciable overlap. On existing evidence it is difficult to justify recognition of assumptionis.

Abbott (in Ridgway 1895, 530, under Demigretta gularis) found this the commonest heron on Aldabra, and breeding in large numbers in December, laying from two to four eggs. The white phase was twice or thrice as numerous as the blue. Nicoll (1906, 696, 704, under Demiegretta sacra) collected it on both Assumption and Aldabra, finding it extremely abundant on the latter. A specimen collected on Aldabra was partially white and dark. I can confirm that this applies to both this and another specimen from Aldabra, both in the British Museum. Morris (1963) found both phases plentiful on Aldabra. Bourne (1966) records hundreds, of which about forty per cent were in the dark phase. He also records it from Cosmoledo, where the phases were about equal, while one "White-faced Heron" was seen on Astove (presumably this was a specimen of E. g. dimorpha in the dark phase, in which the chin and throat are still white). He gives no record from Assumption, and possibly it has been extirpated there. Dawson (1966a, 7) records large flocks on Cosmoledo, Astove and Aldabra, the proportion of light to dark birds being about seven to three, with the occasional intermediate piebald.

Milon (1959) found that in two breeding colonies in Madagascar selected for study the ratio of the dark phase to the white phase was about 35: 65. The observations from the Aldabra archipelago tend roughly to bear this out.

Threskiornis aethiopica abbotti (Ridgway) Sacred Ibis

This species occurs in Africa (T. a. aethiopica (Latham)), Madagascar (T. a. bernieri (Bonaparte)) and Aldabra (T. a. abbotti). The characters on which these three subspecies can be recognised may be summarised as follows (it should here be mentioned that immature specimens of all three have the head and neck feathered, whereas in adults these areas are bare):

Feathering on head and neck (in immature): In aethiopica and bernieri white heavily streaked black; in abbotti black streaking much reduced, and only on a few feathers. (Only one immature specimen of abbotti was available. But the difference was striking, and shows up well in three photographs in Nicoll (1908).)

Decomposed tertials: Glossy purplish slate in aethiopica, bluish slate in bernieri, much paler than in aethiopica; bluish slate in abbotti, as in bernieri, but darker.

Metallic green tips to remiges: Extending back 40 - 60 mm. in aethiopica; not more than 15 mm. in bernieri, in three out of eight specimens absent; not more than 10 mm. in abbotti, in four out of six specimens absent.

Iris (in adult): Brown in aethiopica (see for example McLachlan and Liversidge 1957); white in bernieri; bluish-white in abbotti. (The difference between bernieri and abbotti is as given by Ridgway 1895, 530, and is confirmed from the labels of one adult specimen of the former and two such of the latter. An immature specimen of abbotti had the iris very dark brown.)

Ridgway also suggests that the lower half of the neck is entirely naked in abbotti, but not so in bernieri. I cannot convince myself that the extent of feathering up the neck is not variable in the adult of all three subspecies, and that it can be used as a distinguishing character. Ridgway further suggests that the tips to the remiges differ in colour, but it seems that there is only a difference in its extent.

Presumably bernieri was derived from aethiopica, and probably abbotti from bernieri rather than aethiopica. The colour of the decomposed tertials, the reduction of the dark tips to the remiges, and the colour of the iris all suggest a closer relationship of abbotti to bernieri than to aethiopica.

The following are measurements in mm. of the material of bernieri and abbotti studied, in London, together with two specimens of bernieri in Cambridge:

	Wing			Culmen from base			Tarsus		
<u>Bernieri</u>									
Adult ♂	374			169			95		
Adult ♀ ♀	342	348	362	132	137	144	72	76	82
Immature ♂	357			182			84		
Immature ♀ ♀	334	340		136	143		74	78	
Immature ○	371			broken			87		
<u>Abbotti</u>									
Adult ♀ ♀	336	340		125	132		76	76	
Adult ○	335	337	338	125	133	136	70	70	72
Immature ♂	347			176			80		

These figures do not suggest any marked difference between the two subspecies. Evidently males are longer billed in both.

Falco newtoni aldabranus Grote Madagascar Kestrel

It is presumed that Madagascar, inhabited by F. n. newtoni (Gurney), has been the source of origin for the populations elsewhere in the Malagasy Region, namely F. punctatus Temminck of Mauritius, F. n. aldabranus of Aldabra, and F. araea (Oberholser) of the Seychelles. A single unsexed specimen of aldabranus (judging from its wing-length) from Anjouan, in the Comoros, is considered by Benson (1960a, 39) to have been a stray from Aldabra, but is discussed further below. Failure to colonise the Comoros may be because the islands as a whole were probably originally almost wholly covered with evergreen forest (Moreau 1966, 346). In Madagascar, Rand (1936, 378) found the species everywhere except in heavy forest.

Benson (1960a, 39) studied to some extent the material in London. It has been re-examined, 13 specimens in Cambridge have also been considered, and wing-lengths taken of three specimens of aldabranus collected by Cherbonnier, in Paris. Material of F. araea in London, Paris and Cambridge has also been considered.

From field observations, Gaymer tells me that the male of F. n. aldabranus is more brightly coloured than the female. I cannot make any personal judgment in this matter, since the only two specimens examined after I had

had my attention drawn to this possibility are two immature ones in the British Museum. There is no marked colour difference in F. n. newtoni. Possibly, considering adults, the female has the mantle devoid of any markings, whereas the male has a few spots. But the difference is not well defined, and the male is certainly no brighter than the female. Immature specimens have the whole upperside rufous, heavily barred with black on the mantle and wing-coverts. In adults the markings are in the form of spots, and relatively sparse. Grey is only apparent in the immature birds on the tail, and even in that area there is some rufous admixture. Adults also have the rump grey, and there is some grey admixture on the crown. On the underside there is no marked difference, but regardless of age or sex there is clearly dimorphism, specimens being either white or chestnut. But the only evidence of a chestnut phase in aldabranus is from the specimen labelled Anjouan, which is immature, and is this colour below. But a female of aldabranus collected by Nicoll, also immature, is white below, as are three males and two females collected by Abbott, as Watson informs me. A coloured photograph of a bird taken by Gaymer also shows a white underside. Unfortunately I did not take note of the colour in the three specimens in Paris, but on present evidence there is no certainty of the existence on Aldabra of a morph with underside chestnut (it should be a simple matter to check on this by field-observations, not necessarily accompanied by collecting). Apart from this, I am not satisfied that any other colour-differences exist between aldabranus and nominate newtoni. There is no suggestion of it from the two immature specimens in the British Museum. Actually it is possible that the Anjouan specimen, in view of its chestnut underside, is an unusually small example of nominate newtoni (its wing-length is 176 mm., see Table 5), and so a stray from Madagascar.

The wing-lengths in Table 5 show that in both newtoni and araea of the Seychelles, females average larger than males, though with an overlap. Considering the sexes separately, it is evident that, although there is some overlap, aldabranus does average considerably smaller than nominate newtoni. This would appear to be a Bergmann's Rule effect, and it will be seen that this has been much accentuated in araea. Araea could well be regarded as conspecific with newtoni. The most marked difference from newtoni is that in adults the crown is unstreaked, plain grey, and the underside unmarked, plain pinkish, showing no dimorphism.

Nicoll's female of aldabranus has the colour of the iris recorded on the label as yellow, which he emphasises (1906, 701) as being unusual. Yet Watson tells me that in all five of Abbott's specimens it is recorded as brown or dark brown. On only seven of the specimens of nominate newtoni is there any record of the colour. In six it is given as hazel or brown, though in the seventh as "jaune" (yellow). Conceivably the colour could change with age. One of these six specimens was collected with six eggs (see also below), and so presumably fully adult. A coloured photograph taken by Gaymer of an apparent adult aldabranus also shows a brown iris. Yet so also does the one of nestlings in Penny (1965). An error may somehow have arisen in ever recording the iris as yellow. A yellow iris should show up in life, and Gaymer tells me that he has no note of it. In F. tinnunculus, from which newtoni is presumably derived, the iris is apparently always brown (see for example Witherby and others 1941, 31; and McLachlan and Liversidge 1957, 65). In four adults of F. araea

Table 5. Wing-lengths (in mm.) of specimens of *Falco newtoni* and *F. araea*

F. n. newtoni, MADAGASCAR

19 ♂♂ 177 - 196 (185.8) 14 ♀♀ 188 - 210 (196.6) 42 177 - 211 (192.5)

F. n. aldabranus, ALDABRA

4 ♂♂ 170 170 175 183 3 ♀♀ 186 188 197 4 170 174 176 177

F. araea, SEYCHELLES

9 ♂♂ 142 - 152 (147.0) 7 ♀♀ 151 - 155 (153.1) 6 143 - 157 (150.3)

Notes: Some sexed specimens have been relegated to the unsexed column, if the sexing seemed not beyond reasonable doubt.

The number of sexed specimens of *F. n. newtoni* shows an increase on those in Benson (1960a, 40). This is based mainly on specimens sexed by E. Newton, considered reliable.

First male figure of *F. n. aldabranus* from Berlepsch (1899, 492), first female from specimen in British Museum. Remainder of figures of sexed specimens supplied by Dr G. E. Watson from material in the Smithsonian Institution. Of the four unsexed specimens, the figure 176 is for the Anjouan bird, but the remainder from material in Paris. The smallest is unsexed as females, but perhaps incorrectly.

in Cambridge it is recorded as brown, likewise in five of punctatus. It should be simple to settle this question by field-observation.

Rand (1936, 379) records copulation in Madagascar in September. Newton (1863, 336) records a nest with five eggs on 17 September, the female parent of which is in Cambridge. Another female in Cambridge was collected at Tananarive on 17 September from six eggs. It may be expected that in Aldabra too *F. newtoni* breeds predominantly in the hot pre-rains season. The record by Penny (1965) is in keeping with this. The precise date of the taking of the photograph of the three nestlings was 18 November, so I am informed. Note also the apparent reduction in clutch-size compared with Madagascar.

Dryolimnas cuvieri aldabranus (Gunther) White-throated Rail

The genus *Dryolimnas* is endemic to the Malagasy Region. *D. c. cuvieri* (Pucheran) occurs in Madagascar, and is said to have also formerly been resident on Mauritius (Rountree and others 1952, 180). At one time the species was apparently represented on all four islands of the Aldabra archipelago, though Vesey-FitzGerald (1940, 487) reported that it was extinct except on Aldabra. As regards Cosmoledo and Astove, which Abbott did not visit, he had it at second-hand that rails swarmed on both islands (Ridgway 1895, 529). Dupont (1907, 13, 43) indicates that in late 1906 *D. c. abbotti* still existed on Assumption but was extinct on Cosmoledo and Astove. However, Fryer (1911, 428) saw what he presumed to be this form on Astove in 1908, and he reported (1911, 430) its existence on South Island of Cosmoledo, though he did not land there. Evidently it finally became extinct on these two islands some time

between 1908 and 1937, when Vesey-FitzGerald visited the archipelago. D. c. abbotti (Ridgway), of Assumption, was originally discovered by Abbott in 1892. It still flourished in 1906, Nicoll (1906, 695) finding it one of the most abundant birds on the island, allowing approach to within a few inches. However, he (1908, 111) predicted its extirpation due to imported rats, which were very abundant and probably ate many eggs. According to Fryer (1911, 433), it still existed in 1908, but like the Cosmoledo and Astove populations evidently became extinct between 1908 and 1937. On Aldabra in 1892, Abbott (in Ridgway 1895, 528) found R. c. aldabranus very common on all the islets except South Island, where it had been exterminated by the cats which ran wild there. Yet in 1906, Nicoll (1906, 702; 1908, 117) in the course of his three-day visit saw only two. According to Gaymer (1966), a few hundred survive only on Middle Island, though Bourne (1966) mentions that it was twice seen on Polymnie. Its extirpation elsewhere on the atoll is probably due to cats. The species is unknown from any other island in the Malagasy Region. It may have failed to colonise the Comoros due to a lack of sufficient marshy habitat, such as it mainly frequents in Madagascar (Rand 1936, 357).

Abbotti differs from nominate cuvieri in being paler, more greyish olive above, with the streaks narrower. It also has the white on the chin and throat more extensive, tending to extend onto the upper chest, while the white barring on the lower abdomen is broader and coarser. Aldabranus was described first by Günther in 1879 from two specimens, in the British Museum, collected by Commander Wharton. This subspecies is slightly more yellowish olive above than in nominate cuvieri, while the streaking tends to be finer, and in three specimens is virtually obsolete. The extent of white on the chin and throat is variable. The white barring on the lower abdomen is relatively fine, as in nominate cuvieri. In all three subspecies the immature bird is dingy olive on the whole upperside. The cinnamon coloration of the adult, on the crown, nape and sides of head, as well as on the chest and upper abdomen, is lacking, and these latter two areas are dull brown. The single immature of aldabranus available differs from one such of abbotti and several of nominate cuvieri, in having the white feathers of the chin and throat tipped with rufous.

Measurements of the three subspecies are given in Table 6. It will be seen that aldabranus is much the shortest winged, and according to Abbott (in Ridgway 1895, 529) it has almost completely lost the power of flight, though Fryer (1911, 418) states that it can "flutter along". Even the extinct abbotti was considerably shorter winged than nominate cuvieri, in process of losing the power of flight. Nicoll (1908, 109) states that he never saw one fly. On average, aldabranus is longer billed than the other two subspecies, and aldabranus and abbotti have a shorter tarsus and middle toe than nominate cuvieri.

Alectroenas sganzini minor Berlepsch Comoro Blue Pigeon

This genus is confined to the Malagasy Region, and four species have been distinguished:

- A. nitidissima (Scopoli): Mauritius, extinct since about 1830.
- A. madagascariensis (Linnaeus): Madagascar.

Table 6. Measurements (in mm.) of specimens of *Dryolimnas cuvieri*

Specimens	Wing	Culmen from base	Tarsus	Middle toe with claw
MADAGASCAR (<i>D. c. cuvieri</i>)				
♂ ♂	147 151 152 155 157 158 160	41 43 45 45 46 46	41 42 43 44 44 45 46	48 49 50 50 51 51 54 54
♀ ♀	142 143 144 145 147 147	38 38 39 39 40 40 41	40 40 40 41 41 42 43	45 46 47 48 48 49 50 50
	148 150 150 151 162	41 41 41 41 45	43 44 45 45 46	50 51 51
○ ○	146 147 148 148 149 151 152	38 39 39 39 40 40 40	39 43 43 43 44 45 45	44 46 47 49 49 49 50 52
	155 159 160 160 160	43 45 45 46 47 47 48	46 46 47 47 50 50	52 52 53 54 55 56
Overall	142 - 162 (151.3)	38 - 48 (42.2)	39 - 50 (43.8)	44 - 56 (50.0)
ASSUMPTION (<i>D. c. abbotti</i>)				
♂ ♂	133 136 141	40 42 45 45	39 39 39 41	46 46 48
♀	136	41	39	42
Overall	133 - 141 (136.5)	40 - 45 (42.6)	39 - 41 (39.4)	42 - 48 (45.5)
ALDABRA (<i>D. c. aldabranus</i>)				
♂	127	48	41	46
♀ ♀	116 121 122 125	42 44 46 49	36 38 38 41	41 41 44 45
○ ○	115 117 122 123 126	44 46 46 49 50	37 38 40 41 41	43 44 46 48
Overall	115 - 127 (121.4)	42 50 (46.4)	36 41 (39.1)	41 - 48 (44.2)

Notes: The numbers of measurements do not tally completely in some series, because it was not possible to take all four measurements of some specimens. Thus there were four males of *D. c. abbotti*, but the wings and middle toes of one were incomplete. Some specimens may have been mis-sexed; for example the female of *D. c. cuvieri* with the longest wing.

A. sganzini (Bonaparte): Comoros and Aldabra.

A. pulcherrima (Scopoli): Seychelles.

In colour of plumage, A. sganzini is distinguished from madagascariensis by a blue instead of a mainly red tail and upper tail-coverts, and white instead of blue head, nape and chest. In pulcherrima the crown is red, and the remainder of the head, and the nape and chest, are bluish white rather than white as in sganzini. A. s. minor Berlepsch, confined to Aldabra, unknown elsewhere in the archipelago, was presumably derived from the Comoros rather than the reverse. In colour of plumage it does not differ from A. s. sganzini, though Benson (1960a, 51) did note that four Comoro specimens of nominate sganzini, from Mayotte and Moheli, had traces of red on the tail. Eight out of ten specimens of minor specially examined for this character show traces of it, either on the tail or the upper tail-coverts, or both. This tendency serves to emphasise the close relationship of sganzini to madagascariensis.

Gaymer had recorded the soft parts of three males of minor as follows: iris scarlet with golden inner rim; bare skin around eye bright crimson; bill waxy green, blue at base; feet pale blue. This description suggests no difference except in minor detail from nominate sganzini (see Benson 1960a). He also thought some feathers of the neck had pink tips.

Benson gives the wing-length of seven specimens of minor as 152 - 158, as against 163 - 184 mm. in 51 specimens of nominate sganzini. The small size of minor is fully borne out by the measurements of further material, using the three males collected by Gaymer, two specimens in Paris, and two recorded by Berlepsch (1899, 493): ♂♂, 148, 153, 154, 158, 159; ♀♀, 153, 154 mm. Gaymer gives the weight of his three males as 119.5, 120, 160 gms.

By analogy with the case of Falco newtoni and araea, it might be expected that pulcherrima of the Seychelles would be still smaller than A. s. minor. However, the following are wing-lengths of the material of pulcherrima in London, Paris, and Cambridge, showing that it is intermediate in size between nominate sganzini and minor: ♂♂, 162, 163, 168, 171; 8 ♀♀, 158 - 165 (160.9); 13 ♂♂, 157 - 171 (162.9) mm.

Streptopelia picturata coppingeri (Sharpe) Madagascar Turtledove

This species is endemic to the Malagasy Region, if Diego Garcia is included. Benson (1960a, 47) discussed the subspecies to some extent, except for S. p. chuni (Reichenow), of Diego Garcia, of which no material was available, as has still been the case. This subspecies is not considered in the discussion which follows. It must suffice to say that according to the original description it is a dark edition of S. p. picturata (Temminck), of Madagascar, and, like it, is distinguished by having a grey head.

Thanks to (a) a loan of three of Abbott's specimens from Aldabra and another from the Amirantes, and of all five collected by Voeltzkow on Aldabra, and (b) the material in Cambridge and two Aldabra specimens collected by Gaymer, it is now possible to present a more comprehensive assessment. In the first place, the point must be emphasised, of which Benson (1960a) did not take note, that males tend to have the reddish purple on the upperside more

extensive than in females, and average larger (see the figures in Table 7). The only subspecies studied in which I have been unable to satisfy myself that this necessarily applies is S. p. rostrata (Bonaparte), of the Seychelles.

S. p. picturata, of Madagascar, is distinguishable from all the other subspecies considered by its bluish grey instead of purple head. S. p. comorensis (Newton), of the Comoros, has the reddish purple on the upperside as in nominate picturata, in males extending well onto the mantle and wing-coverts, in females more restricted, absent from the lower mantle. All of the material shown in the table from Gloriosa, Assumption and Aldabra is easily distinguished from both these other two subspecies in having the reddish purple on the upperside paler, more restricted, in males not extending beyond the upper mantle and lesser wing-coverts, in females not beyond the nape, absent from all the wing-coverts. Furthermore, the posterior of the upperside, where reddish-purple is lacking, is a much paler brown. This material is also paler below, with a pinkish rather than a purplish suffusion, which, unlike the upperside, tends to be more, not less, extensive onto the abdomen, which in nominate picturata and comorensis is grey or buffy white without any purplish suffusion. These differences may be a reflection of a relatively dry environment in the Aldabra archipelago and on Gloriosa.

Another type of variation is that, regardless of sex, in nominate picturata and comorensis there is usually some suffusion of grey on the rump and upper tail-coverts, in some specimens covering the whole of these two areas. But there was no sign of it in the Gloriosa and Assumption specimens, and it was only slightly apparent in two out of the 13 from Aldabra which had been personally examined.

The situation is complicated in that the two syntypes of S. p. aldabrana (Sclater), a male and a female in Cambridge, do not show the colour characters of the Gloriosa, Assumption and Aldabra material. On the contrary they agree quite well in colour with comorensis, and with a female lent to me collected by Abbott on Ile Alphonse, in the Amirantes. Dr Watson tells me that the latter differs from the type of S. p. saturata (Ridgway), a male from Ile Poivre, in the Amirantes, in having the reddish purple on the upperside a little less extensive. This would seem to represent the sexual difference to be expected, and is also noticeable in the two syntypes of aldabrana. With regard to the colour of the rump and upper tail-coverts, grey is well developed in the male syntype, but absent in the female and in the Ile Alphonse specimen. It is evident from their labels, in E. Newton's handwriting, that the two syntypes died in the captivity of the Zoological Society, London, the male of 17 January 1873, the female on 29 September 1871. Both had been bred in Mauritius. There is no indication by Newton on the labels, nor in the original register of the collection from the Malagasy Region in Cambridge made out by Professor Newton, that either specimen came from Aldabra, though Sclater (1871, 692) states that he had been informed by E. Newton that "these Doves were procured for him by Mr Swinburne Ward, when he visited the coral-reef of Aldabra in 1868". Presumably Newton meant the parents of the two specimens, in view of his statement on the labels that they were bred in Mauritius.

Either the two syntypes of aldabrana acquired a richer coloration in the course of captivity or their source of origin was not Aldabra but the Amirantes. The latter explanation seems the more likely, and they are placed accordingly

in the table, together with the female collected by Abbott on Ile Alphonse, which has wing 161 mm. The female syntype of aldabrana measures 142 mm. only, but its wings are incomplete. It is evident that these three specimens are much smaller than those from the Comoros, and this is the only really appreciable difference.

Obviously it would be confusing to use the name aldabrana for the Amirante birds. It would seem best to apply to the International Commission of Zoological Nomenclature for the annulment of the name Turtur aldabranus Sclater (1871), under article 79 of the International Code (1961), and to continue to use the name Turtur saturatus Ridgway (1893). In anticipation of this action and its subsequent approval, this is duly observed here. The Gloriosa, Assumption and Aldabra material seems all similar in colour, and the only difference is that that from Aldabra is slightly smaller, as the figures in Table 7 show. This is of no great import, and rather than introduce a new name it would seem best, at least on the basis of the material at present available, to apply the name S. p. coppingeri (Sharpe), with S. c. assumptionis (Nicoll) as a synonym, to the populations of all three islands, and not to introduce a new name for the smaller Aldabra population.

It will be seen from Table 7 that the Aldabra population of coppingeri, and saturata, are smaller than nominate picturata and comorensis, while rostrata is smaller still, probably a reflection of Bergmann's Rule. Rostrata is also quite distinct in colour. The posterior of the upper side is darker brown than in any of the other subspecies discussed, and the abdomen is markedly grey. This tendency to greyness is apparent in some specimens even on the throat and chest, and there is always some sign of greyish wash on the rump and upper tail-coverts. Also, viewed from above, the dark colouring in the tail appears as slate rather than brown. According to Loustau-Lalanne (1962, 17) rostrata has been largely replaced by nominate picturata, introduced about the beginning of the century. Actually there is a specimen of nominate picturata in Cambridge from somewhere in the Seychelles dated as long ago as 1870.

Gaymer gives the weight of a male collected by him as 165, and of a female as 170 gms. Another male, not retained, had wing 162 mm., and weighed as much as 187 gms. The soft parts he gives in both sexes as bill blue-grey, base pinkish-purple; legs and feet deep pink in front, blue-grey behind; iris brown, inner rim yellow. These descriptions agree with those by Benson (1960a, 47) for comorensis, except in the colour of the iris, which Benson records as reddish purple, inner rim yellow, but on Grand Comoro as entirely pale red or chestnut. Of four specimens collected by Nicoll on Assumption, in only one, a male, is the colour of the iris recorded, as yellow. In the specimen from Gloriosa, a female, it is given as orange-red. A male of rostrata from Ile Cousin had an orange iris. On the face of it the variation in the colour of the iris is considerable.

Finally, Dupont (1907), who is certainly confused in his nomenclature, lists Turtur aldabranus from Aldabra only, stating that it is extinct. He lists T. saturatus from throughout the archipelago (and also from the Seychelles, the Amirantes, Providence, and Gloriosa), and states (1907, 23) that on Aldabra it is "being used as an article of food and there is some chance of this being destroyed entirely". There is no other evidence of the existence of Streptopelia picturata on Cosmoledo or Astove, nor any satisfactory evidence that any form

has existed on Aldabra in the past one hundred years other than a small-sized population of S. p. coppingeri, which I have no reason to believe is not still flourishing. Incidentally, S. p. coppingeri on Gloriosa is the only example of a subspecific difference between that island and Madagascar.

Centropus toulou insularis Ridgway Madagascar Coucal

This species is only known in the Malagasy Region from Madagascar (C. t. toulou (Müller)), Assumption (C. t. assumptionis Nicoll), and Aldabra (C. t. insularis). There are other related forms, often regarded as conspecific with C. toulou, in Africa and Asia. But assumptionis and insularis are barely separable from nominate toulou, and there can be no doubt but that Assumption and Aldabra were colonised from Madagascar. Moreau (1966, 347) remarks that the poor powers of flight of this species suggest that it used the Comoros as intermediate stages in its expansion and that there is nothing in the ecology of the Comoros to suggest that they would be unsuitable for the bird. As he (1966, 346) states, evergreen forest probably covered almost the whole of the islands originally. Rand (1936, 399) gives the habitat of C. toulou in Madagascar as "the ground-cover in the forest, occasionally in the trees, commonly in the brushlands and the dense reeds and grass of the smaller marshes". I am doubtful if the Comoros have ever been well suited to it. They could have been used as an intermediate stage, though an alternative route seems to exist via Gloriosa, Astove and Cosmoledo.

Watson, Zusi and Storer (1963, 78) indicate that the female is at all seasons mostly brown streaked with cream; the non-breeding male resembling the female, but acquiring a black head, body and tail for the breeding season. The evidence from the available material is that there is no sexual colour-dimorphism, but that both sexes in the breeding season have the head, mantle and chest black (with a marked bluish gloss in fresh dress), replaced in the off-season by dark brown feathers with pale buffy shaft-streaks. Also, the bill is black when breeding, otherwise brown. The only difference between the sexes at any season is that the female is larger (see the figures in Table 8). As Rand (1936, 400) points out, in Madagascar the breeding dress is worn from about October to March, and I have no reason to disagree. Material from Assumption and Aldabra also supports this. Two males of assumptionis collected by Nicoll on 12 March are still in breeding dress. One of them was collected at its nest with two eggs (Nicoll 1906, 694). Another collected by Abbott on 18 September, in Cambridge, has the moult into breeding dress almost complete. A male of insularis collected by Gaymer on 1 December is in full breeding dress, as is a female collected by Nicoll on 14 March. Nicoll also obtained an immature female on the same date, evidently not fully grown, see the measurements in Table 8. It has the crown and nape black, with a buffy spot near the tip of each feather. The throat and chest are barred dark brown and buffy, and the chestnut of the remiges and their coverts is heavily barred with dark brown. Similar young birds have been examined from Madagascar. A female of insularis dated October 1960, in the British Museum, is still in non-breeding dress, and differs from specimens of nominate toulou in this dress, which have the whole abdomen black, by having black restricted to the thighs and under tail-coverts, the feathers of the remainder of this area being buffy white, with some eight narrow

Table 7. Wing-lengths (in mm.) of material of *Streptopelia picturata*

<u>S. p. picturata</u>					
MADAGASCAR	12 ♂ ♂	165 - 177 (172.5)	14 ♀ ♀	158 - 170 (166.7)	
<u>S. p. comorensis</u>					
COMORO ISLANDS	14 ♂ ♂	174 - 183 (177.9)	15 ♀ ♀	166 - 174 (169.6)	
<u>S. p. coppingeri</u>					
GLORIOSA	♂	nil	2 ♀ ♀	168 169	
ASSUMPTION	2 ♂ ♂	172 173	2 ♀ ♀	167 171	
ALDABRA	6 ♂ ♂	163 - 171 (167.3)	7 ♀ ♀	155 - 166 (159.9)	1 ♂ 171
<u>S. p. saturata</u>					
AMIRANTE ISLANDS	2 ♂ ♂	164 166	3 ♀ ♀	142 + 161 163	
<u>S. p. rostrata</u>					
SEYCHELLES	5 ♂ ♂	146 - 155 (149.2)	2 ♀ ♀	146 147	6 ♂ ♂ 148 - 160 (151.3)

Notes: The nomenclature of the subspecies is explained in the text. The figures for S. p. rostrata include three specimens in Paris. The sources for the remainder of the figures, for the subspecies as a whole, are recorded in the text, with the addition of figures supplied by Dr G. E. Watson, from further material collected by Abbott in the Smithsonian Institution, consisting of one female from Gloriosa, one unsexed specimen (presumably a male) from Aldabra, and from the Amirantes a male from Ile Poivre (type of saturata) and a female from Ile Alphonse.

Table 8. Measurements (in mm.) of specimens of *Centropus toulou* from Malagasy Region

Specimens	Wing	Tail	Culmen from base	Tarsus	Long foretoe with claw
MADAGASCAR (<u>C. t. toulou</u>)					
18 ♂ ♂	140 - 160 (149.1)	198 - 227 (216.2)	27 - 30 (28.4)	37 - 41.5 (38.9)	33.5 - 39 (36.0)
15 ♀ ♀	158 - 176 (166.5)	224 - 256 (240.7)	29 - 33 (30.8)	39 - 44 (42.2)	36 - 41 (38.8)
ASSUMPTION (<u>C. t. assumptionis</u>)					
♂ ♂	149 150 154 155	219 222 226 237	25 28.5 28.5 29	37 38.5 39	36 37 38.5
ALDABRA (<u>C. t. insularis</u>)					
♂ ♂	153 154 159	240 242 256	24+28 28	36.5	36.5
♀ ♀	170 174 178 184	254 261 263 265	29 30 30.5 32	38.5 41	39 39
imm. ♀	159	203	30	37	40
○	166	199+	30	40	33

Notes: Only measurements of sexed, apparently adult, specimens included, except for the last two under insularis. Extra measurements (of wing, tail, culmen only) of assumptionis and insularis were supplied by Dr G. E. Watson from material in the Smithsonian Institution. No female of C. t. assumptionis has been available.

bars of dusky on each. However, an unsexed specimen collected by Cherbonnier in May, which I have been lent, and also in nonbreeding dress, agrees better with nominate toulou.

There does not appear to be any definite colour-difference between the three populations. Nicoll (1906, 694) states that assumptionis differs from insularis by its smaller size and by being darker on the wings and mantle. The difference in size is that between males and females. That in colour would appear to be due to the fact that the adult female of insularis which he collected has the wing-coverts very worn, so that the chestnut has become unusually pale.

Insularis seems only to be separable from nominate toulou by its longer tail, while wing-lengths average longer. It should be emphasised that all tails measured were considered complete, the only doubtful one in this respect being the unsexed specimen of insularis shown separately in Table 8. Assumptionis is intermediate in tail length. Its validity is dubious, and it is possible that it no longer exists (Vesey-FitzGerald 1940, 487, saw one bird on Assumption in 1937).

Finally, the following particulars may be given here for the male of insularis collected by Gaymer on 1 December: bill black; legs steel grey; feet steel grey, lighter beneath; iris scarlet with navy blue outer rim; weight 120 gms.

Tyto alba affinis (Blyth) Barn Owl

This owl was introduced into the Seychelles from Africa some fifteen years ago, for an account of the disastrous effects of which, see Blackman (1965). The species is only otherwise known in the Malagasy Region from Madagascar, the Comoros and Aldabra. The name T. a. hypermetra Grote is sometimes used for these populations. But the only difference from African T. a. affinis is average larger size, as illustrated by wing-lengths. There is so much overlap in this respect that there is no justification for separating hypermetra from affinis (Benson 1960a, 59). Benson (1963a) has discussed five specimens from Aldabra, which show this average tendency to large size, like material from Madagascar and the Comoros. Aldabra was probably colonised via the latter.

Abbott (in Ridgway 1895, 533) found it rather common on Aldabra, and occasionally saw it in the daytime. It is curious that, apart from one specimen collected in 1906 (Benson 1963a), there is no subsequent record. However, it presumably still exists on Aldabra, as a breeding resident, but has been overlooked.

Caprimulgus madagascariensis aldabrensis Ridgway Madagascar Nightjar

This species is only known outside Madagascar from Aldabra, and the only other representative of the Caprimulgidae in the Malagasy Region is C. enerratus, confined to Madagascar. Enerratus inhabits heavy forest, madagascariensis more open country (Rand 1936, 411-412). As with Falco newtoni, C. madagascariensis may not have been able to colonise the Comoros because in the past they were too heavily forested.

The only specimen of C. m. aldabrensis Ridgway (1894, 373) personally examined, a female in Cambridge, is distinguishable from a long series of nominate madagascariensis by its paler, more greyish white crown and

whether the Aldabra and Gloriosa populations were separable from parvirostris. However, Rand (1960, 296) recognises not only parvirostris but also H. m. grotei (Friedmann) for Gloriosa and rostratus for Aldabra.

Previously I was able to examine only four specimens from Aldabra, three of which were in very worn plumage. I have now had in addition a specimen in Cambridge, three on loan collected by Voeltzkow, and four collected by Gaymer. Rostratus is separable from nominate madagascariensis and parvirostris in being somewhat more brownish in tone on the upperside and thighs. Still only the one specimen from Gloriosa has been available, judging from which the population of this island is inseparable from nominate madagascariensis. The difficulty in separating the Malagasy forms of this species must be emphasised. Thus Moreau (1966, 349) is doubtful whether the Comoro and Madagascar birds are separable. On the face of it, colonisation of these islands north of Madagascar has been very recent. Aldabra may have been colonised from the Comoros rather than via Astove, Cosmoledo and Assumption, where the species is unknown.

Measurements in mm. of the 12 Aldabra specimens which have now been available may be summarised as follows:

Wing	Tail	Culmen from base
103 - 115 (108.3)	*88 - 99 (93.2)	21 - 25 (23.2)

*Smallest figure in Benson (1960a, 67) omitted, tail incomplete.

These figures show no substantial difference from those provided by Benson (1960a, 67) for other islands.

The four specimens collected by Gaymer, all males, weighed 41, 41, 42, 46 gms. He has provided the following further figures for 19 other specimens mist-netted and subsequently released: wing 102 - 114 (107.9) mm.; tail 87 - 100 (94.0); culmen (exposed part) 18 - 21 (19.8) mm.; tarsus 18 - 27 (22.7) mm.; weight 35 - 48 (41.1) gms. He records the bill as orange, dark at tip, black nares; legs and feet brown; iris mid-brown. There is no substantial difference between this description and that by Benson (1960a, 67) for the soft parts of the Comoro specimens.

Dicrurus aldabranus Ridgway Aldabra Drongo

D. adsimilis (Bechstein) is very widespread in Africa, while the closely allied D. forficatus (Linnaeus) inhabits Madagascar and Anjouan, in the Comoros. D. fuscipennis (Milne-Edwards and Oustalet), of Grand Comoro, may have been derived directly from adsimilis, as was possibly also D. waldeni Schlegel, of Mayotte, though in the shape of the tail it resembles the Asiatic D. macrocercus (Vieillot) (see Vaurie 1949, 221, 234).

Elsewhere in the Malagasy Region, the only representative of the Dicruridae is D. aldabranus, confined to Aldabra. It has invariably been regarded as a full species, and this seems justified. The dingy grey upperside and mainly white underside of two immature specimens in the British Museum is most distinctive, and for full details see Vaurie (1949, 231). By contrast, immature

specimens of adsimilis and forficatus are black above, and black below with mere fringes of white (no immature specimen of fuscipennis or waldeni has been available). Aldabranus is also remarkable in that the frontal feathers, instead of being short and inconspicuous as in adsimilis, are relatively long, curving forward and slightly upward, thus showing a tendency towards forficatus. In size, as shown by wing-length, aldabranus is smaller than any other form inhabiting the Malagasy Region except D. f. forficatus of Madagascar, see the measurements in Vaurie (1949). Possibly it has been derived from Madagascar via Gloriosa and the remainder of the Aldabra archipelago, where however the family is unrepresented. If so, either the frontal feathers have since become reduced in length; or, when colonisation occurred, the development of the frontal feathers in forficatus was less than it is now.

Nectarinia sovimanga aldabrensis (Ridgway) Souimanga Sunbird

Williams (1953a) has revised the subspecies of this sunbird, and the following findings differ in no more than minor detail. N. s. sovimanga (Gmelin) occupies the whole of Madagascar except for the southwest, where it is replaced by N. s. apolis (Hartert), in which the yellow tones are more whitish and the olive more greyish, no doubt a reflection of the relatively arid climate in which it lives. The nominate form also occurs on Gloriosa, and the species has colonised the Aldabra archipelago. Unfortunately the only two specimens collected on Astove cannot be traced (Williams 1953a, 503) though it was still plentiful there in 1964 (Bourne 1966), and it is most desirable that further specimens should be collected. The adult males of the subspecies inhabiting Cosmoledo (N. s. buchenorum (Williams)), Assumption (N. s. abbotti (Ridgway)) and Aldabra (N. s. aldabrensis (Ridgway)) all have more extensive black below the reddish maroon chest-band than in N. s. sovimanga, in which the black does not extend for more than about 10 mm., barely reaching the upper abdomen. In buchenorum the whole of the underside below the chest-band is black, and this is almost so in abbotti, though there is just a trace of dull olive on the lower abdomen. Even aldabrensis has more extensive black than in nominate sovimanga, though the whole of the lower abdomen is dull olive. Buchenorum can also be distinguished from the other subspecies by the more brownish, less reddish tone of the chest-band. Williams indicates that the chest-band is broader in aldabrensis and abbotti than the other subspecies, though I cannot perceive this. Nominate sovimanga and aldabrensis have the lower back olive, the rump and upper tail-coverts black without any metallic green. Abbotti differs from these two in having metallic green tips to the feathers of the rump and upper tail-coverts. Buchenorum is like abbotti in this respect, but in addition has the lower back black instead of olive. Thus the tendency to blackening has its extreme in buchenorum.

Considering now females as well as males, the olive tones in aldabrensis are duller than in nominate sovimanga, the upperside brownish in tone, the abdomen less yellowish. This also applies to abbotti, the only available female of which seems indistinguishable from females of aldabrensis. In buchenorum this tendency to dullness is still more pronounced, two females (one of them a juvenile, with skull-ossification not started) being grey above, with barely a tinge of olive, and yellow wash on the abdomen hardly apparent. It is curious

that this blackening in the male, and reduction of olive and yellow in both sexes, should find their extremes on Cosmoledo rather than on Aldabra, geographically the more remote.

Possible N. dussumieri Hartlaub of the Seychelles is also derived from sovimana stock. Dussumieri is still duller than buchenorum. In the male, metallic is confined to blue on the chin and throat, and a trace on the shoulder, with a slight bluish sheen on the crown. Three specimens showed traces of retention of the maroon chest-band. Yellow (or orange) pectoral tufts are fully retained, and incidentally I agree with Williams (1953b) that they vary in colour individually, in some specimens being a mixture of the two colours, so that there is no case for the recognition of N. mahei (Nicoll). Otherwise both sexes are brown in colour, lacking any olive or yellow tones, though two juveniles in Cambridge have a dull olive wash on the abdomen, and Williams (1953b) mentions traces of olive, and yellowish grey undertail-coverts, in a juvenile available to him.

The following are measurements in mm. of the material examined (sample only of nominate sovimanga measured), in London and Cambridge, including in the case of dussumieri also that in Paris:

	Wing	Tail	Culmen from base
<u>N. s. sovimanga</u> (Madagascar, Gloriosa)			
14 ♂♂	51 - 56 (54.1)	33 - 40 (36.6)	20.5 - 24 (22.1)
16 ♀♀	47 - 52 (49.4)	28 - 33 (31.1)	19 - 21.5 (20.4)
<u>N. s. buchenorum</u> (Cosmoledo)			
1 ♂	54	39	20
1 ♀	51	33	17
1 juv. ♀	50	31	16
<u>N. s. abbotti</u> (Assumption)			
5 ♂♂	53 55 (53.8)	37 - 41 (39.2)	20 - 21 (20.2)
1 ♀	49	34	16+
<u>N. s. aldabrensis</u> (Aldabra)			
7 ♂♂	52 - 54 (52.4)	35 - 39 (37.3)	19 - 20 (19.7)
6 ♀♀	47 - 50 (48.4)	30 - 35 (32.2)	18 - 19 (18.3)
<u>N. dussumieri</u> (Seychelles)			
35 ♂♂	59 - 65 (62.1)	37 - 44 (40.3)	22 - 25 (23.7)
6 ♀♀	56 - 58 (57.1)	35 - 37 (35.7)	22.5 - 24 (23.1)

It will be seen that, apart from the colour-differences, the Aldabra archipelago forms all have a shorter bill than nominate sovimanga. Dussumieri is altogether larger. If it is derived from sovimanga stock, as it probably is, this could be a reflection of the same slight tendency to gigantism as in Caprimulgus madagascariensis aldabrensis.

Gaymer gives the weight of a male of N. s. aldabrensis which he collected as 7.5 gms., and of a female as 6.0 gms. The following measurements in mm. have been supplied by him for other specimens mist-netted and subsequently released:

	Wing	Tail	Culmen (exposed part)
2 ♂ ♂	54 55	31 38	16 16.5
3 ♀ ♀	47 49 49	25 28 31	13 16 16

One of these two males weighed 7.5 gms., the three females 5.5, 6.0, 7.5 gms. Gaymer records the bill as black in males, very dark brown in females, the feet as black and the iris as very dark brown in both sexes.

Males of aldabrensis collected in March, July, October and November are all in full metallic dress, as are males of abbotti collected in March and one of buchenorum (the type) on 15 April. Rand (1936, 470) gives evidence of nominate sovimanga breeding in September-December. There may not be a dull off-season dress in any subspecies. In the British Museum there are two males of nominate sovimanga in full dress collected in May, two in June, nine in July and three in August.

Finally, a word is necessary in regard to N. comorensis (Peters), of Anjouan, in the Comoros, which Williams (1953a, 503) suggests may prove to be conspecific with sovimanga when specimens are available from Astove. Undoubtedly comorensis is derived from sovimanga. Superficially it closely resembles N. s. buchenorum. But in particular the male has red instead of yellow pectoral tufts, and it also has the abdomen black slightly glossed bluish instead of matt brownish black, while the female is brighter olive above than in any of the Aldabra archipelago subspecies. It is unlikely that colonisation of this archipelago was via the Comoros. On Grand Comoro and Moheli, and on Mayotte, there are other very distinct small species, respectively N. humbloti (Milne-Edwards and Oustalet) and N. coquereli Verreaux, the origin of which is discussed in Benson (1960b, 196, 202-203). When specimens are available from Astove, it is almost certain that they will prove to represent sovimanga rather than comorensis.

Zosterops maderaspatana aldabrensis Ridgway Madagascar White-eye

The taxonomy of the Zosteropidae of the Ethiopian and Malagasy Regions as a whole has been very fully discussed by Moreau (1957), from whom the details which follow have been derived, as augmented for the Comoros by Benson (1960a, 88-91) and confirmed by recent personal examination. In Madagascar the only representative of the family is Z. maderaspatana (Linnaeus). This grey-bellied species has colonised Anjouan and Moheli in the Comoros, each of which has its own recognisable subspecies, while Mayotte is inhabited

by the very distinctively coloured Z. mayottensis Schlegel, and Grand Comoro by two forms considered of African origin. Z. m. maderaspatana of Madagascar exists undifferentiated on Gloriosa, and perhaps also on Cosmoledo and Astove (Moreau 1957, 402), but material is insufficient to decide the point for certain. Curiously, the family is apparently unrepresented on Assumption. Z. m. aldabrensis differs only from nominate maderaspatana in being yellower above, and relatively longer tailed and shorter winged. Measurements in mm. of two males which were not available to Moreau (1957, 428), the first in Cambridge, the second collected by Gaymer, are as follows:

Wing	Tail	Culmen from base
52	40	11.5
54	39	12.5

Gaymer has provided the following further particulars for his specimen: bill, upper mandible charcoal grey, lower pale blue-grey; legs pale blue-grey, likewise feet, with lemon soles; iris light brown, pupil with dark blue sheen; weight 6.5 gms.

In conclusion, aldabrensis was presumably derived from Madagascar, via Cosmoledo and Astove rather than via the Comoros.

Foudia eminentissima aldabrana Ridgway Red-headed Forest Fody

The details which follow in this paragraph are derived from Moreau (1960), the characters of aldabrana being confirmed from personal examination of material. In Madagascar and the Comoros this ploceine genus, confined to the Malagasy Region, is represented by two species, F. eminentissima Bonaparte inhabiting evergreen forest and F. madagascariensis (Linnaeus) in drier, more open country. On Mauritius there is an analogous segregation between F. rubra (Gmelin) and madagascariensis. The former is the local representative of eminentissima, from which it differs mainly by its more slender, insectivorous type of beak. Other, more distinct, species inhabit Rodriguez (F. flavicans Newton) and the Seychelles (F. sechellarum Newton). Madagascariensis is also known from the Amirantes and the Seychelles, but outside Madagascar may be a recent introduction by human agency, and shows no subspecific variation. Eminentissima is otherwise only known from Aldabra, and the genus is unknown on Assumption, Cosmoledo, Astove or Gloriosa. F. e. aldabrana is a well marked subspecies, presumably derived from the Comoros, each island of which has its own subspecies. In F. e. algondae (Schlegel) of Mayotte, the driest of the Comoros, the male has the red of the head less crimson, more orange in tone than on the other three islands. This is accentuated still further in aldabrana, and may be connected with a still drier, less shady environment. Also, melanin in the contour feathers is less intense, so that the ground-colour of the streaky back is paler, and the olive-grey of the underside is replaced by pale dull yellow. Two males which have been available to me have the olive of the mantle largely replaced by red, and Benson (1960a, 100) notes that most Comoro males have a few crimson feathers to be found in part of the plumage. The bill of aldabrana is stouter than in any other subspecies, possibly in adaptation to a seed rather than an insect diet.

According to Moreau (1960, 38), and see also Benson (1960a, 101), it is uncertain whether in the humid Comoro environment there is a dull nonbreeding plumage. However, Moreau (1960, 34) quotes Rand that there is in *F. e. omissa* Rothschild. As to Aldabra, a male in Cambridge collected by Abbott in October is in breeding dress, the red fully developed. This is also confirmed by Ridgway (1895, 538), who quotes Abbott that nesting takes place in November, December and January (and see also Bendire 1894). Two males collected by Gaymer on 14 and 30 November are in breeding dress, as are four collected by Nicoll in mid-March. Nicoll (1908, 116) also indicates that there were many such birds at the time of his visit, while Morris (1963), who visited Aldabra in January and February, from his account obviously also saw males in breeding dress. However, two males lent to me, collected by Cherbonnier on 12 and 20 May, are strikingly different. The first has no sign of red, the second has a small amount on the head and chest. No less remarkable is it that in both the olive tones of the mantle are replaced by rufous brown, this also being the coloration of the crown (obscurely streaked with dusky) and the rump. The chin, throat and abdomen are dull yellow, of the same tone as on the abdomen of males in breeding dress, and there is a heavy brownish wash across the chest and on the flanks. Also, the bill, instead of being black, is dark brown in the first specimen, paler horn in the second. Two females collected by Cherbonnier in May, which I have also been lent, are similar to the first male, in their rufous brown tones above and brownish wash on the chest and flanks. But a female collected by Nicoll on 14 March has olive tones above, and the whole underside dull yellow, with some olive (not brownish) wash rather strictly confined to the flanks. All three of these females have the bill horn coloured. There are two further specimens collected by Gaymer on 14 November, similar in all respects to Nicoll's female. One is sexed as a male, the other as a female. But see the measurements below, they have wings 78, 80, tails both 53 mm. Thus they seem to be both males, and to have failed to develop into breeding dress. They are placed accordingly in the measurements.¹

It seems clear that, whatever may be the situation in the humid Comoros, on Aldabra there are well-marked seasonal plumage changes in both sexes, the colour of the bill of the male also changing.

Moreau (1960, 35) gives measurements for only four males of *aldabrana*, and it is worth giving them for all of the material now examined (in mm.):

	Wing	Tail	Culmen from base
11 ♂ ♂	78 - 84 (80.3)	48 - 57 (52.5)	17 - 20.5 (18.6)
3 ♀ ♀	72 74 74	43 47 47	18 18.5 20

The tail/wing ratio for males works out at 65, the same figure as arrived at by Moreau. It is curious that, although males have longer tails and wings than females, the bill measurements are so similar. The Comoro figures in Benson (1960a, 100) show a sexual disparity in all three series of measurements. How-

¹ Gaymer states, however, that the specimen with wing 80 mm. was a female with large gonads - Editor.

ever, only three females of aldabrana were available. Nevertheless, neither is there any indication from the further figures given below of any difference in the bill.

Gaymer gives the weights of the four specimens which he collected as 21, 24, 25, 26 gms. The following summary has been compiled from figures in mm. supplied by him for specimens mist-netted and subsequently released, all caught in November:

	Wing	Tail	Culmen (exposed part)	Notes
10 ♂♂	78 - 85 (80.9)	49 - 58 (53.7)	16 - 19 (17.6)	(a)
juv. ♂♂	62 76 76 83	46 46 48 52	17 18 18 19	(b)
13 ♀♀	68 - 75 (72.1)	43 - 53 (47.8)	16 - 19 (17.4)	}
9 ○○	76 - 79 (77.3)	45 - 52 (50.0)	16 - 19 (17.3)	

Notes: (a) in breeding dress.

(b) in female-like dress, but showing traces of red in plumage, so presumably males.

(c) wholly in female-like dress, but those in second series perhaps too long-winged to be females.

Weights in gms. of these four series were respectively as follows: 22.5 - 27 (25.7); 24, 25.5, 27.5, 27.5; 21 - 27.5 (24.8); 23 - 27.5 (24.9).

(b) Migrants

(i) Already recorded

Porzana marginalis Hartlaub Strip Crake

There is a male in the American Museum of Natural History, collected by F. R. Mortimer on West Island (Ile Picard), Aldabra, 10 December 1904 (Benson 1964, 56). This occurrence may be considered as accidental, and is the only record known to me from the Malagasy Region. Benson (1964, 56) has presented data suggesting that this species is migratory in southern Africa, only normally present during the rains, when it breeds. This particular specimen was probably blown off course on southward migration.

Squatarola squatarola (Linnaeus) Grey Plover

Collected by Nicoll (1906, 703, under the name S. helvetica) on Aldabra, and reported as common. At least one seen by Morris (1963). Probably regular from late September to early April, as in Madagascar (Rand 1936, 351), and see also Benson (1960a, 43) for the Comoros.

Charadrius leschenaultii Lesson Great Sand Plover

Collected by Abbott on Aldabra, and noted as "rather common" (Ridgway 1895, 527, under the name Aegialitis geoffroyi). There is also a specimen in the British Museum collected in 1906. Seen by Morris (1963). Dupont (1907) lists it from throughout the archipelago. Rand (1936, 354) found it fairly common in Madagascar from September to early May, and Benson (1960a, 43) found it on all four islands in the Comoros.

Numenius phaeopus phaeopus (Linnaeus) Whimbrel

Collected by Abbott on Aldabra, recorded as common (Ridgway 1895, 528). Also collected there by Voeltzkow (Berlepsch 1899, 494). Dupont (1907) lists both N. phaeopus and N. madagascariensis (presumably meaning N. arquata) from throughout the archipelago. Fryer (1911, 420), who was in the archipelago from August to February, states that both N. phaeopus and arquata were abundant. However, in Madagascar and the Comoros the former outnumbers the latter (Rand 1936, 348; Benson 1960a, 44). Bourne (1966) records hundreds of "curlews" Numenius sp. A solitary "curlew" seen by Morris (1963) may also have been N. phaeopus.

Numenius arquata orientalis Brehm Curlew

Under the heading N. madagascariensis, though presumably N. arquata was intended, found by Abbott to be not common, though no specimen was collected (Ridgway 1895, 527). See also other possible records under N. phaeopus. N. a. orientalis has been collected in the Comoros (Benson 1960a, 44), and the occurrence of N. a. arquata (Linnaeus) seems unlikely, see especially Rudebeck (1963, 499-501).

Tringa nebularia (Gunnerus) Greenshank

A specimen collected by Abbott on Aldabra (Ridgway 1895, 527) appears to be the only record from anywhere in the archipelago, other than the listing of it from throughout by Dupont (1907, under the name T. glottis). It may not be so very uncommon, for Benson (1960a, 44) gives a number of records from the Comoros, including one of a flock of 40, and Rand (1936, 349) found it in Madagascar from late November to early March.

Tringa glareola Linnaeus Wood Sandpiper

One specimen collected by Abbott on Aldabra, and he noted it as "rather scarce" (Ridgway 1895, 527). This appears to be the only record from the Malagasy Region, so that it must have been an accidental occurrence. This species prefers inland marshes to sea-coasts.

Actitis hypoleucos (Linnaeus) Common Sandpiper

One specimen collected by Abbott on Aldabra, but he found it "not common" (Ridgway 1895, 527). Dupont (1907) lists it from throughout the archipelago. It may not be rare, for Benson (1960a, 44) found it fairly common in the Comoros, Rand (1936, 349) records it from August to March in Madagascar, and it is even abundant and regular on Réunion and Mauritius (Berlioz 1946, 35).

Arenaria interpres interpres (Linnaeus) Turnstone

Collected by Abbott on Aldabra, where very common (Ridgway 1895, 527). Also collected there by Cherbonnier in May. Recorded by Fryer (1911, 420) as abundant in the archipelago throughout his stay, from August to February. In

March 1964 thousands were seen on Aldabra, also large numbers on Cosmoledo and 100 on Assumption (Bourne 1966). Dupont (1907) lists it from throughout the archipelago. Rand (1936, 351) found it fairly common in Madagascar, from late September to early May, while Benson (1960a, 43) gives various records from the Comoros.

Crocethia alba (Pallas) Sanderling

Collected by Abbott on Aldabra, said to be common (Ridgway 1895, 527, under the name Calidris arenaria). Nicoll (1906, 704), in dealing with the next species, mentions seeing it there, and (1908, 118) saw "a few". Although Benson (1960a, 44) gives only two records from the Comoros, Rand (1936, 350) found it fairly common in Madagascar from late September to early March.

Erolia testacea (Pallas) Curlew Sandpiper

Abbott records a small flock, and collected two specimens (Ridgway 1895, 527, under the name Tringa ferruginea). Nicoll (1906, 704, under T. subarquata) saw several, and collected a specimen. Five "dunlins" seen by Morris (1963) were probably this species. Benson (1960a, 43, under Calidris ferruginea) gives a few records from the Comoros, and Rand (1936, 349) found it fairly common from October to early March in Madagascar.

Eurystomus glaucurus glaucurus (Müller) Broad-billed Roller

At least four specimens have been collected on Aldabra: one in November 1906 (Benson 1960a, 55); one by Abbott on 10 December 1892, and one by Mortimer on 24 December 1904 (Benson 1963a); a female by Gaymer on 9 December 1964, wing 197 mm. Abbott (in Ridgway 1895, 534) was informed of several others previously seen there. Vesey-FitzGerald (1940, 488) saw one on Cosmoledo, 6 October. There are at least four specimens from the Comoros, one of which is dated 7 November, one 10 April, the others being undated (Benson 1960a, 55; 1963a).

According to Moreau (1966, 249-250), this subspecies (there are two other, smaller, ones which breed in Africa, see White 1965, 237) is present in Madagascar from October to March, breeding in October and November. The main "winter" quarters are probably in the Congo. Records from Malawi and Zambia are all for October-November and February-April, suggesting that the birds are only on passage through these territories. This must also apply to the Aldabra, Cosmoledo and Comoro records. Such a passage may be regular in small numbers.

Apus apus apus (Linnaeus) Eurasian Swift

Abbott collected a specimen on 1 December (Ridgway 1895, 534) which I have been lent. It agrees with material in the British Museum of nominate apus rather than of A. a. pekinensis (Swinhoe). The label is endorsed "The only one observed - undoubtedly accidental straggler". This appears to be the only record of the species from the Malagasy Region, though it is plentiful as a visitor to southern Africa, whence there is no lack of material of both subspecies (Irwin and Benson 1966, 15).

Riparia riparia riparia (Linnaeus) Sand-Martin

One was collected by Abbott on Aldabra on 2 December, another by him on Gloriosa on 29 January (Benson 1963a). Although this is a common palaeartic migrant to southern Africa, it is probably merely casual in the Malagasy Region, the only other record traced being a specimen from Lac Iotry, Madagascar (Rand 1936, 427).

Phedina borbonica madagascariensis Hartlaub Mascarene Martin

Abbott collected a specimen on Aldabra on 19 November, listed by Ridgway (1895, 535) as P. borbonica, and further reported on by Benson (1963a). No doubt it was on passage, even though the breeding season in Madagascar includes October and November (Moreau 1966, 252). As Moreau points out, the movements of this bird are not understood. Small numbers have been reported from Pemba Island in September-March, prior to 1930. The only other African record is from Lake Chilwa, Malawi, where hundreds were seen between 28 June and 30 July 1944.

Motacilla flava lutea (Gmelin) Yellow Wagtail

Abbott collected a male on Aldabra on 20 December (Ridgway 1895, 535, under M. campestris). It is evidently by a slip of the pen that Watson, Zusi and Storer (1963, 198) place this record under the Tawny Pipit Anthus campestris. I have been lent this specimen, the label of which is endorsed "accidental visitor". Indeed this seems to be the only record of the species from the Malagasy Region. The specimen is in full adult dress, except for some brownish feathers on the underside. It has the crown mainly green, with yellow restricted to the fore part and the forehead, and a well-developed yellow eyestripe. Thus in colour it agrees with the description by Vaurie (1959, 75, 78) of M. f. flavissima Blyth rather than lutea. However, the view of Dowsett (1965) that such specimens from eastern Africa are individuals of lutea showing the characters of flavissima is accepted, and applies also to Abbott's specimen.

Muscicapa sp. Flycatcher

Under this heading Abbott (in Ridgway 1895, 535) mentions seeing a small grey flycatcher with white rump on Aldabra in December. It is impossible to make any suggestion as to the identity of this bird, which might not have been a muscicapid at all.

(ii) Not yet recorded, but likely to occur

Ardeola idae (Hartlaub) Madagascar Squacco Heron

According to Moreau (1966, 249), this species is said to breed in Madagascar in the rains, and occurs in tropical eastern Africa as an off-season visitor during May to October. Benson (1960a, 34) collected it on Mayotte, in the Comoros, in October, presumably on passage back to Madagascar. It is likely to occur also on Aldabra on passage.

Falco eleonora Gén  Eleonora's Falcon
Falco concolor Temminck Sooty Falcon

According to Moreau (1966, 68) these two species winter entirely in Madagascar. Nicoll (1906, 680) records a specimen of F. subbuteo from Mayotte, in the Comoros, but it may well be an eleonora (Benson 1960a, 105). There is an undated specimen of F. concolor from Tanga, in coastal north-eastern Tanzania, in Paris, and Reichenow (1900, 630) gives two other records of this species from eastern Tanzania, and one from Mozambique. Both these palaeartic breeders may well pass over Aldabra.

Charadrius hiaticula tundrae (Lowe) Ringed Plover

Rand (1936, 352) records it from Madagascar during December to March, and Benson saw it regularly from late August until he left the Comoros in late November. It may well be regular on Aldabra.

Limosa lapponica lapponica (Linnaeus) Bar-tailed Godwit

Since Rand (1936, 349) refers to its occurrence in the Seychelles and Madagascar, it presumably occurs occasionally on Aldabra.

Tringa totanus (Linnaeus) Redshank

A record by Dupont (1907, under the name T. glottis) for the Greenshank T. nebularia has already been referred to under that species. Dupont also lists T. nebularia, which he calls "Redshank", from Aldabra. It would seem that there has been a clerical error, and that both records refer to the Greenshank T. nebularia. Watson, Zusi and Storer (1963, 30) do not give any occurrence of T. totanus nearer than the Maldives. It is true that Dawson (1963a, 7) mentions it from the Seychelles. But its occurrence anywhere in the western Indian Ocean south of the equator requires proper substantiation, and moreover Rudeback (1963, 492) finds that south of 10^oN. in Africa it is scarce and irregular.

The necessity for the inclusion of this species has arisen from Dupont's apparent clerical error. It can only be extremely rare on Aldabra.

Xenus cinereus (G ldenstaedt) Terek Sandpiper

Rand (1936, 348) found it not uncommon in Madagascar, and there is even a specimen in Cambridge from Mauritius, collected on 13 January 1864. Benson (1960a, 44) gives one record from the Comoros. Its occasional occurrence on Aldabra is very probable.

Erolia minuta (Leisler) Little Stint

Newton (1867, 343) found it common on Mah , in the Seychelles, and there is a specimen collected there by him in Cambridge. Benson (1960a, 44) collected one on Grand Comoro, and Rand (1936, 350) gives one record from

Madagascar. It must occur occasionally on Aldabra, but its listing by Dupont (1907, under Tringa minuta) from throughout the archipelago requires confirmation.

Glareola ocularis Verreaux Madagascar Pratincole
Glareola maldivarum Forster Eastern Collared Pratincole

Moreau (1966, 251) refers to Galachrysis nuchalis, no doubt really meaning Glareola acularis, as quite common in coastal Kenya in August and September. Benson (1960a, 45) collected a specimen on Mayotte, in the Comoros, on 28 October. A. D. Forbes-Watson tells me he saw one on the Dzaoudzi airstrip, Mayotte, on 24 October 1965, and five days earlier three on the Moroni airstrip, Grand Comoro. Presumably all these Comoro records refer to birds on delayed passage back to Madagascar. It is likely to also occur on passage on Aldabra.

G. maldivarum, treated by Watson, Zusi and Storer (1963) as conspecific with pratincola, is known as an occasional visitor from the palaeartic to the Seychelles (Benson and Roux, in press) and has also been recorded from Mauritius (Rountree and others 1952, 179). It could also occur on Aldabra.

Cuculus canorus Linnaeus Grey Cuckoo

Nicoll (1906, 700) saw a cuckoo on Aldabra which he thought was this species. Its occasional occurrence as a migrant from the palaeartic is possible. Benson and Roux (in press) record such a specimen from Mahé, in the Seychelles. Abbott (in Ridgway 1895, 514) also gives a very probable record from Mahé, though he did not retain a specimen.

Cuculus poliocephalus rochii Hartlaub Lesser Cuckoo

According to Moreau (1966, 249), the Madagascar breeding subspecies is present in most of the island only from the end of September to April, and has been recorded from Kenya, Uganda, Tanzania, and the south-eastern Congo as a non-breeding visitor from June to September. So far there is no record from any of the intervening islands between Madagascar and eastern tropical Africa. But its occurrence on passage, including Aldabra, is likely.

Collocalia francica (Gmelin) Cave Swiftlet

Abbott saw a Collocalia sp. on Aldabra several times (Ridgway 1895, 535). Possibly the form frequenting Mahé, in the Seychelles, C. f. elaphra Oberholser, occurs occasionally on Aldabra. The genus is only otherwise represented in the Malagasy Region on Mauritius and Réunion, and its status in Madagascar is problematical (Moreau 1966, 331).

Merops superciliosus superciliosus Linnaeus Blue-cheeked Bee-eater

As Moreau (1966, 251) indicates, this subspecies, which breeds in Madagascar (and in tropical eastern Africa), has for long been regarded as a migrant between Madagascar and Africa. But he concludes that large-scale migration

from Madagascar remains to be proved. However, it probably occurs occasionally as a wanderer on Aldabra, especially as it breeds on Mayotte, in the Comoros (Benson, 1960a, 59).

Hirundo rustica Linnaeus Swallow

J. H. Crook has a record of it as a straggler to Frégate, in the Seychelles, in November (Lousteau-Lalanne 1962, 30). Rand (1936, 427) saw six or seven at Tulear, Madagascar, in January. This species is very plentiful as a visitor from the palaeartic to southern Africa, and may be expected to occur occasionally on Aldabra.

(c) Of Uncertain Status

Bubulcus ibis (Linnaeus) Cattle Egret

The only definite record traced from Aldabra is of one seen by Abbott (Ridgway 1895, 531), though Gaymer states that they are a recent arrival, and that in 1964 about 100 birds were roosting at Takamaka, in the eastern part of Aldabra. Bourne (1966) gives a record of six seen on Astove. With any development of the atoll, a breeding colony could well become established.

It is impossible to suggest whence the birds seen on Aldabra and Astove might have emanated. The nominate subspecies breeds in Madagascar (Rand 1936, 332) and on Anjouan, in the Comoros (Benson 1960a, 33), while the populations of the Amirantes and the Seychelles may have to be known as B. i. seychellarum (Salomonsen), despite the strictures on its validity by Dawson (1966b). As pointed out by Benson (1960a, 33), two of the specimens on which Salomonsen based his description are from the remote Bird Island, in the Seychelles. The third, in Paris, which I examined in 1966, is from Ile Cousine, and its wing measures 236 mm. only. Unfortunately the buff coloration is confined merely to a trace on the forehead, and I found it impossible to decide whether it was more golden cinnamon, as claimed for seychellarum, or buff, as in the nominate form.

Ridley and Percy (1958, 31, 45) found this species to be a serious predator of eggs on Desnoeuufs Island, in the Amirantes, and to a lesser extent on Bird Island. They suggest that it was introduced at some time, but were unable to trace when or from where. If it was introduced, it seems odd that Abbott (in Ridgway 1895, 531) found it already plentiful in such remote places as Coetivy and the Amirantes 75 years ago. It may have established itself unaided and have evolved into a recognisable subspecies. If so, the coloration of seychellarum suggests a derivation from the Asiatic B. i. coromandus Boddaert. If the Asiatic Ixobrychus sinensis could establish itself unaided in the Seychelles as would appear to be the case (Benson, in preparation), there seems no reason why Bubulcus ibis should not also achieve this (and in the Amirantes). Further material is required of the latter species in order further to assess the validity of seychellarum.

Egretta alba melanorhynchos (Wagler) Great White Heron

Bourne (1966) refers to egrets which were abundant on Cosmoledo, and were evidently E. garzetta. Also present were five larger white birds which could have been E. alba, though the description of the bottom of the feet as orange is puzzling. One would expect the colour to be black, like the remainder of the feet and the legs. But be that as it may, it is likely that this species occurs occasionally as a wanderer, and might even establish itself, in the Aldabra archipelago, as it breeds on Moheli, in the Comoros (Benson 1960a, 32).

Phoenicopterus ruber roseus Pallas Greater Flamingo
Phoenicopterus minor Geoffroy Lesser Flamingo

Abbott (in Ridgway 1895, 529) collected five specimens of a flamingo on Aldabra, which he thought was a breeding resident, there probably being between 500 and 1,000 birds on the atoll. But Nicoll (1906, 703) in his admittedly short stay did not see any, and was also informed that there was no breeding population. Dupont (1907, 23) records flamingos from Aldabra "all along the South East and South on the shores of the lagoon in numerous flocks of several hundreds". In his list he cites P. erythraeus, presumed to be the same as P. ruber roseus. Possibly the specimen dated October 1906 in the British Museum, mentioned below, was collected by him, since Dupont was on Aldabra in that month. Fryer (1911, 419) refers to the presence of a resident population of P. minor on Aldabra. According to Gaymer (1966), about fifty flamingos live in the southeast of the atoll, and probably breed there. He suggests that they belong to a new subspecies of P. ruber. Watson, Zusi and Storer (1963, 194) consider that five specimens (undoubtedly those collected by Abbott) appear aberrant, and refer them to P. ruber subsp.

Watson has most kindly lent me one of these five specimens, a male, consisting of a head and whole skin of the body as well. There is another such (unsexed) specimen in the British Museum, collected on Aldabra in October 1906, part of a Howard Saunders Bequest. Their measurements in mm. now follow, together with those of the other four specimens collected by Abbott, which Watson has been so kind as to supply (those of the first male listed were taken by myself from the specimen which I was lent):

	♂	♂	♀	♀	♀	○
Wing	386	356	371	371	355	384
Tail	140	135	134	133	130	138
Tarsus	245	253	265	255	235	275
Culmen (exposed part)	120	115	118	110.5	116	122

These figures agree substantially with those of P. r. roseus provided by Witherby and others (1941, 166). The two Aldabra specimens personally examined, compared to material of this form from Africa in the British Museum, show no difference in either structure or colour. Both appear to be adult. The body-plumage of neither has any of the pink tinge said by Witherby and others to characterise adults, but several other adults also lacked any such tinge. It may

be that the colour varies quite temporarily, according to the food available. Abbott gives the iris of the specimen which I was lent as straw-yellow, and this also agrees quite well with Witherby and others (1941), who give it as lemon-yellow.

Rand (1936, 342) refers a specimen from Lac Iotry, south-western Madagascar, to P. r. antiquorum (= P. r. roseus) without any question, and he states that P. minor is very common there. Griveaud (1960) records only P. ruber from Lac Iotry, estimating the numbers of flamingos there to be between 25,000 and 30,000. The lower photograph on page 38 of his paper is certainly of a P. ruber, not a P. minor.

Satisfactory as it would be in the cause of the conservation of Aldabra to be able to show that an endemic form of Phoenicopterus exists there, I cannot find any such evidence. Dr Watson has also recently written to me to the effect that, despite the comment of Watson and others (1963), he no longer considers Abbott's material separable from P. r. roseus. Nor can I even find any definitive evidence of breeding on Aldabra. It may well be that both P. ruber and minor do so occasionally, particularly as minor as well as ruber is said to occur in Madagascar. So far the only report of the occurrence of P. minor on Aldabra is from Fryer, but it is very possible that he confused it with ruber. It should be emphasised that both species seem highly nomadic and capricious in their places of breeding. Thus Brown (1957) records attempted breeding by P. minor (a few ruber were also present) in north-eastern Northern Rhodesia (now Zambia) in 1955. There is no other such evidence from Zambia, and the attempt was due to unusually dry conditions preceding (see also Benson 1963b, 627).

Milvus migrans parasiticus (Daudin) Black Kite

Abbott collected two specimens on Aldabra, on 2 October and 19 December, stating that kites are occasionally observed but are not common, while he apparently saw it also on Gloriosa, which he visited in September (Ridgway 1895, 525, 533). Nicoll (1906, 687; 1908, 102) saw this species on Gloriosa in March, and regarded it as non-resident. Its status on Aldabra (and Gloriosa) cannot be regarded as certain, but presumably it is non-resident. Elsewhere in the Malagasy Region it is only known from Madagascar (Rand 1936, 381) and the Comoros (Benson 1960a, 36), where it is common. Rand saw an occupied nest in Madagascar in October. In southern Africa it is only normally present, as a breeding visitor, from August to March; see for example White (1965, 58). Although there is no definite evidence, it is reasonable to suppose that this also applies to Madagascar and the Comoros. If this is so, it could pass through Aldabra on its way to and from non-breeding quarters, perhaps in equatorial Africa. However, the dates of Abbott's specimens are not in keeping with this. The possibility cannot be excluded that the odd pair breeds on Aldabra, and perhaps also on Gloriosa.

Dromas ardeola Paykull Crab Plover

Abbott saw "large flocks" on Aldabra, and collected two specimens (Ridgway 1895, 527). It was also collected by Voeltzkow (Berlepsch 1899, 494). Nicoll (1906, 703) saw "enormous flocks" on Aldabra in mid-March. From observations also made in March, Bourne (1966) records "thousands" on Aldabra, and

20 and 40 respectively on Cosmoledo and Assumption. Morris (1963), who made short visits in January and February to Aldabra, records merely "several" and "three". But he might have been unlucky, and not have visited a locality on the atoll where large numbers were congregated. Dupont (1907) lists it from throughout the archipelago.

The status of this species on Aldabra is uncertain. But in view of the large numbers which have been reported it may well breed there. The nearest breeding locality to Aldabra which Benson (1960a, 45) was able to trace was the coast of former British Somaliland, though according to Watson, Zusi and Storer (1963, 115, 121) it may also do so in the Maldives and the Chagos Archipelago.

Corvus albus Müller Pied Crow

This crow has presumably colonised the Malagasy Region from Africa, but from the evolutionary aspect is of no interest, and no subspecies from throughout its wide range has ever been proposed. It definitely breeds in Madagascar and the Comoros, and apparently also does so on Aldabra, Assumption and Gloriosa, though this requires confirmation for Aldabra. It has also been recorded from Cosmoledo and Astove.

Benson (1960a, 87) found it common throughout the Comoros. He saw nestlings in early November, and probably throughout its range in southern Africa and the Malagasy Region it is essentially a pre-rains breeder. Abbott, who was on Aldabra from September to December, found it not common, likewise on Assumption, which he visited in September, yet plentiful on Gloriosa, visited in January and February (Ridgway 1895, 537, under C. scapulatus). While Abbott gives no evidence of breeding on any of these islands, Nicoll (1906, 689) was informed that it was resident on Gloriosa, saw empty nests on Assumption in March (1906, 693), while like Abbott he (1906, 700) found it uncommon on Aldabra, but was only there from 13 to 16 March. It does not appear in the catalogue of specimens collected by Voeltzkow (Berlepsch 1899). Vesey-FitzGerald (1940, 488) states that it is a visitor to Cosmoledo, Astove and Assumption, and nests on Aldabra, but gives no further details. Boulton (1960), who visited Aldabra in November 1959, records it, but gives no further information. Morris (1963), who visited the island twice in January and February, apparently did not see it. Gaymer collected a specimen on 5 December. Dupont (1907) lists it from throughout the archipelago.

In the light of the foregoing, it is remarkable that, as a result of the visit of H.M.S. Owen in March 1964, while Bourne (1966) was unable to give any record from Assumption or Astove, and only one pair from Cosmoledo ("the first for many years"), yet there were "hundreds" on Aldabra. Clearly the status of this crow on Aldabra and neighbouring islands is in need of further investigation. Has it recently increased there, or is there perhaps some movement between the islands? It is my experience in Africa that any extension of human settlement, with an increase in the availability of offal, favours it. The availability or otherwise of suitable tall trees as nesting sites may also be important (see for example Benson 1953, 69). The statement by Vesey-FitzGerald that it breeds on Aldabra should be confirmed, and in the meantime it is best to include the Pied Crow among the species of uncertain status.

(2) Sea Birds

No doubt species additional to those now listed occur occasionally on or around Aldabra, more especially representatives of the families Procellariidae and Hydrobatidae. Such possibilities can be found in Watson, Zusi and Storer (1963, 15-19). In the British Museum there is a specimen of Wilson's Petrel Oceanites oceanicus labelled as from Aldabra, November 1906. However, as it is further stated on the label that it was collected at sea, as far north as "latitude 2°", it evidently was not obtained so very close to Aldabra.

Phaethon rubricauda rubricauda Boddaert Red-tailed Tropicbird

Both Betts (1940, 504) and Vesey-FitzGerald (1941, 530) state that it breeds on Aldabra, but give no details. The latter author also states that it breeds on Cosmoledo. It has been collected on Assumption (Ridgway 1895, 522; Nicoll 1906, 697), and according to Ridgway, Abbott found it breeding there (and on Gloriosa). Dupont (1907) lists it from throughout the archipelago. Gaymer informs me that he found a population probably numbering some hundreds, mainly along the northern part of the lagoon, breeding on small islets under rock ledges or bushes: he found a nest with one egg on November 18. Stoddart tells me that he saw a number on Aldabra when he was there in September and October 1966.

Phaethon lepturus lepturus Daudin White-tailed Tropicbird

Collected by Abbott and by Voeltzkow on Aldabra (Ridgway 1895, 532, under the name P. candidus; and Berlepsch 1899, 496, under P. flavirostris). Morris saw a pair there in January 1962, and 20 were seen in all in March 1964 (Bourne 1966).

Sula abbotti Ridgway Abbott's Booby

There is no record of this species from Aldabra, and it is only known from Assumption and from Christmas Island (near Java). Unfortunately the breeding colony on Assumption was wiped out by labourers employed on guano extraction, and there is no record of its occurrence there since 1936 (Betts 1940, 502). Vesey-FitzGerald (1941, 52) in fact gives the year of its final extirpation as 1926.

Sula dactylatra melanops Heuglin Blue-faced Booby

The only evidence of its occurrence on Aldabra is from Morris (1963), who saw both adults and immature birds. It has been collected on Assumption, while Abbott found a few breeding (Ridgway 1895, 520; Nicoll 1906, 697, under the name S. cyanops). Vesey-FitzGerald (1941, 521) doubted if it still bred on Assumption, due to the depredations of the guano labourers, though he also gave several islands on Cosmoledo Atoll as breeding localities. Bourne (1966) records a few seen on Cosmoledo and Assumption.

Sula sula rubripes Gould Red-footed Booby

Collected on Aldabra (Ridgway 1895, 531; Berlepsch 1899, 495, under the name S. piscatrix), where Abbott found it very abundant. Nicoll (1906, 704) also found it abundant; likewise on Assumption, where he collected two specimens and saw nests with young. There are also specimens in the British Museum collected on Aldabra in October 1906. Vesey-FitzGerald (1941, 522) records nesting on islets in the lagoon of Aldabra, various islands in the Cosmoledo lagoon, and, before the start of guano extraction, on Astove and Assumption, but gives no details. According to Dawson (1966a, 6), it breeds in mangroves on the northern rim of Aldabra, and in mangroves on the inner edges of the islands of Cosmoledo atoll, the nests being made of twigs. Bourne (1966) records three in all seen on Cosmoledo, and thousands of birds, probably mostly this species, seen feeding 10 miles to the north of Aldabra. Stoddart tells me that it was plentiful on Aldabra when he was there in September and October 1966, but in much smaller numbers than the Frigatebirds.

Sula leucogaster Boddaert Brown Booby

One was seen off Aldabra in March 1964 (Bourne 1966). No further evidence has been traced of the occurrence of this species anywhere in the archipelago, though it breeds in the Amirantes (Vesey-FitzGerald 1941, 521; Ridley and Percy 1958, 19, 30).

<u>Fregata minor aldabrensis</u> Mathews	Greater Frigatebird
<u>Fregata ariel iredalei</u> Mathews	Lesser Frigatebird

It is convenient to consider these two species together. Abbott collected F. minor on Aldabra, and found colonies of many thousands, with eggs plentiful in November (Ridgway 1895, 522). He apparently saw both species, since there is mention of "all gradations of size between the two forms". It was evidently also F. minor which Voeltzkow collected, referred to by Berlepsch (1899, 495) as F. aquila. Nicoll (1906) makes no mention of frigatebirds on Aldabra, but saw F. aquila on Assumption, presumably also referring to F. minor. Vesey-FitzGerald (1941, 530) states that both species breed on Aldabra and Cosmoledo. Thousands of frigatebirds "of two sizes" were seen on Aldabra in March 1964 (Bourne 1966), and Stoddart informs me that they nest in very large numbers on the lagoon side of Middle Island, especially near East Channel. He also (Stoddart and Wright 1967a, 1175) describes them diving to drink on the wing at freshwater pools on South Island. Dupont (1907) lists both species from throughout the archipelago.

Lowe (1924, 308, 312) gives details of further specimens from Aldabra, in the British Museum and in the Rothschild collection at Tring. Those which were at Tring are presumably now in the American Museum of Natural History, including the holotypes of aldabrensis and iredalei (Hartert 1925, 275). The only specimens from Aldabra traced in the British Museum are the two of aldabrensis mentioned by Lowe.

Larus fuscus Linnaeus Lesser Black-backed Gull

Dawson (1966a, 8) reports a single bird seen from Aldabra, and this appears to be the only record from the Malagasy Region. Either this species or the southern L. dominicanus has been recorded from Beira, in coastal Mozambique (Benson 1948, 151; Worth 1960, 173). But except in the hand, these two cannot be certainly distinguished from each other. Fuscus is much the more likely on Aldabra.

Hydroprogne caspia Pallas Caspian Tern

There is no record from Aldabra, but this species is mentioned on the strength of sight-records, both during October, from Astove and Cosmoledo (Vesey-FitzGerald 1941, 527).

Sterna albifrons Pallas Little Tern

Dupont (1907, under the name Sterna minuta) lists this species from throughout the archipelago. Dupont's records of S. balaenarum may also refer to S. albifrons. Bourne (1966) records that "thirty small terns that might have been" this species were seen off Assumption on 17 March. Gaymer informs me that he saw perhaps a hundred in November along the northern coast of Aldabra, and rarely in the lagoon, and that it is locally reported to breed.

Sterna sumatrana mathewsi Stresemann Black-naped Tern

Collected on Aldabra (Ridgway 1895, 526; Berlepsch 1899, 496; Nicoll 1906, 704; in all these references under the name S. melanauchen). Thirty seen there in March 1964, likewise three on Assumption (Bourne 1966).

Sterna anaethetus antarctica Lesson Bridled Tern

There is no record from Aldabra, though Vesey-FitzGerald (1941, 526) states that eggs have been found on limestone islets in Cosmoledo atoll in October.

Sterna fuscata Linnaeus Sooty Tern

"Rare in Aldabra", not collected (Abbott, in Ridgway 1895, 496); one specimen collected by Voeltzkow on Aldabra (Berlepsch 1899, 496) (both notes under the name S. fuliginosa). Vesey-FitzGerald (1941, 525) states that it breeds on Wizard Island, Cosmoledo Atoll.

Thalasseus bergii thalassinus (Stresemann) Crested Tern

Abbott found it common on Aldabra, but did not collect a specimen (Ridgway 1895, 526, under the name Sterna bernsteini). Morris (1963) saw terns there which he thought were the next species, T. bengalensis, but were perhaps bergii. Gaymer reports frequently seeing it feeding at Aldabra, in shallow water over the outer reef or in the lagoon, sometimes in small groups, and states that it is locally reported to breed. Dupont (1907) lists both Sterna bernsteini and bergii from throughout the archipelago, but presumably refers to the one species only, now known as T. bergii. There is also a possible record of three seen on Astove (Bourne 1966). Benson (1960a, 45) collected specimens in non-breeding dress in the Comoros during August-November, and records one in breeding dress from Gloriosa, 10 March.

Thalasseus bengalensis par (Mathews and Iredale) Lesser Crested Tern

There is no certain record from Aldabra or elsewhere in the archipelago, though Abbott collected a specimen on Gloriosa (Ridgway 1895, 524, under the name Sterna media), and there are also specimens from the Comoros (Benson 1960a, 45).

Anous stolidus pileatus (Scopoli) Common Noddy

Collected by Abbott on Aldabra, and breeding in thousands on small islets in the lagoon (Ridgway 1895, 527). Also collected on Aldabra by Voeltzkow (Berlepsch 1899, 496). Seen by Morris (1963), and hundreds seen in March 1964 (Bourne 1966). Stated by Vesey-FitzGerald (1941, 528) to breed on Aldabra (and Cosmoledo), though no details are given. Listed by Dupont (1907) from throughout the archipelago.

Gygis alba monte Mathews Fairy Tern

Collected by Abbott on Aldabra, where common (Ridgway, 1895, 527), and also collected there by Voeltzkow (Berlepsch 1899, 496). Seen by Morris (1963), and hundreds seen in March 1964 (Bourne 1966). Listed by Dupont (1907) from Aldabra, Assumption and Astove.

4. THE LAND BIRDS: THEIR STATUS, ORIGINS AND TRENDS OF VARIATION

Status

Of the 16 species considered in Section 3(1)(a), only one, the drongo Dicrurus aldabranus, is considered to be a full species, endemic to Aldabra. The following are well marked subspecies, also endemic: Threskiornis

aethiopica abbotti (the species is only otherwise known in the Malagasy Region from Madagascar); Dryolimnas cuvieri aldabranus (the species is known also from Madagascar, Mauritius, and the remainder of the Aldabra archipelago, but only still survives on Madagascar and on Aldabra); Caprimulgus madagascariensis aldabrensis (the species is only otherwise known from Madagascar); and Foudia eminentissima aldabrana (the species is only otherwise known from Madagascar and the Comoros).

Other well-marked subspecies are: Butorides striatus crawfordi (known also from Assumption); Streptopelia picturata coppingeri (known also from Assumption and Gloriosa, the Aldabra birds being smaller); and Nectarinia sovimanga aldabrensis (admittedly there is a rather similar subspecies, N. s. abbotti, on Assumption, but these two are distinct enough from any other subspecies, including N. s. buchenorum, of Cosmoledo). Butorides striatus has an almost cosmopolitan distribution, Streptopelia picturata is widespread in the Malagasy Region, while Nectarinia sovimanga occurs also in Madagascar and on Gloriosa.

Two further subspecies endemic to Aldabra, but only certainly distinguished by their smaller size, are Falco newtoni aldabranus and Alectroenas sganzeni minor. The former occurs also in Madagascar, the latter in the Comoros. Yet other, poorly marked, endemics are: Centropus toulou insularis (differing from C. t. toulou of Madagascar only by its longer tail and average longer wing-length, with C. t. assumptionis intermediate); Hypsipetes madagascariensis rostratus (differing from the populations of Madagascar, the Comoros and Gloriosa by a rather slight color-difference); and Zosterops maderaspatana aldabrensis (showing minor differences in colour and proportions from Z. m. maderaspatana of Madagascar and Gloriosa, and perhaps also Cosmoledo and Astove).

Egretta garzetta assumptionis has been separated on material from Aldabra and Assumption as having a longer bill than has E. g. dimorpha of Madagascar, but is not worth formal recognition. Finally, there are two species the Aldabra populations of which are indistinguishable. Ardea c. cinerea occurs in Europe, Asia, Africa, the Comoros, the Aldabra archipelago and the Amirantes, with A. c. firasa in Madagascar, while the populations of Tyto alba affinis inhabiting Madagascar, the Comoros and Aldabra differ from those of Africa merely by average larger size. Nor is there any evidence that any of the species whose status is uncertain (Section 3(1)(c)) show any peculiarity.

The status of the land birds proved to breed on Aldabra presents an interesting range, from one "good" endemic species and several well-marked endemic subspecies down to two in which no variation at all can be discerned.

Origins

In the Comoros, Benson (1960b) found the land avifauna to be mainly of Madagascar origin, though with some African elements. The Madagascar influence is proportionately even more preponderant on Aldabra, still more remote from Africa. The only claim to any African affinity arises in the case of Ardea c. cinerea, in any event not a land bird in the strict sense that most

of the other 15 species in Section 3(1)(a) are. The only other one not having at least an ultimate Madagascar origin is Butorides striatus crawfordi. Both this, and the populations of the Mascarene Islands and of the Comoros, appear to be of Asiatic origin, those of Madagascar and the Seychelles of African. B. s. crawfordi is again not a land bird in the strict sense, and an Asiatic derivation need not tax the imagination.

The following species, for none of which is there any definite record from the Comoros,¹ could have colonised Aldabra from Madagascar via Gloriosa and the islands to the east in the Aldabra archipelago: Egretta garzetta, Threskiornis aethiopica, Falco newtoni, Dryolimnas cuvieri, Centropus toulou, Caprimulgus madagascariensis, and Nectarinia sovimanga. This is all the more likely in the case of E. garzetta, D. cuvieri and N. sovimanga, recorded from throughout the archipelago, while C. toulou is also known for Assumption. This route may also have been used by Streptopelia picturata and Zosterops maderaspatana, the populations of which on these intervening islands are very similar to those of Aldabra.

Alectroenas sganzeni is only otherwise known from the Comoros, where it may have originated after an earlier colonisation by Alectroenas stock from Madagascar. Tyto alba, Hypsipetes madagascariensis and Foudia eminentissima, also only known in the Aldabra archipelago from Aldabra, but occurring throughout the Comoros, are probably also of proximate Comoro (ultimate Madagascar) origin.

The origin of Dicrurus aldabranus is more obscure, though it is presumably Madagascar-derived. Possibly it arrived via Gloriosa and the other islands in the archipelago, where however the Dicruridae are unrepresented. There is a different species on each of the Comoros except for Moheli, where again the family is unrepresented. It may have been one of the earliest colonisers - it is considered to have attained specific rank - and possibly arrived before the frontal feathers of D. forficatus of Madagascar were as developed as they now are.

Trends of Variation

The most pronounced general trend in variation is towards small size, as shown by wing-length. Thus on Aldabra Butorides striatus, Alectroenas sganzeni, and Streptopelia picturata are all smaller than in the Comoros, as is Falco newtoni than in Madagascar and likewise to some extent Zosterops maderaspatana. F. araea, the representative of newtoni in the Seychelles, is still smaller than is newtoni on Aldabra. Streptopelia picturata has become still smaller in the Seychelles too, while Butorides striatus is about the same size there as on Aldabra. On the other hand; Alectroenas pulcherrima of the Seychelles is larger than A. sganzeni on Aldabra, and almost as large as that species is in the Comoros. With the exception of A. pulcherrima, these cases fall into line quite well with Bergmann's Rule, the effect of which has probably been accentuated by isolation. But Caprimulgus madagascariensis, which might

¹Except for one record of F. newtoni on Anjouan as a stray.

also be expected to be smaller on Aldabra than in Madagascar, is larger. It has already been suggested that it may show an incipient tendency to gigantism in isolation. The same may apply to Nectarinia dussumieri in the Seychelles, considerably larger than N. sovimanga, from which it may have been derived long ago.

The striking reduction in wing-length in Dryolimnas cuvieri is not considered to be a reflection of reduction in size so much as in powers of flight, presumably the result of a lack of any natural enemies. The havoc caused by introduced enemies has been mentioned. D. c. aldabranus is almost flightless, while D. c. abbotti of Assumption, now extinct, was well on the way to this stage.

Compared to the Comoros, where (Benson 1960a, 10) the annual rainfall probably nowhere averages much less than 1000 mm. (about 40 inches), and around Mount Karthala, Grand Comoro, exceeds 5000 mm. (about 125 inches), there is a distinct tendency to reduction of melanin, often resulting in an increase of pallor. This is well shown by Streptopelia picturata and Foudia eminentissima. The pallor on the underside of Butorides striatus and brownish tone in Hypsipetes madagascariensis may be due to the same cause. In comparison with Madagascar, this may also apply to Zosterops maderaspatana, yellower above, and Caprimulgus madagascariensis, paler on the crown and scapulars. Nectarinia sovimanga, on Assumption and Cosmoledo as well as on Aldabra, shows a reduction of the olive and yellowish tones, brightest in Madagascar excepting the arid south-west. But it is puzzling to find an extension of black in males in the Aldabra archipelago. This is most marked on Cosmoledo, where by contrast reduction of the olives and yellows is also most marked. In N. dussumieri of the Seychelles these tones are only slightly apparent in juveniles. But perhaps the best example of reduction of melanin is in the immature Dicrurus aldabranus, grey above and white below instead of wholly black except for mere fringes of white on the underside as in D. forficatus of Madagascar and adsimilis of Africa. The almost wholly white feathering on the head of the young Threskiornis aethiopica abbotti may also be the effect of this influence.

Finally, an increase in length of bill, a characteristic of many island populations (see for example Grant 1965), is apparent to some extent in Dryolimnas cuvieri aldabranus. Yet in Nectarinia sovimanga it has shortened, the opposite to N. notata in the Comoros as compared to Madagascar (Benson 1960a, 92). Foudia eminentissima aldabrana has a relatively heavy bill, possibly in adaptation to a seed rather than an insect diet.

5. THE LAND BIRDS: COMPOSITION OF SPECIES

Table 9 shows the occurrence of the various species of land birds in the Aldabra archipelago, drawn up from Section 3(1)(a), with the addition of Cisticola cherina, and from Section 3(1)(c) of Corvus albus. Cosmoledo and Astove have been much less studied than Aldabra and Assumption, especially Aldabra. Nevertheless the list is probably reasonably complete. No record at

all of the first two species in the table has been traced from Cosmoledo or Astove, though it is likely that they do both occur, and may well breed. Some idea of the areas of the four islands can be obtained from Watson, Zusi and Storer (1963, 191). As might be expected from its relatively large land area (60 square miles), Aldabra has easily the largest number of species.

Moreau (1966, 345-357) considered the avifauna of the Comoros, but not that of Aldabra. A few comparisons between the Aldabra list and that for Grand Comoro in Benson (1960a, 17), slightly the nearest of the four Comoros to Aldabra, are worth while. Grand Comoro is of course far larger and higher, having an area of 380 square miles and rising to 7874 feet (for areas and altitudes of the four Comoros, see Watson, Zusi and Storer, 1963, 201). Nevertheless, Moheli, the smallest of the Comoros, area 84 square miles only and not rising higher than 2950 feet, is almost as rich in species as Grand Comoro (Benson 1960a, 17), having 34 as against Grand Comoro's 35, and Aldabra's 16.

Due no doubt to lack of development, Aldabra has none of the following four introduced species, occurring on Grand Comoro and fairly general in the Comoros as a whole: Numida meleagris, Agapornis cana, Acridotheres

Table 9. List of land birds breeding in the Aldabra Archipelago

'X' indicates that the species has been proved, or may be assumed, to breed on the island in question. A bracketed 'X' indicates that breeding is likely but cannot be assumed.

	<u>Aldabra</u>	<u>Assumption</u>	<u>Cosmoledo</u>	<u>Astove</u>
<i>Ardea cinerea</i>	X	(X)	(X)	(X)
<i>Butorides striatus</i>	X	(X)	(X)	(X)
<i>Egretta garzetta</i>	X	(X)	(X)	(X)
<i>Threskiornis aethiopica</i>	X			
<i>Falco newtoni</i>	X			
<i>Dryolimnas cuvieri</i> *	X	X	X	X
<i>Alectroenas sganzini</i>	X			
<i>Streptopelia picturata</i>	X	X		
<i>Centropus toulou</i>	X	X		
<i>Tyto alba</i>	X			
<i>Caprimulgus madagascariensis</i>	X			
<i>Hypsipetes madagascariensis</i>	X			
<i>Cisticola cherina</i>			X	X
<i>Dicrurus aldabranus</i>	X			
<i>Corvus albus</i>	(X)	X		
<i>Nectarinia sovimanga</i>	X	X	X	(X)
<i>Zosterops maderaspatana</i>	X		X	X
<i>Foudia eminentissima</i>	X			

*Extinct except on Aldabra.

tristis, or Passer domesticus. Foudia madagascariensis may also owe its presence in the Comoros to an artificial introduction. Nor has it been established on Aldabra, and the nearest approach to a species associated with human activity is Corvus albus, which in any case is not certainly known to breed there, even though it does on Assumption.

Nor has Aldabra any of the 10 African-derived species found on Grand Comoro, and mostly general in the Comoros, no doubt because it is more remote from Africa. Lack of suitable habitat might explain the absence of such Madagascar-derived species as Circus spilonotus and Saxicola torquata, associated with open grasslands (Cisticola cherina, unknown in the Comoros, also associated with this type of habitat, occurs on Cosmoledo and Astove), or Coracopsis nigra, Chaetura grandidieri and Coracina cinerea, associated with heavy forest (Coracopsis nigra is known also from Praslin, in the Seychelles). Yet Alectroenas sganzi and Foudia eminentissima, mainly forest dwellers in the Comoros, have both colonised Aldabra. Cypsiurus parvus, occurring at lower altitudes throughout the Comoros, may have failed to colonise Aldabra because of a paucity of introduced coconut palms, providing suitable nesting sites. Two other species whose presence might be expected are Alcedo vintsioides and Terpsiphone mutata, both occurring throughout the Comoros. So far as the former is concerned, possibly there is a lack of suitable banks for burrowing of nesting holes, while it may be noted that the genus Terpsiphone is represented in the Seychelles.

Of the first four species listed from Aldabra in Table 9, only Butorides striatus is on the Grand Comoro list. The absence of the other three (the Egretta and Threskiornis are absent throughout the Comoros) may be due to a paucity or lack of suitable habitat, which may also explain the absence of Dryolimnas cuvieri (also absent throughout the Comoros). As already suggested in Section 3(1)(a), Falco newtoni, Centropus toulou and Caprimulgus madagascariensis, all present on Aldabra but completely unknown in the Comoros (except for one record of the first named) may have failed to colonise the latter because originally they were too heavily forested.

6. SUMMARY

1. The history of ornithological exploration of Aldabra is outlined.
2. So far as is possible from existing knowledge, the status of every species of bird known on Aldabra is assessed in a systematic list, divided into two categories, land birds and sea birds.
3. Special attention is paid to the 16 known resident land birds, derived almost entirely ultimately from Madagascar, either via Gloriosa and the islands immediately to the south-east of Aldabra (Astove, Cosmoledo and Assumption) or via the Comoros.
4. One form, a drongo Dicrurus aldabranus, is considered to have attained specific rank, and there are a number of well-marked subspecies. In only two cases is there no apparent variation at all. Trends of variation include a strong tendency to small size in several species in comparison with Madagascar and/or the Comoros. On the other hand, a nightjar Caprimulgus madagascariensis has become somewhat larger than in Madagascar. The

- other most marked tendency is a reduction of melanin, often resulting in an increase in pallor, and perhaps associated with a relatively dry climate.
5. A special case is that of a rail Dryolimnas cuvieri, which has become almost flightless, probably due to a lack of natural enemies. But due to the introduction of predators, its continued existence is precarious, and it is already extinct on Assumption, Cosmoledo and Astove.
 6. The numbers of land birds on Aldabra, Assumption, Cosmoledo and Astove are listed in a table. Aldabra, the largest in area, has easily the highest number. The Aldabra list is compared with one from Grand Comoro. It lacks all of the African-derived species on Grand Comoro, nor has it any introduced species. But there are two herons and an ibis not on the Grand Comoro list, and a falcon, coucal and nightjar unknown in the Comoros generally, perhaps originally too heavily forested for their occurrence.
 7. Various palaeartic migrants, mostly shore birds, have been recorded from Aldabra. Two species have also been recorded as visitors from Madagascar, and which also visit Africa. Other species in both these categories which may also occur are listed.
 8. Among land birds of uncertain status, there is a flamingo, Phoenicopterus ruber. It appears not to be a distinct subspecies, and it is still uncertain whether it ever breeds on Aldabra. It is possible that there is a breeding colony of the Crab Plover Dromas ardeola. The nearest definitely known colony is in Somaliland.
 9. Aldabra is important as a breeding area for various sea birds, including very large numbers of two frigatebirds, Fregata minor and ariel, a booby Sula sula, and noddy Anous stolidus.

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