

## GENERAL NOTES

**Brown Noddy incubation shifts.**—In 1971 and 1972 I studied incubation behavior of Brown Noddies (*Anous stolidus*) breeding on Manana Island, Hawaii. Approximately 30,000 Brown Noddies breed on Manana annually (Brown 1976, Condor in press). I marked the caps of incubating Noddies with picric acid or "brilliant green" dyes. At least one and usually both mates were marked although the sexes were not known. In 1971 I determined hourly for 48 h which mate of eight pairs was incubating, and in 1972 I determined every 2 h for 72 h which mate of seven pairs was incubating. I checked at night using a headlamp with a red lens that did not disturb the birds. No eggs were left unattended by the parents for more than a few minutes.

The Brown Noddy incubation shifts on Manana averaged about 1 day long (mean = 23.3 h, SD = 6.9 h) based on one complete shift for each of 24 parents of 15 nests. Nonincubating mates are apparently at sea during the period, although it is possible they spend some time on Manana away from the nest. The incubation shift length varied from 3–41 h (Table 1), but more than half of the shifts were 20–28 h. I recorded the first time a parent took over incubation for each of

TABLE 1  
BROWN NODDY INCUBATION  
SHIFTS<sup>1</sup>

Length of shift (h)	No. of shifts observed
0–4	1
4–8	0
8–12	1
12–16	0
16–20	4
20–24	9
24–28	6
28–32	2
32–36	0
36–40	0
40–44	1
44–48	0

<sup>1</sup>Based on a single complete shift of each of 24 parents.

TABLE 2  
BROWN NODDY INCUBATION  
CHANGEOVERS<sup>1</sup>

Time of day	No. of changes
1200–1400	1
1400–1600	0
1600–1800	0
1800–2000	2
2000–2200	9
2200–2400	9
2400–0200	4
0200–0400	2
0400–0600	2
0600–0800	0
0800–1000	1
1000–1200	0

<sup>1</sup>Based on a single changeover for each of 30 parents.

30 parents of the same 15 nests (Table 2); 60% of the changeovers occurred between 2000 and midnight. Watson (1908, Pap. Tortugas Lab. Carnegie Inst. Wash. 2: 187) reported that Brown Noddy incubation shifts on the Dry Tortugas of Florida averaged 2 h and varied from 30 min to 5 h. Brown Noddies may shift more frequently on the Dry Tortugas than Manana because they apparently feed closer to shore (Watson, loc. cit.; Brown 1975, J. Anim. Ecol. 44: 738).

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