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INCUBATION PERIOD OF THE AUSTRALIAN GRASS OWL *TYTO CAPENSIS* LONGIMEMBRIS

Of the four or five species of Tytonid owl found in Australia, details of breeding are well known only for two, the Masked Owl, *Tyto novaehollandiae* and the Barn Owl, *Tyto alba* (e.g. Schodde & Mason 1981; Fleay 1949). There are no published accounts of the incubation period for the Australian Grass Owl, *Tyto capensis longimembris* in Australia, although McLachlan & Liversidge (1978) record 42 days for the African Grass Owl (*Tyto capensis*). This is unusually long for Tytonids. We report here some observations on the breeding of the Australian Grass Owl.

The observations were made on a sibling pair of Australian Grass Owls that hatched in captivity at the Cairns Bird Park in June 1983 and bred in Brisbane during April–May 1985. The parents of this pair were also siblings and had been hand-raised at the Cairns Bird Park after being picked up as chicks near Ingham. The female could be distinguished by the darker facial disc and speckles on the ventral plumage. The sex of each bird was confirmed at laparatomy under ketamine (10 mg intramuscular) and xylazine (2 mg intramuscular) anaesthesia at Cairns, in March 1984. At that time the gonads were small in both birds but the female had slight follicular development. On transfer to Brisbane the pair was established in an outdoor aviary (2 × 10 × 3 m) at the University of Queensland's Veterinary Farm at Pinjarra Hills. Diet consisted of fresh mice, frozen mice and chopped frozen rats. Food was supplied *ad libitum*. Each bird ate about 2 mice per day but increased to 3–4 mice per day during March–May 1985 before laying began. 'Courtship song' was first heard on some evenings, after dark, at the end of March 1985 when the male's trilling was heard as it perched on a high point in the aviary while the female was in grass on the ground. This trilling was like that used by courting male Barn Owls in captivity (J. Pettigrew & D. Margoliash unpubl.; Bunn 1977), except that the trills of the Grass Owl were not emitted continuously but in phrases of five to six trills with an interval of 2–3 seconds between each phrase.

The female Grass Owl laid eggs on the nights of the 10th, 12th, 14th, 16th and 19th of April 1985. Young hatched some time in the early morning of the 12th, 14th, 16th, 18th and 21st of May. Incubation began from the laying of the first egg, the female being fed by the male at the nest site on the ground, and she was not seen to leave the nest site until after all the chicks were hatched. The female sat tight in the early morning but could be enticed off the eggs briefly by throwing a freshly-killed mouse to her side. During the warmest part of the afternoon she stood over the eggs. These two opportunities each day allowed the eggs to be counted and showed that laying always occurred during the period between 6 p.m. and 9 a.m.

Assuming that the incubation time is similar for each egg, the mean incubation time is 31 days, counting from the midnight on the night the egg was laid until the midnight before the morning of hatching. We were sufficiently content with this assumption, and sufficiently concerned about disturbing the hen bird during laying, that we made no attempt to check it by marking the eggs for identification as they were laid. The close correspondence between the laying sequence and the hatching sequence also support this assumption.

The Barn Owl has an incubation period of about 31 days (Smith *et al.* 1974; Bunn & Warbuton 1977; Bunn *et al.* 1982) and the Masked Owl, 35 days (Fleay 1949, 1968). Our records therefore confirm that the Australian Grass Owl is like the Barn Owl and the Masked Owl in its incubation time. Like the Barn Owl (Bunn *et al.* 1982), the Australian Grass Owl has a staggered sequence of laying and hatching. Our figure of 31 days for the incubation period of the Australian Grass Owl is hard to reconcile with the previous report of 42 days for the African Grass Owl (McLachlan & Liversidge 1978). The latter figure seems likely to be an error.

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BEHAVIOUR OF THE LITTLE PIED CORMORANT *PHALACROCORAX MELANOLEUCOS*

Some authors (cited in van Tets 1965, 1976) propose that five species of *Phalacrocorax* (i.e., the microcormorants) should be placed in a separate genus *Halietor* or *Microcarbo*. The species concerned are the Pygmy Cormorant (*P. pygmaeus*), from North Africa and central Europe east to Afghanistan; the Reed Cormorant (*P. africanus*), from Africa and Madagascar; the Crowned Cormorant, (*P. coronatus*), from the west coast of Southern Africa; the Little Cormorant (*P. niger*) from India south-east to Borneo; and the Little Pied Cormorant (*P. melanoleucos*), from New Guinea, Australia and New Zealand (Landsborough-Thomson 1964; G.F. van Tets pers. comm.). All four species live in marine and freshwater environments and are distinguished by their generally small size and relatively long tails. The validity of *Microcarbo* as a taxon is debatable (van Tets 1965, 1976) because of gaps in our knowledge that could be at least partly filled by study of behavioural homologies among the microcormorants. However, so far as we are aware the behaviour of no microcormorant has been detailed except for brief, unclear descriptions of *P. africanus* by Olver (1984). Therefore it is not possible at present to make comparisons, either within that small group, or between the microcormorants and other phalacrocoracids.

For *P. melanoleucos*, work in coastal Manawatu, New Zealand between January 1981 and May 1983 was partly designed to provide information on all maintenance and social behaviour during breeding at the colony. Observations were made in two localities involving colonies of about 11 and 13 pairs at an ox-bow lake 23 km from the coast, and 22 pairs at a dune lake 1 km from the coast. Nesting occurred on a disused hunters' blind and in trees overhanging the water. From this work emerged several discrete areas of behaviour, which, according to the literature, contained differences to other phalacrocoracids.

In this note we draw attention to some postures and patterns of behaviour in *P. melanoleucos* that appear distinctive to us, and which could help in better understanding relationships between microcormorants and other phalacrocoracids. This note is based on a total of 700 h of observations made three days each week from a hide, with 7 × 50 and 13 × 30 binoculars. Photographs were taken to augment field notes and diagrams.

Normal

In the Normal posture the neck assumes a characteristic 'S' bend, and the bird appears to be relaxed even when it moves its head to scan the surroundings. The angle that the body makes with the substrate ranges from near vertical in calm conditions, to near horizontal in very strong winds, when the tail is also used as a counterbalance. The 'normal' posture (Fig. 1.1A) described here is not unique among cormorants, but is a socially 'neutral' posture with which other displays in this species may be contrasted.

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