Round Island – a Tale of Destruction

David Bullock

Round Island, off Mauritius, is a classic example of the disasters that can follow the introduction of potential pests such as goats and rabbits on a small island. Their destruction of the vegetation inevitably leads to the destruction of the wildlife, and on Round Island this includes four reptiles that are endemic, several that are local to Mauritius and its islands, and several endemic plants. The author was a member of a scientific party which spent five weeks studying the island in July and August 1975.

Round Island, 22 km NNE of Mauritius, is one of the most isolated of a group of small islands. About 374 acres (151 ha) in size, it consists of half a volcanic crater, the rest being submerged, with steep sides sloping up to a curving summit ridge 280 m high.

Between 1840 and 1865 rabbits and goats were introduced, and overgrazing has greatly reduced the natural vegetation. Perhaps the worst loss has been the hardwood forest; a few dead remains are scattered over the badly eroded western and southern slopes which support a palm savanna of about 2300 fan palms, the indigenous *Latania loddigesii*. The western slopes show some signs of regeneration, but there are very few young palms on the southern slopes and this part of the savanna appears to be dying. Dotted amongst the *Latanias* and in gullies elsewhere are about 200 mature screwpines *Pandanus vandermeerschi*, another indigenous tree. Both provide good cover for reptiles, and the continuing survival of the endemic snake *Casarea dussumieri* and the endemic gecko *Phelsuma guentherii* depends very much on the state of the palm savanna. The two endemic palms, the bottle palm *Mascarena revaughnii* and *Dictyosperma album*, a hurricane palm, are reduced to fifteen and five mature trees respectively, with no regeneration of the latter and only a few seedlings of the former. In our vegetation quadrats which contained *Latania* seedlings an average of 62 per cent had been grazed by either goats or rabbits. We marked out potential exclosure sites to protect seedling palms, but it was not possible to erect fencing.

Approximately one-tenth of the island has a loose soil-and-rock covering extensively burrowed by shearwaters. In some places the birds have made the soil friable and very susceptible to erosion, and in cyclone Gervaise, in February 1975, several mature *Latanias* fell, probably as a result of being undermined by shearwaters. The ground vegetation is dominated by creepers especially *Passiflora suberosa* and *Tylophora laevigata* and the grass *Vetiveria arguta*. On disturbed soil, e.g. in the shearwater *Puffinus pacificus* colony and areas of rabbit scratchings, tobacco *Nicotiana tabacum* and purslane *Portulaca oleracea* predominate.

Reptiles

There are eight species of reptiles on Round Island – two snakes, three skinks, and three geckos – and four of them are endemic: both snakes, one gecko and one skink. The two snakes are of special interest because they

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are the sole representatives of a distinct group of primitive boas, the Bolyerinae. After intensive searches in most of the palm savanna we found twenty-six individuals of the commoner snake *Casarea dussumieri*. During the day, most specimens were found hiding under palm debris or in crevices, but after sunset several were seen hunting for small lizards and probably invertebrates. Characteristically, sensing snakes adopted a posture with the front part of the body raised above the ground, the head at an angle and the tongue constantly flicking. Although a few individuals were longer than one metre, which is close to the maximum length, most were about 50 cm long and some nearer 20 cm. A population estimate of approximately 75, based on our field work, does not include snakes which may retreat during the day into the inaccessible crown leaves of mature *Latanias*, but counts were also made at night when these particular snakes would be hunting nearer ground level. Lack of suitable cover for daytime retreats and reproductive activities may be one of the reasons for the present low population. We made observations, in daylight, of *Casarea* eating two species of skink – *Leiolopisma telfairii* and *Gongylomorphus bojerii* – and J. Vinson reported a specimen feeding on the gecko *Phelsuma ornata*, again in daylight,[6] these being the only prey items recorded. We also strongly suspected that this snake eats the nocturnal gecko *Cyrtodactylus serpeninsula*. Since there is an abundance of reptilian and invertebrate prey, food shortage is unlikely to be a factor limiting the population.

We found only one individual of the other snake, *Bolyeria multicarinata*. It was in rocky ground with sparse creeper cover, and was the first specimen to be sighted since J.M. Vinson recorded one not far away in December 1967, and only the fourth to be seen in the last forty years.[6] Our specimen was 88 cm long which is apparently nearly maximum size. *Bolyeria* has a small head and no neck, suggesting that it is a burrowing species, and certainly it was adept at burrowing through loose soil, plant debris, etc., and excellently camouflaged for this. A possible reason for its rarity is the destruction of the hardwood forest which may have been its primary habitat.

Some of the reptiles are more susceptible to cyclones than others, a point illustrated by comparing the population estimates of J.M. Vinson[6] prior to cyclone Gervaise and ours five months after Gervaise. However, only large differences in the population figures have been attributed to cyclone losses since Vinson's field methods were not consistent with ours.

Of the three gecko species on Round Island, the large *Phelsuma guentherii* is endemic, the small nocturnal *Cyrtodactylus serpeninsula* is endemic to Round Island and nearby Serpent Island, although its status on the latter is not known, and *P. ornata* is abundant on Round Island and also found on Mauritius and several outlying islets.

P. guentherii is usually found during the day clinging to the trunks of *Latania* or *Pandanus* trees. At sunset, at least some and possibly all the adult population descend from the trees to feed on invertebrates, especially the abundant cockroaches. The population seems to be greatly affected by cyclones. Vinson[6] estimated the pre-cyclone population to be 1500–1800; our post-cyclone estimate, arrived at by intensive searches in predetermined areas, area counts in suitable habitats and direct counts, was 200–300. By far the largest number are in the palm savanna on the north-western slopes, where the rock is very loose and the steep slopes badly eroded. How-

Latania palms *Latania loddigessii* on Round Island, framing a view of Serpent Island
Heather Angel

ever, it seems to be the most sheltered area, and so may maintain a reservoir population able to recolonise other parts of the island after a dramatic crash in numbers such as the 1975 one. This gecko lays pairs of eggs in October to December,[4] usually under rock overhangs protected from wind and predators. Occasionally one or two pairs of eggs were found on living *Latania* fronds, and once on the trunk of a *Pandanus* tree. Most sites are on the north-west and west flanks above the palm savanna, although a few isolated ones were found on the south-west and south slopes. In the exposed

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crater area, where there are very few mature trees, only old nest sites were found; one fresh site was recently discovered near the summit ridge (J.M. Vinson pers. comm.), but we saw no *P. guentherii* in this area.

The smallest gecko, *C. serpeninsula*, until recently thought to be extremely rare, had been overlooked because of its nocturnal habits. Our census of 3600–4500 individuals, based on area counts in suitable habitats and capture-recapture, is similar to the pre-cyclone figure of 4000–5000.[6] During the day, this gecko hides in vertical rock crevices, under dead vegetation and occasionally under boulders, emerging after sunset to feed on cockroach nymphs and woodlice,[6] cockroaches and geckos often emerging from the same crevice! In a sample of fifty-one full-grown individuals, forty-seven did not have their original tails and several had missing digits. These facts, together with frequent sightings of *Cyrtodactylus* and *Casarea* hunting in the same area, suggest that the snakes frequently attack the geckos, which may be for them a major food source, although some of the injuries may have been the result of territorial disputes.

The third and most abundant Round Island gecko, *P. ornata*, is associated with *Latania* and *Pandanus* trees although it is also seen on more open ground. In some parts of the palm savanna there is a pair of these geckos, and often juveniles on every mature *Latania*. The population was estimated, using the same methods as for *P. guentherii*, at between 5000 and 6000; the pre-cyclone population estimate is not known. Their diet includes small moths, larvae, and dipteran flies; after rain squalls these geckos were often seen licking moisture from leaves and flowers.

The three skink species are terrestrial and diurnal. The largest, *Leiolopisma telfairi*, which often exceeds 25 cm, is endemic. Except in large areas of bare rock it may be encountered anywhere on the island, although it prefers sheltered areas with vegetation. Often several will appear for scraps from a human meal, and at times the number round the camp rose to pest proportions. Our population estimate of 4000–5000 was based on sample quadrats, transects and direct counts and is the same as the pre-cyclone estimate.[6] *Leiolopisma* is very difficult to census because it is not confined to one particular habitat and frequently hides in crevices. It has been suggested that the population may be declining[5] and certainly we recorded very few juveniles less than 15 cm in total length, although this may merely indicate a low reproductive rate. Very little is known about the breeding behaviour; captive specimens have deposited eggs in the hot summer months of November and December,[6] but no eggs have been found on Round Island. Copulation was observed once, in an exposed situation at 15.30 on July 18 1975. These skinks spend most of the morning alternately basking and retreating to shaded crevices, but in late afternoon become more active, eating *Passiflora* berries, ants, flies, etc., and carrion. One was observed killing and eating a juvenile *P. ornata*, and a large adult was seen carrying a dead fledgling of the dove *Geopelia striata* of which several pairs nest on the island.

The inquisitive nature of *Leiolopisma* is matched only by that of the small, very active skink, *G. bojerii*, now found on only six islets off Mauritius.[5] Numbers on Round Island, estimated at 12,000–15,000 using methods similar to those used for *Leiolopisma*, do not appear to have been affected by the cyclone since a pre-cyclone estimate was the same.[6] Wherever there is ground vegetation or even just palm debris this skink may be found, although

its local abundance varies greatly. Counts were made in two 400 sq m. quadrats, one consisting mainly of bare rock with a cover of the creeper *Ipomoea pes-caprae*, and the other a dense association of herbs and creepers with a loose, mature stand of *Latania* palms; the results were mean populations of 20 and 53 respectively. Presumably this difference reflects the greater abundance of flies and other food in the thickly vegetated quadrat.

The only other species of reptile on Round Island is the small, elusive skink *Ablepharus boutonii*, which is found almost exclusively on coastal rocks, often in areas completely devoid of vegetation. Since this species has a wide distribution, including the Mauritius mainland, we devoted little time to it, and did not attempt a census. Where observations were possible up to eight individuals could often be seen together, all within a few metres of each other, usually on rock slabs around midday.

Rabbits

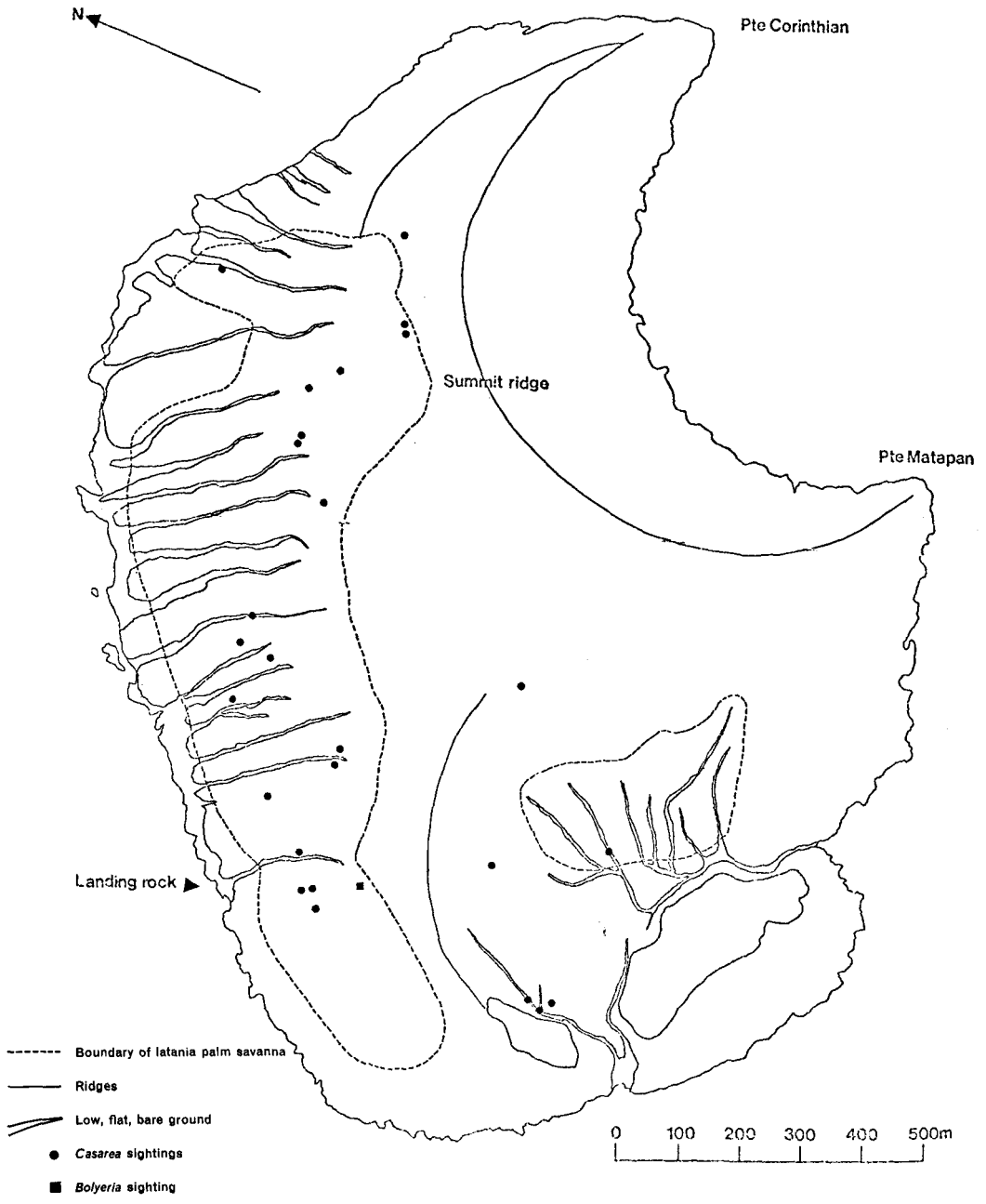
The rabbits *Oryctolagus cuniculus* were living completely above ground. No rabbit burrows were ever found,* and rabbits were seen washing, copulating and nesting above ground. However, it is possible that shearwater burrows may be used in May when no adult shearwaters are there. As with most other rabbit populations, they are crepuscular, lying up during the heat of the day in shady crevices and thickets of young palms. Our estimate of the population based on line transects and direct counts at dawn and dusk, indicated 1000 ± 200 individuals. Temple estimated 2000 but it is known that many were killed by the cyclone. The peak breeding season is probably just after the relatively cool, wetter winter period from August to September.

Four buck rabbits examined in mid-August and were all in reproductive condition. Copulation was also observed and a nest found containing one blind young, both factors suggesting a winter breeding season. It is possible, therefore, that the population may have increased in the absence of cyclones after September 1975. Their diet as determined by faecal analysis and direct observation, in August 1975, was predominantly *Passiflora*, especially the leaves and berries, and also *Portulaca oleracea*, *Solanum nigrum* and grasses. Rabbits are probably responsible also for the grazing of *Latania* seedlings; we had no direct evidence, but the areas with a high percentage of grazed seedlings corresponded closely to areas of high rabbit density. *Latania* and *Pandanus* seedlings, having spiny edges to their leaves, are relatively unpalatable to rabbits – they are still, however, grazed – but *Mascarena* and *Dictyosperma* seedlings are tender and very susceptible to grazing, especially since several of the surviving mature fruiting trees grow in areas of high rabbit density. The distinct browse-line on a recently fallen *Mascarena* with fresh, green crown leaves proved its palatability.

The coat-colour of Round Island rabbits has not reverted to the 'wild type', and colours range from sooty black to sandy, usually with some white on the feet or head.

* A.W. Owadally reports finding rabbits in burrows, the depth and size of which showed them to be rabbit not shearwater burrows, although the latter now use them. No rabbit dares to enter a burrow occupied by a shearwater. *Pers. comm.*

ROUND ISLAND



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Cyrtodactylus serpeninsula
T. Gardner

Goats

During our five-week stay on the island ten goats *Capra hircus* were seen, of which two were kids and at least three were billies. They were extremely wary and only observable at close range when carefully stalked. Observations of the feeding forays of one group of seven goats and faecal analysis showed that they ate most of the accessible plant species, even aromatic and spiny species.

Seabirds

The islets off the north coast of Mauritius comprise one of the few seabird breeding stations in the Western Central Indian Ocean.[2] Our visit did not coincide with the peak breeding seasons of any of the four species that breed on Round Island, but some of the breeding populations were present. We estimated that 40–50 pairs of white-tailed tropic birds *Phaethon lepturus* were occupying nest sites between July 19 and August 24. Most were incubating but a few had small young. They were widely dispersed and often concealed by vegetation, making them difficult to count.

Our estimate for the large conspicuous red-tailed tropic-bird *P. rubricauda* was 200–300 active nests, about half with eggs or very small young, indicating a protracted breeding season. It is fortunate that some of the population breeds during the winter months from April to September since there is considerable predation by local fisherman in the summer months, when landing on Round Island is relatively easy. We found bundles of wings and heads indicating a slaughter in at least seven places on the island, each containing 10–75 birds. They are eaten by the fishermen or sold to restaurants. Even on a one-day reconnaissance trip on July 3 1975, of 24 nests known to have been occupied a few weeks earlier, only two were found with any evidence of activity. Nearby, the remains of several birds with fresh blood stains indicated a recent landing.

A fairly well-defined race of the Trinidade petrel *Pterodroma a. arminjoniana* breeds on Round Island and South Trinidade Island off Brazil. About 35 pairs were in residence although in the peak breeding season, October/November, about twice as many breed.[2] They nest in rocky, exposed situations but are apparently not taken by fishermen.

About a tenth of the area of Round Island is occupied by burrows of the wedge-tailed shearwater *P. pacificus* at a mean density of roughly 0·7 burrows per square metre. In August, towards the end of our stay, birds were occupying and clearing out burrows in preparation for breeding in September and October. Possibly as many as 18,000 pairs breed in a season.

Nine shearwaters were found suffering from what was possibly a tick-borne virus infection, a paralytic condition that was invariably fatal, although no ticks were found associated with the shearwater colony. Two collected for autopsy and toxic chemical analysis showed marginally high levels of PCBs in muscle tissue,[1] but the investigations revealed nothing extraordinary.

Recommendations

The two main recommendations for Round Island are removal of the alien herbivores, rabbits and goats,* and halting or at least slowing down the erosion. If achieved these measures might ensure the survival of the reptiles and their prey. Difficult to land on from the sea, Round Island has no fresh water and can be excessively hot between September and April, and the establishment of a permanent warden, which would be highly desirable, may be impracticable at present.

Much of the 1975 expedition's work is repeatable, so that monitoring of the reptile, rabbit and tree populations with respect to age structure and total counts is feasible; permanent quadrats were established so that changes in the vegetation could be detected, and such field work would require only two or three days residence. But it cannot be overemphasised that rabbits and goats are a destructive, alien element and their eradication is strongly recommended.

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* In the autumn of 1976 a marksman sent by UFAW camped on Round Island and shot 883 rabbits and all but two of the goats.