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## A RECORD OF A RED-FOOTED BOOBY *SULA SULA* (L.) FROM THE CAPE VERDE ISLANDS, WITH A REVIEW OF THE STATUS OF THIS SPECIES IN THE SOUTH ATLANTIC OCEAN

(CANCAP-project. Contributions to the zoology, botany and paleontology of the Canarian-Cape Verdean region of the North Atlantic Ocean, no. 64)

by

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The first Western Palearctic record of a Red-footed Booby *Sula sula* (L., 1766), a brown white-tailed morph observed on Cima (Cape Verde Islands), is described. The status of this species in the tropical South Atlantic Ocean is evaluated. At present, Fernando de Noronha is the only South Atlantic stronghold of the species (ca. 4000 individuals; cf. Oren, 1984). The species has disappeared, or almost so, from other islands (St. Helena: absent; Ascension: 0-30 individuals; Ilha da Trindade: less than 100 pairs). A link may exist between the apparent recent increase of the population of Fernando de Noronha and the apparent recent decline of the Trindade population. It seems possible that the Trindade population for some unknown reason has migrated to Fernando de Noronha. It is concluded that the Caribbean and South Atlantic populations do not mix on a significant scale. These two populations predominantly consist of brown white-tailed and white morphs, respectively; thus indicating a considerable genetic difference. Distance between the two populations (possibly combined with prevalent conditions in the intervening area) apparently forms an effective barrier.

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### INTRODUCTION

From August 8 to September 12, 1986, a marine-biological expedition under the auspices of the Rijksmuseum van Natuurlijke Historie, Leiden, was made to the Cape Verde Islands. This expedition, CANCAP-VII, was to conclude the so-called CANCAP-project, a long-term scientific programme in

the south-eastern part of the North Atlantic Ocean (cf. Den Hartog, 1984a). In the framework of this project another expedition to the Cape Verdes had been made in 1982 (Den Hartog, 1985, 1986). Bird observations and notes made during this first Cape Verde expedition (CANCAP-VI) were published by Nørrevang & Den Hartog (1984) and a report on the birds of the expedition in 1986 is in preparation. The present paper, dealing exclusively with the Red-footed Booby *Sula sula* (L., 1766), is in anticipation of this general report.

### OBSERVATIONS ON CIMA

On August 23 and 24 I made a reconnaissance of Cima, one of the small, uninhabited Rombos islands in the south-western part of the Cape Verde archipelago, close to Brava and Fogo. The central and eastern part of Cima are rather low, flat and sand-covered. The western part, however, rises to a height of some 40 metres above sea level, with steep sea cliffs to the south and southwest. These cliffs, especially on the south side, form the base of a colony of Brown Boobies *Sula leucogaster* Boddaert, 1783, formerly large as indicated by guano-covered cliffs and ledges, but now reduced by human depredation to less than a hundred birds (and not entirely wiped out as suggested by Nelson, 1978: 433). On August 24 I watched this colony for some time and estimated that there were some 40-50 birds, but as I had no overall view of the cliffs, I may have missed a few dozen. Most birds were adults and I observed sexual activities such as preening, billing and copulating. A few birds were incubating. The absence of immature birds presumably reflected human predation. Weather permitting, Cima is regularly visited by fishermen from Brava and Fogo, who take non-fledged immature birds whenever they have the opportunity. During my visit to the island there were two small boats with five fishermen each and one of these parties had a ca. 3-weeks old chick (the only chick I saw on Cima) for the pot.

When I approached the colony I caused some disturbance, many birds flying down the rocks and to and fro, but calm was soon restored, be it that apparently for other reasons some birds would occasionally take to the wings and fly around in the vicinity of the colony. I then observed that one "immature" bird had a white tail and I realised that I was not watching an immature Brown Booby but a Red-footed Booby, a species hitherto unreported from the Cape Verde Islands.

The bird was perfectly at ease among the Brown Boobies and I saw no signs of aggression. It would not separate from the other boobies but it was obvious that it had no mate among them. Tail, rump, lower back and lower belly (up to

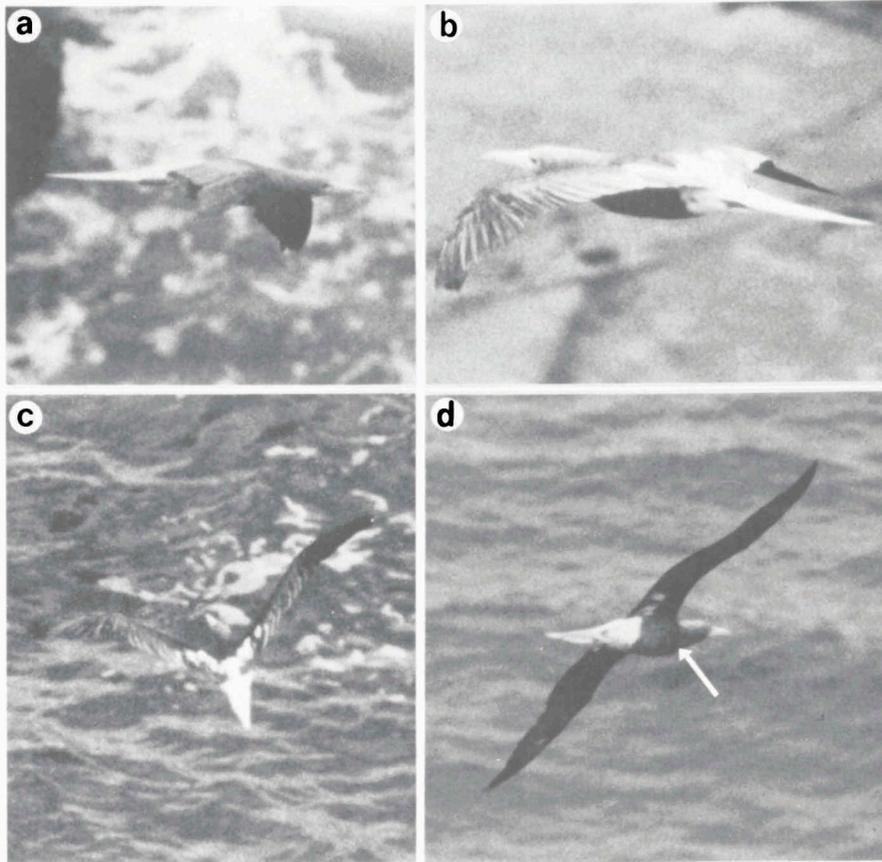


Fig. 1a-d. Red-footed Booby: individual from Cima, Cape Verde Islands; various views. Note the distinctly white rump, lower back and lower belly, and the white patches on the wings, both above (b, c) and below (d). The arrow (cf. d) indicates the demarcation between the different shades of brown of breast and neck.

slightly proximal of the legs) were white (fig. 1a-d). In addition there were white patches on scapulars and secondary coverts (b, c), not only visible in flight but also in perched condition. In flight some white splashes showed also on the wing-linings of the fore-arms (d). Head and fore-neck were pale brown; breast and upper belly dark brown. The demarcation of the brown upper and white lower belly was sharp-cut, and, depending on the light, a sharp demarcation was also visible between the different shades of brown of breast and neck (fig. 1d). Bill and naked skin of the face were grey-blue with a blush of rose at the base of the lower mandible and on the fore-head, just above the dark eyes. Legs and feet were red.

The white parts made the bird quite conspicuous when on the wing, but perched in the colony it was well camouflaged against the white-washed cliff-wall.

#### SOME NOTES ON COLOUR PATTERN AND GENERAL DISTRIBUTION

The Red-footed Booby is a polymorphous, circumtropical species, nowadays predominantly if not entirely restricted to small, isolated islands. Three basic colour-phases or morphs (cf. Nelson, 1978: 656-657) are usually recognized: a white morph with black upper wing-coverts and primaries; a brown or grey-brown morph; and a brown morph with white tail, rump and lower back. It is self-evident that the bird sighted on Cima belonged to the last-named morph; it showed a striking resemblance to an incubating bird from Ascension Island depicted by Nelson (1978, col. pl. 12), except for the distinct white splashes on the wings (and with the restriction that belly and lower breast do not show in the picture concerned).

In addition to the three basic colour morphs mentioned above, there are various intermediates, sometimes of rather local occurrence. To complicate matters three subspecies are currently recognized: *Sula sula sula* L., 1776 (Atlantic), *S.s. rubripes* Gould, 1838 (Indo-West Pacific), and *S.s. websteri* Rothschild, 1898 (East Pacific), but the morphological basis for this distinction seems rather weak and does not correlate with the various colour morphs, which, although intermediates occur, seem better defined and much easier to distinguish. Different colour morphs may, and usually do occur in a single population or colony, although some morphs are restricted to certain geographical areas or islands. Taken world-wide, the white morph is the commonest form.

In the Atlantic the Red-footed Booby occurs in two basic morphs: the white and the brown white-tailed. Breeding in the Atlantic is restricted to the Caribbean and a few small oceanic islands in the South Atlantic. Van Halewijn & Norton (1984: 181, map 10) estimated the total Caribbean population at about 14.000 pairs, though breeding seemed largely restricted to a few large colonies.

#### A REVIEW OF (HISTORICAL) DATA FROM THE SOUTH ATLANTIC

In the South Atlantic Ocean breeding has exclusively been reported from

Fernando de Noronha, Ilha de Trindade and Ascension, but there can hardly be any doubt that St. Helena also harboured a significant population at the time of its discovery and colonization. However, due to introduced predators (rats, cats, etc.) and destructors such as goats and pigs, but most of all as a result of the deforestation by man, the species (predominantly a tree-breeder) must have vanished. Substantial data, however, are wanting, except that Ashmole (1963b: 393, 402) and Olson (1975: 24, 36) found Recent fossil bones. Nowadays no more than a stray individual is occasionally reported from the island (Olson, 1975: 36 [two white morphs collected by the "Blossom" expedition on October 10, 1925]; Stonehouse, 1963: 482; Bourne & Dixon, 1975: 83; Den Hartog, 1984b: 92).

The species is also rare at Ascension. During the B.O.U. centenary expedition to that island (October 1957-May 1959) the population was estimated at some 10-12 pairs to 30 birds (Dorward, 1962: 174-175; Stonehouse, 1962: 107, 116) but, although several pairs were suspected breeding (on Boatswain Bird Island), only a single breeding case could be ascertained (Dorward, 1962: 175; Stonehouse, 1960: 145). It is interesting to note that Van Bruggen (1958: 38) reported the Red-footed Booby to be common around the island on May 20, 1957, i.e. shortly prior to the B.O.U. expedition. Although I have little reason to doubt that Van Bruggen (personal communication) did indeed observe the species, I am at least suspicious about his statement that it was common, especially as his original note-book states the Masked Booby *Sula dactylatra* Lesson, 1831 to be the least common species; it therefore seems that he shifted his (brief) notes on these two species. Simmons (1968: 15-16) mentioned five sightings from the main island between 1962 and 1964, including four white morphs and one brown white-tailed morph. One of these birds was seen to collect nest material. All in all recent records are scanty [the latest published record, 1 bird, dating from 3 May, 1982 (Bruce, 1983: 54)] and it seems doubtful that nowadays the Red-footed Booby, even on Boatswain Bird Island, is more than an occasional visitor and breeder. On January 14, 1984, Dr. B. C. Livezey failed to find it at the former breeding site on Boatswain Bird Island (Dr. W. R. P. Bourne, in litt., February 9, 1987) and Dr. J. de Korte (personal communication), when visiting the same spot (without landing, however) on February 8-10, 1987, also searched in vain for it. However, even more recently I was informed by Dr. Bourne (in litt., March 6, 1987) and squadron leader M. I. Blair, the leader of The Royal Air Force Ornithological Society expedition to Ascension Island in February 1987 (in litt., April 2, 1987), that a number of Red-footed Boobies were spotted at various sites on the north coast on the main island, and that on February 21 a small con-

centration of ca. 15 individuals, believed to be breeding, was located on the north-west side of Boatswain Bird Island. In addition to these adult birds (white morphs), there were a few non-fledged juveniles, whose identity, however, is not yet fully certain.

Ilha da Trindade, like St. Helena once covered with luxuriant forest, certainly used to be an important stronghold of the species. On this island too, the forest, which mainly consisted of a single species of tree, viz. *Colubrina glandulosa* var. *reitzii* (Rhamnaceae) (cf. Eyde & Olson, 1983: 42), has almost completely disappeared; not, however, by human deforestation. For reasons that still can only be guessed at, this forest died off in the early 19th century, apparently within a few years (Olson, 1981: 486; Eyde & Olson, 1983). Seabirds, however, including Red-footed Boobies, went on nesting and breeding in the dead boughs as is clear from an account by Marryat (1829; quoted from Murphy, 1936: 173) shortly after this disaster occurred: “. . . Thousands and thousands of trees covered the valley, each of them about thirty feet high; but every tree was dead, and extended its leafless boughs to another – a forest of desolation, as if nature had at some particular moment ceased to vegetate! There was no underwood or grass. On the lowest dead boughs, the gannets, and other sea-birds, had built their nests in numbers uncountable . . .”. Late nineteenth and early twentieth century reports still mention the Red-footed Boobies as nesting in the dead trees, then further decayed and mostly fallen down: e.g. Knight (without year: 413-432) who visited the island in 1881, and Nicoll (1909: 47). In this period the birds are generally described as “fairly abundant” (e.g. Nicoll, 1906: 672) to “very abundant” (Wilson, quoted by Lowe & Kinnear, 1930: 184, from his unpublished diary on 26 July 1910). But even Novaes (1952: 224-225) who visited the island in May 1950, still mentioned the species to be present in great abundance on the west-side of the island, around the highest tips. Since Novaes' visit, however, matters seem to have changed for the worse, for 25 years later, when Olson (1981) visited the island from December 12, 1975 to February 10, 1976, the population had declined dramatically. Olson found no more than two very small colonies of “10-12 and about 75” (meant are probably nests or pairs, but this is not stated) Williams (1984: 395), however, on authority of Olson, in litt., mentioned the population of Trindade to comprise 100 pairs maximally).

Simmons (1927: 72) is the only author to have suggested that the Red-footed Booby might breed, or at least might have bred on treeless Rocas Reef, situated some 70 nautical miles to the west of Fernando de Noronha: “At once a cloud of wings arose in the air, and we realize that the ground had been

covered with birds sitting on their eggs. Most of them were sooty terns; but we estimated that there were 1500 nests of the blue-faced booby, 1200 of the brown noddy, and perhaps a few nests of other birds, for we saw about 350 brown boobies, 25 red-footed boobies, and 15 man-of-war birds". I present this quotation for what it is worth. Although the Red-footed Booby predominantly is a tree-breeder, there is no doubt that it may, in the absence of trees, breed on the ground. This has not only been ascertained on Ascension (see above), but recently also on Trindade (Olson, 1981: 489). In the Cape Verde Island the same is demonstrated by frigate birds *Fregata magnificens* Matthews, 1914.

Just like other oceanic islands in the South Atlantic Ocean, Fernando de Noronha has been visited by few ornithologists or scientists in general, and at large intervals. The earliest biological or ornithological reports, dating from around the turn of the present century (Ridley, 1888, 1890a, b; Bowdler Sharpe, 1890; Murphy, 1915), make no mention of the Red-footed Booby. Simmons (1927: 69-70), the leader of the "Blossom" expedition, was the first to report on the species. He published photographs of both the white and the brown white-tailed morph sitting on their nests. The caption with the latter reads: "Naturalists disagree about this Fernando de Noronha nester. Some believe that this bird is a form of Red-footed Booby, which has a white body" (although Simmons speaks of a grey body, it is obvious from the picture that the bird is a brown white-tailed morph). This must have been sufficient reason for the "Blossom" party to procure a good series of this form, though this is not mentioned by Simmons. Murphy (1936: 862), as a basis for the chapter on *Sula sula* in his "Oceanic birds of South America" (1936: 861-870), had both white and brown-white tailed morphs from Fernando de Noronha at his disposal, including no less than eight specimens of the latter (Murphy, l.c.: 862), and although he did not state when and by whom these birds were collected, there seems little doubt that they represented "Blossom" material. Almost half a century after the "Blossom" expedition, the island was visited by Olson (1981), from July 6 - August 18, 1973. Unfortunately this author, primarily interested in fossil birds, gave no specific data on the numbers of recent seabirds. However, from his account it can be inferred that Red-footed Boobies were both present in significant numbers, and breeding. He stated (Olson, l.c.: 484): "The population of seabirds at Fernando de Noronha seems to be thriving better than elsewhere in the tropical South Atlantic. Exceptions are *Sula dactylatra* and *Sterna fuscata*, both of which need flat open areas, little of which is available on the predator-free offshore islets where these birds must now nest at Fernando de Noronha", and: "All the species of seabirds appeared

to be breeding during our visit though we could not confirm breeding in the frigate bird or the decidedly rare Red-billed tropic bird". Possibly because Olson did not explicitly state so, Williams (1984: 395), listing the breeding distribution of seabirds in the South Atlantic, overcautiously mentioned Fernando de Noronha with a query. However, even from sight records published between 1966 and 1985 in the "Sea Swallow" (Bourne, 1982: 32; 1985: 41; Bourne & Dixon, 1973: 50; Chapman, 1984: 19; 1985: 52) which mention between one and 80 Red-footed Boobies in the surroundings of Fernando de Noronha, and "groups heading for Fernando de Noronha at dusk", it can be inferred that the island still forms at least a refuge for the species. Nelson (1978: 880) too (without source or reference, though), mentioned the species to occur "commonly around the island and for at least 320 km to the north-east", and recent visits of Oren (1982, 1984) have made clear that the population of Fernando de Noronha comprises no fewer than about 4000 birds, 80% of which breeding on the main island. The great majority of the Fernando de Noronha population appears to represent the white morph whereas about 4% belong to the brown white-tailed morph. Oren (1984: 26) refers to this form as "fasa parda" (parda = brown/grey), but it is obvious that he did not use this term in the strict sense as the entirely brown morph does not occur in the Atlantic Ocean (Nelson, 1978: 661).

Although in particular the report by Ridley (1980a; see also Bowdler Sharpe, 1890), who spent more than a month on Fernando de Noronha (from August 14 - September 24, 1887), suggests that the Red-footed Booby may have been absent from the island around the turn of the century, it seems reasonable to assume that the species was present in earlier times. Although not strictly proof, it may be noteworthy that I found some indication of this in the ship's journal of the Portuguese navigator Lopez de Sousa (cf. de Castro, 1927: 103), who sailed past the island on January 23/24, 1531, and who mentioned that Portuguese seamen knew from experience that on the windwards side of Fernando de Noronha many birds occurred, mostly "rabifurcados" (= frigate birds) and "alcatrazes pretos" (= Brown Boobies) whereas there were only very few birds on the leeward side, and these being "alcatrazes brancos" ("white boobies": i.e. Red-footed and/or Masked Boobies). It is interesting to establish that a similar distribution of Brown and Red-footed Boobies was recently noted by Oren (1984: 25) and also that the Red-footed Booby, unlike nowadays, apparently was never very common.

## THE INCREASE OF THE POPULATION ON FERNANDO DE NORONHA AND ITS POSSIBLE CAUSE

Oren (1984) suggested that the recent increase of the Red-footed Booby on Fernando de Noronha may have come about because the island, which functioned as a penal settlement for about 300 years, ceased to do so in 1942. The convicts used to be more or less left to their fate and, although their number fluctuated, they presumably took a heavy toll of the seabirds, including, or first of all, the confident Red-foots. In 1873, when the "Challenger" called at the island, there were said to be no fewer than 1400 convicts, and part of them lived with their families (Moseley, 1982: 69). About 30 years later Nicoll (1906: 37) mentioned a number of 250, but when the "Blossom" expedition visited the island, the number of convicts seemed to have increased again, for Simmons (1927: 60) stated that there were hundreds. All the same Simmons was the first to report Red-footed Boobies from Fernando de Noronha. It should further be borne in mind that the island, although after 1942 not a penal settlement any more, remained populated. In 1980 there were 1266 inhabitants (Oren, 1982: 2), and it would be surprising if this human population would not exploit or have exploited any accessible seabird colonies. Mice and rats, especially the latter, also must have formed a threat to the seabirds. Both have more than once been reported to be very common (e.g. Ridley, 1890b: 477). The population of these rodents, however, used to be more or less controlled by the convicts. Ridley (l.c.) wrote: ". . . At the monthly rat-hunt while we were on the island over 3900 (meant are possibly rats and mice; the Portuguese word "rato" covers both) were taken; but we were assured that, in the dry season, when the herbage which covered the greater part of the island was dried up and burnt, the mice [*sic*] were compelled to leave their holes, and many more were taken. The hunts are then undertaken weekly, and 20.000 have been caught in a day . . .". Recently mice were still very common, but the number of rats seems to have decreased considerably: Oren (1984: 39) did not see a single individual, but he was informed that they were present in the little town. Feral cats, on the other hand, another threat to island birds, seem to have increased and are now very common (Oren. l.c.). In conclusion it seems that the recent increase of the Red-footed Booby on Fernando de Noronha, apart from possibly being correlated with the closing down of the penal settlement, must have additional and/or, as I am inclined to assume, quite different reasons.

Accepting that the species was absent or nearly so at the turn of the century, I suggest that a recolonization must have occurred since. Even if the species had maintained itself in small numbers, it seems unlikely that these, consider-

ing various unfavourable circumstances (man, rats, cats; not to mention goats and other domestic animals such as sheep, cattle and dogs), could have regenerated within a few decades to the present flourishing population without an influx of birds from elsewhere. I therefore wonder whether there is a direct relation between the obvious increase in numbers on Fernando de Noronha and the decline of the population of Ilha da Trindade.

The Red-footed Booby, more than most or any other species of booby, is often encountered fishing on the high seas, far from the breeding colonies. The species also seems more inclined to follow ships than its congeners, and there are numerous reports of birds perching in ship's riggings for a "free ride" (e.g. Anon., 1960: 22; 1975; Bourne & Radford, 1962: 22; Bourne, 1965: 30; 1966: 26; Chapman, 1981: 60; 1982: 19; 1985: 52), occasionally for periods of up to a week (Bourne, 1985: 41). This behaviour might increase the chance that birds stray and become desorientated. Hence some exchange of individuals from one South Atlantic island/colony to another seems conceivable but such casual stragglers are unlikely to have accounted for both the reduction of the Trindade population and the increase of the Fernando de Noronha population.

The hypothesis postulated above that the Trindade population has moved to Fernando de Noronha, therefore should have another basis, at present not understood, but possibly correlated with the progressed state of decay and decomposition of the dead forests on Trindade.

Ringling studies by Woodward (1972: 200-205; see also Nelson, 1978: 717-719) have shown the existence of significant movements of Red-footed Boobies — up to at least a thousand nautical miles — in the northern Mid-Pacific (roughly the Hawaiian Islands), and suggest that some of these have the character of migration. Unfortunately such studies are not available and hardly feasible in the South Atlantic. However, in accordance with the situation in the Pacific, it is not inconceivable that an exchange of birds between colonies on South Atlantic Islands is (or used to be) a regular phenomenon. In this context I may also refer to Tomlinson (1947) who reported what may be called a massive invasion of Red-footed Boobies on Ascension. I quote: "Late in May, 1946, I received an interesting report that a great number of birds, called "ducks" by the natives, had arrived, and were resting on the high inaccessible rocks in the triangle between Powers Peak, Weather Post and White Hill. My informant stated that these birds come to this small area every year between May and June, stay for about eight weeks, and then disappear. Toward 25 May, at sunset, large numbers of Boobies were seen flying parallel to the coast at English Bay; and I now believe that they were the same birds as those reported farther to the south-east.

On June 1, 1946, my wife and I spent the morning investigating, and in the

hilly area first mentioned we found thousands of Boobies, mainly with adults, but with them a few dark brownish individuals, all perching on the high crags”.

Tomlinson added a description of one bird killed, which leaves no doubt about the identity of the species. With Tomlinson one wonders where these birds came from, if they did not stay or breed on Ascension itself. Ashmole (1963a: 388) suggested them to represent the survivors of the original Ascension population, “long prevented from breeding on the island by the presence of cats”. This would imply that the original Ascension population would have been even more numerous than the thousands(!) mentioned by Tomlinson. A population of that size and of such sizeable birds, however, can hardly have been prevented from breeding even by a relatively large cat population (now also present on Fernando de Noronha: see above) and one might further argue that, in spite of predation by cats, frigate birds, etc., the much smaller Wide-awake Tern *Sterna fuscata* L., 1766 still breeds on Ascension by the hundreds of thousands, in rough though easily accessible terrain. Although I do not doubt that the Red-footed Booby once used to be a resident of the island (an account by Osbeck, 1957: 293, leaves little doubt about this), it must have disappeared as such long ago, in the 19th or early 20th century, and presumably not primarily due to cats, etc., but first of all due to human depredation. Even if we accept that a significant population at some time left the island (cf. Ashmole, l.c.) because it was prevented from peacefully breeding or otherwise, it can only have moved to new breeding grounds, the nearest being the other tropical South Atlantic Islands. If this were so, one could indeed imagine that during a number of years some back-and-forth migration could have taken place between the old haunts and the new colonies before the new situation stabilized. Considering distance, Ashmole disregarded the possibility that the birds seen by Tomlinson might have come from Fernando de Noronha or Trindade, but it seems even more unlikely that these birds would spend their entire lives on the high seas (the only alternative) only to return to their original haunts for about two months, and . . . not to breed(!). Such a view would in fact ignore the existence of sexual and reproductive instincts. If Ascension indeed would have been the only island within their range, there would be no plausible explanation for the birds to leave or avoid it, even if breeding might prove difficult. In that case the island could serve at least as a roosting place and furthermore one would expect breeding attempts to have proceeded on predator-free stacks and on Boatswain Bird Island.

Therefore, in my view the birds seen by Tomlinson can only have been birds from Trindade or Fernando de Noronha, the only two islands in the South Atlantic where the species breeds, or bred on a significant scale. Fernando de Noronha may have been repopulated by one or more of such invasions. It even

seems conceivable that part of the birds reported by Tomlinson came from Trindade (where the species has now all but disappeared) and, not finding suitable breeding conditions on Ascension, eventually ended up on Fernando de Noronha where trees are still amply available. Some birds may have stayed behind and accommodated themselves to the local, unfavourable conditions. These, or their survivors, might have represented the small "resident" population on Boatswain Bird Island, encountered by the B.O.U. centenary expedition in 1957-1959.

### CONCLUDING REMARKS

Recapitulating it may be stated that at present Fernando de Noronha is the last true stronghold of the Red-footed Booby in the South Atlantic, although some breeding still occurs or may occur on Ascension and Trindade. It may

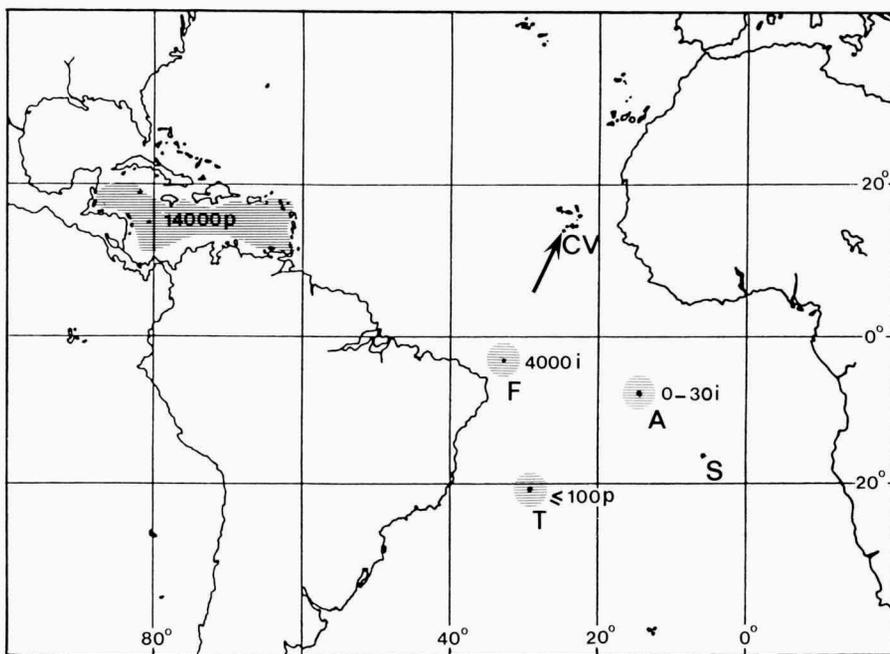


Fig. 2. Distribution of the Red-footed Booby in the Atlantic Ocean (based principally on: Van Halewijn & Norton, 1984; Oren, 1984; Olson, 1981; Simmons, 1968; Dorward, 1962; Stonehouse, 1960; and Blair, 1987, in litt.).

Numbers indicate breeding pairs (p) or individuals (i); the arrow indicates the record from Cima, Cape Verde Islands. A = Ascension Island; CV = Cape Verde Islands; F = Fernando de Noronha; S = St. Helena; T = Ilha da Trindade.

further be stressed that the South Atlantic population is not to be regarded as part of the Caribbean population. The latter predominantly exists of brown white-tailed morphs whereas the former is predominantly white. This implies that, whatever caused the increase of the Fernando de Noronha colony, it was not a colonization by Caribbean birds. The white and brown white-tailed morphs in the two regions, respectively, occur in a ratio of ca. 1 : 20 (Caribbean; Nelson, 1978: 661; Van Halewijn, pers. comm.) and ca. 24 : 1 (Fernando de Noronha; Oren, 1984: 26). These estimates, though probably far from accurate, indicate a significant genetic difference, implying a considerable degree of isolation between the two populations. Apparently the distance between them (possibly in combination with particular meteorological and oceanographical conditions in the intervening area) forms an effective barrier against large-scale mixing and hybridization. The distance between the South Atlantic islands among themselves admittedly is quite considerable (ca. 1200-1300 nautical miles), but is amply exceeded by even the shortest distance between the Caribbean and South Atlantic populations: the nearest colonies, Tobago and Fernando de Noronha, respectively, lying some 2000 nautical miles apart (fig. 2).

A closing remark may be made concerning the possible origin of the Cape Verde record of the Red-footed Booby presented in this paper. Considering just distance – as the crow (but also as the booby) flies – it seems most plausible that it originated from Fernando de Noronha, especially if one bears in mind that Nelson (1978: 880) qualified the species as common for at least 320 km to the north-east of that island (see page 00). However, taking into account the afore-mentioned tendency of this species to follow and stay with ships, there is always the possibility of a straggler from the Caribbean (where the brown white-tailed morph predominates).

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