

fledging as brownish, and bluish-brown at the base. The *P. palpebrata* nestlings I observed at Marion Island may have developed this coloration prior to fledging, and after my departure from the island. The shape of the eye-ring of the two species (adult and sub-adult birds, and nestlings prior to fledging) was different (Fig. 1). However, this is an aid to identification only at very close quarters, and in live birds.

The two species are distinguishable at fledging, on the basis of eye-ring shape and general plumage coloration. It appears that wear on the plumage of fledgling *Phoebetria* produces buffy or whitish edges to the feathers, particularly on the mantle and nape of *P. fusca*. Thus a post-fledgling *P. fusca* with worn plumage apparently has a buffy or whitish mantle and nape, and would be very difficult to separate from adult and sub-adult *P. palpebrata* in the field. However, it appears that *P. fusca* consistently has a darker abdomen than *P. palpebrata*, and this may be a valuable aid to identifying juvenile *Phoebetria*.

I thank the South African Department of Transport for financial and logistical support of work at Marion Island, and my colleagues at the FitzPatrick Institute for advice and assistance. The project was carried out under the auspices of the South African Scientific Committee for Antarctic Research.

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#### MULTIPLE CLUTCHES BY WELCOME SWALLOWS IN THE WAIRARAPA

A pair of Welcome Swallows (*Hirundo neoxena*) was studied over four breeding seasons (1974-75 to 1977-78) at the Field Research Area of the Ministry of Agriculture, 8 km south of Masterton. It is assumed that the same pair was studied each year because their markings and behaviour were consistent. Daily observations were made during the nesting season from a hide only 1.7 m from the nest, which was under a farm bridge.

Both birds took part in the nest construction, which began in August each year and was characterised by slow beginnings, when mud was layered for the nest foundation, and by rapid completion (3 days) during the nest-lining stage. The important dates during the 1976-77 season, typical of each season, are given in Table 1. Eggs were laid one per day; the average of 10 clutches was 4.2 eggs, range 3-5. Incubation began immediately the last egg was laid and lasted 15-16 days. Chicks were fed by both parents and fledged at three weeks. Feeding continued for another two weeks, after which the chicks dispersed.

When chicks were very young, they were fed at intervals of often up to an hour but when they were near to fledging, intervals were nearer 30 minutes. After fledging, the intervals varied considerably

TABLE 1

11/8/76	First evidence of nest-building on bridge runner.
27/8/76	First egg in nest.
31/8/76	Four eggs and bird sitting.
18/9/76	Three chicks and one egg.
10/10/76	Chicks fledged, returning to nest at intervals.
17/10/76	Nest being repaired. Unhatched egg removed and found to have been infertile.
21/10/76	Nest re-lined with fresh feathers.
23/10/76	First egg in nest.
27/10/76	Five eggs.
13/11/76	Four chicks and one egg.
4/12/76	Chicks fledged and left nest.
11/12/76	35-40 swallows seen, with many staying up to four days.
12/12/76	Nest re-lined with fresh feathers.
14/12/76	First egg in nest.
17/12/76	Four eggs.
4/1/77	Four chicks in nest.
25/1/77	Chicks fledged.
5/2/77	Nest disappeared.

Thereafter, two swallows were seen on most days until early May. Seen irregularly at intervals of 5-6 days during, May, June and July.

and we did not try to note them, although we noticed that from sunset to dark the intervals were much shorter. Early morning and evening feeding of the fledged young often took place under the bridge near the nest; during the day, the young were fed usually while they were resting on fence posts or fence droppers. They were not seen to be fed on the ground.

In all three seasons 1974-75 to 1976-77, three clutches were laid. In 1974-75, from each of the first clutch of 5 and the second of 4, 4 chicks were hatched and were successfully reared, and the third clutch of 4 was deserted just before hatching. In 1975-76, from each of the first clutch of 4 and the second of 5, 4 chicks hatched and were reared and all of the third clutch of 3 were hatched and reared. In 1976-77, from the first clutch of 4, 3 chicks hatched and were reared and from each of the second clutch of 5 and the third of 4, 4 chicks hatched and were reared. This means that, from 38 eggs laid, 30 hatched (79%); if the deserted clutch of 4 is omitted, then 88% hatched. Successful fledging of hatched chicks was 100%.

In 1977-78, the nest was damaged, possibly by an opossum that was caught the next day under the bridge, two days before the first clutch of 4 eggs was due to hatch. Although they partly repaired the nest, the birds finally abandoned it almost two weeks later, at the end of September.

In the three full seasons, this pair of swallows reared 30 young. Their high breeding success must therefore be considered a major factor in the species' rapid increase since its arrival in New Zealand.

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