

## NOTES ON THE SEABIRDS OF ROUND ISLAND, MAURITIUS

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As one of the few seabird breeding stations in the western central Indian Ocean, Round Island, 14 miles north of Mauritius Island, provides nesting sites for two tropic-birds (*Phaethon lepturus* and *P. rubricauda*), a shearwater (*Puffinus pacificus*), and the only known Indian Ocean breeding colony of the South Trinidad Petrel (*Pterodroma arminjoniana*). The paucity of information on the biology of the petrel, which was only discovered on Round Island in 1949 (Murphy and Pennoyer, 1952) despite numerous previous visits by naturalists, prompts us to record here the observations we made during three visits to Round Island in the fall of 1964. We also include a few notes on the other three, more widespread, Indian Ocean species.

Landing difficulties usually limit access to Round Island to October and November when the seas are calmest, but even then trips can be planned only on a day-to-day basis. Furthermore, field work on the island is productive only during the few morning hours before the intense midday heat develops and one's energy is expended in climbing the steep, unshaded hillsides. Our visits to Round Island were as follows: 16 October 1964 from 07:00 to 10:00 (Gill), 22 October 1964 from 09:30 to 12:30 (Gill and Storer), and 21 November 1964 from 09:00 to 12:00 (Jouanin).

### DESCRIPTION

The 372 acres of volcanic rock forming Round Island rise to a maximum elevation of 860 feet and were once covered with a lush forest that included several endemic palms (*Mascarena revaughnii* and *Dictyosperma album*), a screwpine (*Pandanus vandermeerschii*), a fan palm (*Latania loddigesii*), as well as typical Mauritian evergreen forest hardwood elements. Well-known to herpetologists, these forests once supported two endemic (to Round Island itself) geckos as well as a relict subfamily (Bolyerinae) of boid snakes. In the last 100 years ravages by the introduced goats and rabbits that now abound have reduced the island's aspect to one of barren rock with only scattered palms and clumps of vegetation (Figure 1). Erosion and cyclone damage also contribute to the loss of natural vegetation. Round Island's curious herpetofauna has suffered along with the vegetation and in addition, when calm seas permit, the avifauna is regularly plundered by local fishermen who prize the seabirds highly as a source of fresh meat. Fortunately of the four seabird species inhabiting the island, the South Trinidad Petrel is said to be the least appetizing. Recently both Vinson (1965) and Newman and Bannister (1965) have



Figure 1. Remnants of the original vegetation on the south slope of Round Island.

emphasized the marked deterioration of the island's flora and fauna and the need for protection.

#### THE SOUTH TRINIDAD PETREL

The South Trinidad Petrel (*Pterodroma arminjoniana*) occurs at subtropical latitudes in the Atlantic, Indian, and Pacific Oceans. Two subspecies, *P. a. arminjoniana* in the South Atlantic and the smaller *P. a. heraldica* in the Pacific are recognizable, the Indian Ocean population being similar in size to *P. a. arminjoniana* (Murphy and Pennoyer, 1952).

These petrels are so conspicuous on Round Island that we find their retarded discovery rather surprising. Throughout the morning they fly actively back and forth over the island and certainly attract one's attention with their eerie calls. Vocal activity was greatest during the early morning hours (07:00-08:00) and decreased gradually thereafter, though a few birds could be heard up to midday. The calls are normally associated with aerial activities involving pairs and, as far as we could tell, were always given by the individual that was following closely behind the other during a "chase." Occasionally a bird on its nest would call, particularly if disturbed. The call we heard most frequently was a rapid series of up to twenty "ki" syllables increasing in intensity followed by an extended series

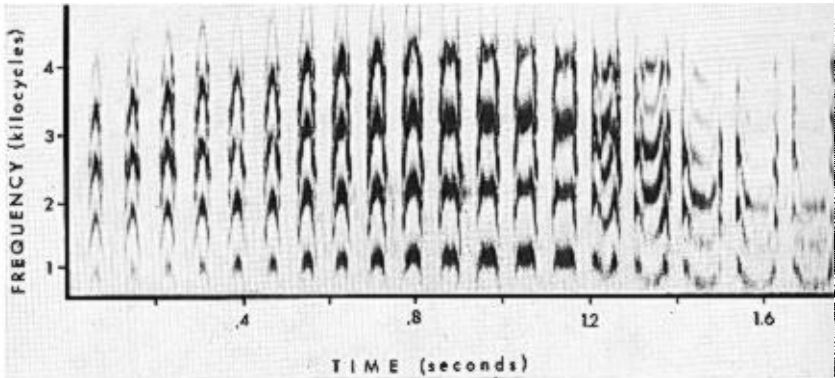


Figure 2. Spectrogram (using wide band-pass filter) of a South Trinidad Petrel's call recorded on Round Island. First 14 elements are a series of rapid "ki's" that increase in intensity and show some structural transition to the terminal "k-lu's" (last four elements). A complete call normally includes many more "k-lu's" than are shown here.

of lower, melodic oscillating "k-lu" notes (Figure 2). On several occasions we heard a rather different, harsh, descending "kree kree kree kree kree kree."

During the two October visits, Gill and Storer estimated that a maximum of 75 pairs of petrels were using the island. Banding studies are now needed to determine the extent of turnover of individual petrels actually on the island at any given time and thus to ascertain the total population size. We found most of the petrels near the summit of the island (Figure 3), though small groups of between 5 and 10 pairs were also nesting in several sheltered spots on the upper slopes.

As are other populations of this species, the South Trinidad Petrels on Round Island are highly variable in plumage color. In order to estimate the relative proportions of the different phases in the field, we divided the complex continuum of coloration into three major categories: 1) entirely dark brown, 2) dark throat and upper breast with white belly, 3) white below (occasionally with gray vermiculations) including throat. Entirely dark birds were the most numerous of these forms and white-throated forms the rarest. The population was composed approximately of 6:3:1 ratio of all dark forms to dark-throated forms to white-throated forms. Possible future changes in this composition will be of interest.

Correlated with plumage phase are differences in foot color, light-phase birds having bicolored feet with the outer half black and basal half and tarsus pink. The feet of dark-phase birds were entirely black while those of intermediate plumage types contained variable amounts of black on the tarsi and inner portions of the webbing.



Figure 3. Petrel nesting area on the summit of Round Island; Serpent Island is in the background.

Also corresponding to plumage color is variation in the underwing coloration, a character for which Murphy and Pennoyer (1952) described species-specific patterns that might be important for species recognition and the maintenance of reproductive isolation. Like the rest of the plumage the underwing color ranges from completely dark to predominantly white with a dark anterior border. It would be interesting to know whether such variability is found only in those populations that are not sympatric with a congener.

*Pterodroma arminjoniana* is known to be a surface-nesting petrel, and we found no evidence to the contrary on Round Island. However, the nests were almost always sheltered, sometimes under succulent plants or by tufts of grass, but usually under overhanging eroded rocks (Figure 4) or among large surface boulders. They are invariably on the shaded sides of such structures and thus protected from the intense midday sun. Except for a few pebbles and some small pieces of plants or bones, the nests consist only of bare rock or dusty soil.

On all three visits we found nests with eggs or young of various ages, including nearly full-size downy young. The downy young (Figure 5) are light gray, almost whitish in color, and not the dark brown or dusky gray Murphy and Pennoyer (1952) describe as characteristic of this and



Figure 4. Sheltered nesting site of a dark-phase South Trinidad Petrel on Round Island.

other species of *Pterodroma*. On 16 October we counted at least six downy young, some very small, but noted no eggs. On 22 October we found 3 eggs and over 10 young, some nearly full-size and some very small. On 21 November Jouanin examined six nests, three of which contained a single chick about 40 days old. The other three nests contained one egg each, one of which was fresh. In addition many birds were always sitting in nest-like situations but without eggs or young. Newton (1958) found 10 eggs in October 1954 and 1 egg and 14 chicks in December 1954. Of particular interest are the recent observations by Jean-Michel Vinson (in litt.) of both incubated eggs and full-sized young petrels on Round Island between 22 July and 9 August 1968. Thus it seems that some breeding occurs in this population of South Trinidad Petrels throughout the year, for if the times of incubation (i.e. at least 50 days) and fledging (90+ days) are at all similar to those of *Pterodroma hasitata cahow* (Wingate in Palmer, 1962), eggs producing full-sized young by 22 July were probably laid at the end of March and the young from eggs found fresh on 22 November would not fledge until late February. Populations of *Pterodroma arminjoniana* in the Pacific region and South Atlantic are known to breed throughout the year (Murphy, 1936; Murphy and Pennoyer, 1952).

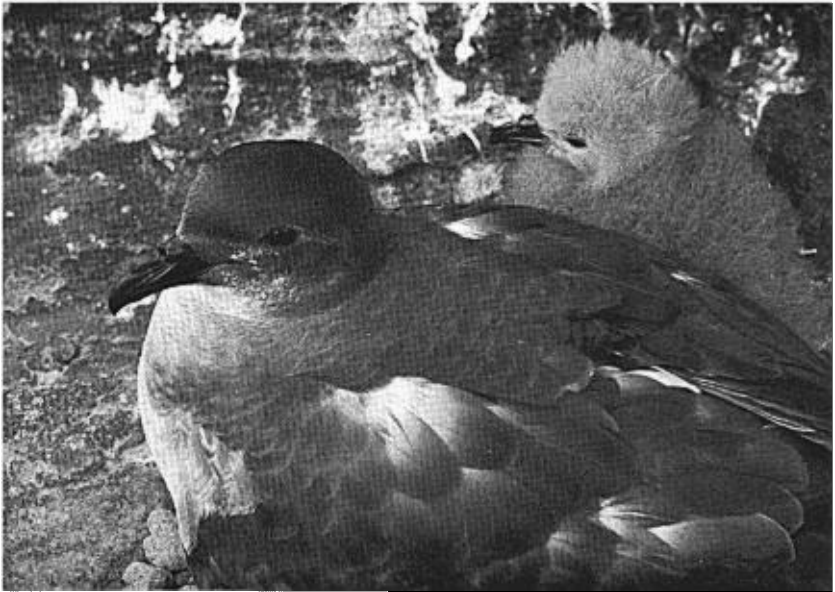


Figure 5. Adult South Trinidad Petrel (light phase) and downy young.

At present we have no evidence of migratory movements by these petrels; elsewhere the species is known to be sedentary and to occupy breeding stations throughout the year (Murphy, 1936; Murphy and Pennoyer, 1952). The only at-sea observations of South Trinidad Petrels in the Indian Ocean are by Newton (1958) in the waters around Mauritius and northward towards the Cargados Carajos archipelago.

#### OTHER SEABIRDS

Wherever soil existed in any quantity on Round Island, it was riddled with burrows containing Wedge-tailed Shearwaters. We also found shearwaters in rock crevices, in the piles of boulders on the island's summit, and in sheltered sites deep in tangles of vegetation, roots, or fallen branches, but unlike South Trinidad Petrels, the shearwaters were not active during the day and could be found only by careful searching. Also, Wedge-tailed Shearwaters were usually found in small colonies segregated from South Trinidad Petrels. On 16 October Gill found no eggs or young though the gonads of two specimens were enlarged. On 22 October very few shearwaters were found in the rock piles on the island's summit where there had been many the previous week. The three specimens taken on this second visit also had enlarged gonads; the one female had a brood patch and one large, collapsed follicle. On 21 November, Jouanin examined

18 nests, 17 with an adult incubating an egg and 1 with an adult without an egg or a chick. Of the five eggs checked at this time from incubating adults, four were almost fresh and the fifth contained a well-formed embryo without down. Apparently the nesting season of the Wedge-tailed Shearwater on Round Island starts later and more abruptly than that of the South Trinidad Petrels.

Nesting tropic-birds were scattered over most of the island but they were concentrated on the steep, relatively inaccessible slopes. We estimated about 200 pairs of *Phaethon lepturus* and 100 pairs of *Phaethon rubricauda* to be present on Round Island. From our rather quick survey, some segregation of the two species was discernible, *lepturus* tending to be on the southwest slopes in the same habitat as *Puffinus pacificus*, while *rubricauda* was more common on the steeper, eastern slopes. Also, *lepturus* nests were located among the exposed roots or fallen palm branches, or occasionally in rocky crevices, whereas *rubricauda* nested under rocky overhangs and among boulders in situations quite like those used by *Pterodroma arminjoniana*. Small *lepturus* young were found on 16 October and both eggs and chicks of various ages were present on 22 October. On this second visit we also found some large *rubricauda* young. On 21 November Jouanin found three adult *lepturus* incubating eggs, one adult *rubricauda* on an egg, and several well-grown *rubricauda* young about 40 days of age. Thus, like the Trinidad Petrel, the tropic-birds on Round Island must have a rather prolonged breeding season. The presence of large *rubricauda* chicks suggests that this species may start to nest before *lepturus*.

Prolonged breeding seasons in some Mascarene Island seabirds have been noted on Rodriguez Island (Bourne, 1968) and probably on the Cargados Carajos archipelago (Newton, 1958; Watson et al., 1963). But on Serpent Island just a few miles north of Round Island, a variety of seabirds, including Sooty Terns (*Sterna fuscata*), Brown Noddies (*Anous stolidus*), Lesser Noddies (*Anous tenuirostris*) and Blue-faced Boobies (*Sula dactylatra*) nest primarily in October and November (Vinson, 1950; Watson et al., 1963). While additional documentation of these breeding seasons is badly needed, the presence on Round Island of only four seabird species, three of which apparently have prolonged asynchronous breeding seasons, is especially curious. The explanation may lie in the fact that Serpent Island is virtually inaccessible to the local fishermen while Round Island is visited frequently during October and November and that the tropic-birds and South Trinidad Petrel are able to persist on the latter island because their entire reproductive effort is not confined to those months when disturbance and destruction are most likely. Wedge-tailed

Shearwaters, on the other hand, are undoubtedly less subject to disturbance in their underground burrows than the surface-nesting species.

#### ACKNOWLEDGMENTS

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