

INCUBATION BEHAVIOUR OF THE RED-TAILED TROPICBIRD  
(*Phaethon rubricauda*) ON NORFOLK ISLAND

The four birds whose behaviour is described here were nesting at the base of Norfolk Island pines (*Araucaria heterophylla*) on ground sloping between 30° and 50° some 8-40 m from the sea. Two nests were on the seaward side and one on the landward side of their respective trees. The fourth was against the same tree as one of the seaward nesters but at 90° to and half a metre above it.

I took up an observation position on 17 December 1979 at 0445 hours (17 minutes before sunrise), from which I continuously watched these four birds until 1930 hours (15 minutes after sunset). From this position, where the birds were not disturbed by my presence, I noted three incubating postures. The most common was the *bill down* posture where, with wings folded close to the body, the head is pointed forward with bill lowered. The *bill up* posture was least common, similar but with the head pulled back into the body feathers and the bill pointing sharply upwards. Fleet (1974) found that Hawaiian birds adopted this position during rainfall, but no rain fell nor was any appreciable wind felt on this day. One bird was reacting to flies while in this position and eventually placed its head under its wing. The third position, in which the head is placed under the upper rear edge of the folded wing, I called the *head under wing* position. In the first two positions the eyes were sometimes open, sometimes closed, but in the last were completely shielded from view.

On other days when the birds were approached for banding and measuring, they adopted the *defence posture*, in which the tail is fanned, the wings are held away from the body and the open bill is held up with the loud raucous call sometimes given. These birds rarely gave the volume of threatening call and the aggressive lunging that I found in the Sugarloaf colony (Tarburton 1977), despite the fact that the Sugarloaf birds are rarely troubled by predators whereas Norfolk birds are attacked by cats, a large number of which roam the island. I found three tropicbirds that had been killed by cats, along with Wedge-tailed Shearwaters, White Terns, a Grey Noddy and a Black-winged Petrel that had suffered the same fate.

The above four postures are shown in Figure 1 and the time each bird spent in these is shown in Figure 2. The birds were not relieved of their incubatory duty on this day and the wide range in time spent awake may have been due to the varying time each bird had been on its incubatory shift. Bird three spent much time asleep and so may have been recently returned, and bird four, which was awake most of the day, could well have been nearing the end of its shift, which averages 6 days on Aldabra (Diamond 1975) and 8 days in Hawaii (Fleet 1974).

That bird three was the only one to preen at all (which it did for 25 minutes) may also indicate its more recent arrival. That the

other three birds did not preen may not be abnormal. Firstly, Elder (1954) and Thomson (1964) have shown that after experimental removal of the uropygium some species remain unaffected even though others exhibit deterioration of their feathers, beaks and leg scales and the development of rickets. Secondly, McKinney (1965) has shown in ducks that preening is not normal during incubation, though at other times they preen 2-17 times a day.

Between posture changeovers the bird would occasionally make a 180° turn on the nest, using the bill and wings as levers to do so. Once one bird was seen to turn the egg and then settle down as do birds that have a brood patch. The feet were behind the egg and so were not used for incubating, as they are in the Sulidae. Correct

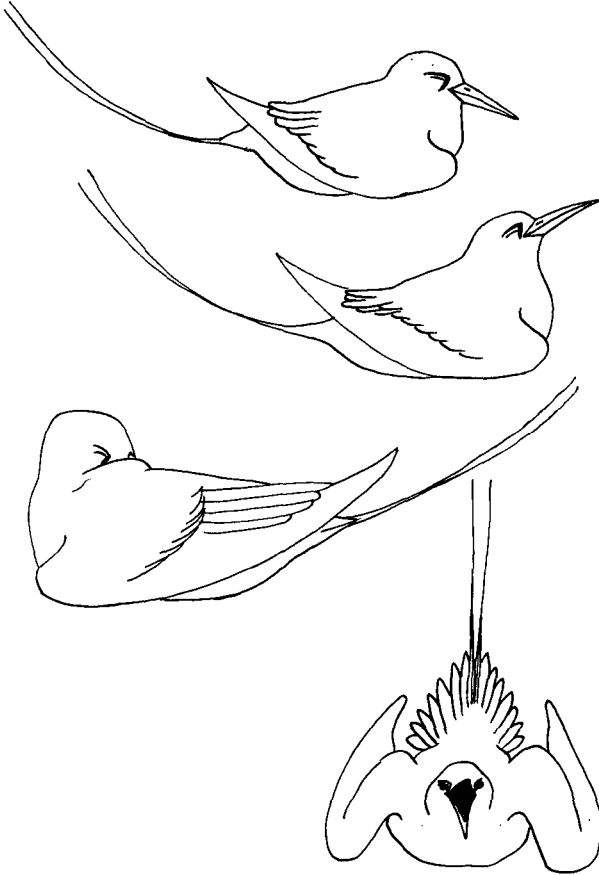


FIGURE 1

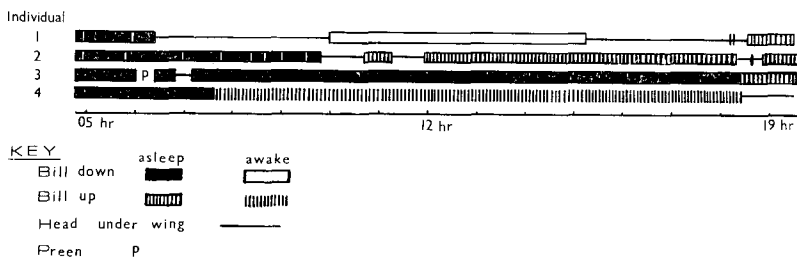


FIGURE 2 — Diurnal behaviour of incubating Red-tailed Tropicbirds

temperature seems to be maintained by placing the egg among the breast feathers with side-to-side and forward-to-back movements as the bird lowers itself over it.

As this species has a strong attachment to its nest site and its mate (Tarburton 1977), it is interesting to note the prebreeding behaviour at three nearby "nest sites." The sites were similar to those in this study except that one was at the base of a 3-metre cliff. In this behaviour, the birds prospecting for sites do aerial courtship and repeated landing circuits, all of which are easily observed and which I had used the previous season to estimate the more hidden portion of Norfolk Island's incubating birds (Tarburton 1979). At the first site a bird landed after four "trial landings" and spent the most of 7 h 16 min asleep in the bill-down position before departing at 1430 h. At the second site nine "trial landings" were made but no actual landing. A pair of birds made two successful landings and then many "trial landings" at the third site. Six days later I found an egg at only one of the sites.

The previous year, while estimating the population on inaccessible portions of the coast, I noted an apparent increase in birds involved in prebreeding behaviour between 1130 and 1530 h. To check this assumption, I made periodic counts of birds involved in this behaviour on the nearest 200-250 metres of coast. At 1025 h, there were two birds; at 1045 h, none; 1155 h, four; 1305 h, nine; 1330 h, 12; 1400 h, seven; 1410 h, five; 1510 h, none; and 1520 h, one. Thus the increase was real.

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