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THE ECOLOGY OF THE PHEASANT COUCAL *CENTROPUS PHASIANINUS* (LATHAM) IN AUSTRALIA

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SUMMARY

The ecology of the Pheasant Coucal *Centropus phasianinus* (Latham) is described with reference to habitat, field characters and general habits, courtship display, breeding, food, distribution and description based on literature and field observations. 117 museum specimens were examined. A record of albinism is mentioned.

INTRODUCTION

The Pheasant Coucal *Centropus phasianinus* is found from the Minilya River in Western Australia, with seven subspecies through New Guinea to the eastern coast of Australia as far south as Conjola, New South Wales (Fig. 1). As yet the exact status of the seven subspecies listed for Australia and New Guinea is in doubt and has been questioned (Storr 1973). It is also recognised that the coucal has a large variation in size through its range (Gould 1865). Little work has been done on the ecology of the pheasant coucal and that of Frauca (1973) was rather inconclusive. This lack of ecological data accounts in part for the large number of Australian subspecies.

Between 1973 and 1976 I undertook a study of the Pheasant Coucal throughout Queensland. I made most observations on 3 nests at Kennedy (18°12'S, 145°57'E) 188 kilometres north of Townsville, which has three broad habitat types. These are a community of narrow-leaved ironbark *Eucalyptus crebra*, vine forest bordering streams, and plantations of the exotic pine *Pinus caribea* with an extensive understory of blady grass *Imperata cylindrica*. The study area was bordered on two sides by Meunga Creek and on the other sides by roads and contained one pair of breeding coucals.

BREEDING

Breeding Season

There are 33 dated breeding records for Australia all of which co-incide with the wet season in the areas concerned. Lavery, Seaton and Bravery (1968) gave the breeding season of the coucal in northern Queensland as October through March. May and July are the only months when coucals have not been recorded breeding.

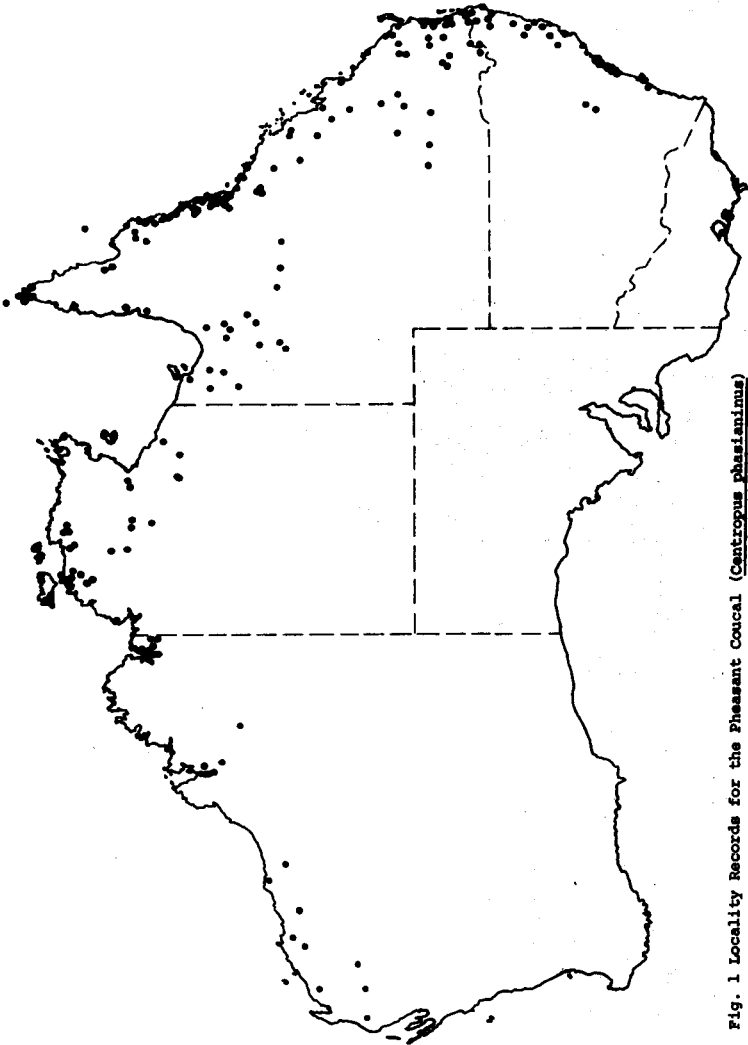


Fig. 1 Locality Records for the Pheasant Coucal (Centropus phasianinus)
Latham, in Australia.

Courtship

The courtship display of the Pheasant Coucal was observed three times, twice at Kennedy and once at Townsville. The male assumed a low crouching position behind the female then followed her moving his head from side to side or up and down. The female ran ahead of the male keeping her body close to the ground. During the courtship the male straightened his body and dragged his outstretched wings along the ground. The female raised her body to its normal height then straightened it, at which juncture the male immediately mounted and copulated.

Sometimes the male carried food in his bill while courting and fed the female. The male would leave for a short time then return with a grasshopper and would put it into the female's bill. Pratt (pers. comm.) has also observed that immediately the female straightened her body the male mounted and copulated. The straightening of the body appeared to be a signal that the female was ready for copulation. Pratt (1970) asks whether or not coucals mate for life? I have seen similar behaviour to that described by Pratt but, as yet, the exact significance of this has not been ascertained.

Nest and Territorial System

The Coucal nests in long grass although there are records of coucal nests in the lower leaves of *Pandanus* (Gould op. cit.). The nests are very cryptic and seldom seen unless 'stumbled' upon. Many different records of nests structure are available (Hill 1912). A nest found in the Kennedy study area was composed entirely of blady grass *Imperata cylindrica* var. *major*. It was open at either end and had a ramp of blady grass leading to the nest. Campbell (1901) received a note from S.W. Jackson regarding the nesting of the Pheasant Coucal in an old nest of a Grey-crowned Babbler *Pomatostomus temporalis*.

Eggs and Incubation

The eggs are off white and the clutch in the study area measured 42.4 x 29.9 mm, 38.1 x 30.4 mm, 36.8 x 30.7 mm. Clutch sizes vary greatly. Pratt (pers. comm.) has recorded the following:- three nests containing 2 eggs, seven nests with 3 eggs, five nests with 4 eggs and two nests with 5 eggs. Barnard (1926) recorded a nest with 7 eggs from Cardwell, Queensland. The Coucal will also shift eggs from a nest if exposed by mowing (Chisholm 1962). Pratt (1971 and 1972b) has shown the Coucal to be double brooded. Unpublished data from the C.S.I.R.O. records of R.J. Smith have shown that Coucals sometimes rear three to four broods in one nesting season. The incubation period is approximately 15 days and incubation duties are shared by both the male and female (Serventy and Whittell 1948).

The Chick

The newly hatched young are a dull leaden black and are covered with white trichoptiles. These trichoptiles are prolongations of the horny sheaths that envelope the developing feathers (Shelford 1900). The young have a crimson-red gape and a red tongue with a black tip. Faecal pellets are deposited at the entrance to the nest where they are picked up and carried away by the adult birds. Seven days after hatching pin feathers have developed and wing quills are approximately 2.4 cm in length. During these seven days the young have doubled in length and leave the nest at

10-15 days. In the nest in the study area the young measured 17.8 cm after 26 days and by 35 days were 29.8 cm in total length. When approached the chicks make a loud hissing noise interpreted as "pssch". If handled the young would defecate. At 65 days the adult birds chased the young and expelled them from their territory. Any attempt by the young to re-enter was quickly stopped by the adults.

FIELD CHARACTERS AND GENERAL HABITS

There are a wide variety of habits listed for the Coucal including thick scrub, creek banks, mangroves, forest country, grassland, swampy areas and heathland. Sharland and Hindwood (1941) recorded the Coucal in a small courtyard in a thickly populated suburb of north Sydney. It is a shy, elusive bird and is often seen creeping through grass. The Pheasant Coucal's flight is heavy with an alternation of rapid wing beats and gliding. It also uses a type of threat display. At Yarraman, Queensland, a bird was seen being attacked by two crows *Corvus orru*. The Coucal ruffled its neck feathers and uttered a scolding call. This threat display has also been used on coucals entering another's territory. Frauca (1967) has recorded a peculiar antic performed by Coucals. The birds will suddenly drop from a tree as if shot and upon hitting the ground run off into the grass. I have seen several birds do this at one time. The exact function of this had not been ascertained.

Calls

The Coucal calls mainly during the breeding season. Many different calls are listed in literature as given below.

Locality call: A succession of noted "Hoop-hoop-hoop-hoo-hoo-hoo-hoo-h-h-hoo-hoo-hoo" Slater (1970).

This call is given by both male and female from a prominent perch. The differences in the onomatopoeic renderings of the Coucals call is explained by the fact that male and female call in different pitches. The birds may call till 9.00 pm with individual calls normally lasting for approximately 45 seconds. A Coucals call timed at Nanango, Queensland lasted in excess of 17 minutes.

Alarm call: Double noted interpreted by Frauca (1967) as nah-oo ... nah-oo". Parent birds use this to warn of danger as young leave the nest upon hearing it. The chicks in the study area were heard to use this call after 50 days.

Scolding call: A harsh scolding call used in conjunction with threat display.

Chick calls: The young emit two calls, an alarm call interpreted as "pssch" and a feeding call, being a loud clicking noise.

Food

The diet of the Pheasant Coucal varies greatly and has been known to include the chicks of other birds. Pratt (1972a) recorded a Pheasant Coucal preying on Banded Landrail *Rallus philippensis* chicks at Murwillinbah, New South Wales. Rose (1973) recorded the following stomach contents from birds collected at Newport, Forester and Gloucester, New South Wales:- Yellow-winged Locust *Gastrimargus musicus*, Mantis Ootheca, many Acridids and Gryllotalpids, Notonectidae, Crusader Bug *Mictis*

profana (Coreidae) Elytra remains of Beetles, Lepidopteran Scales and larval hairs.

Frauca (1973) recorded the Pheasant Coucal feeding on a juvenile Eastern Water Rat *Hydromys chrysogaster* and Geary (1918) recorded two house Mice *Mus musculus* swallowed whole - in the stomach of a Coucal. Mathews (1910) recorded one male lizard, two grasshoppers and three wood-bugs in a bird collected at Parry's Creek. Frauca (op. cit.) has recorded the Coucal feeding on a juvenile Short-nosed Bandicoot *Isodon macrourus*, Northern Dwarf Frogs *Litoria bicolor*, Desert Tree Frogs *Litoria rubella* and some crabs (mainly sesarms and semaphore).

An examination of the stomach contents of birds collected from Coolabunia and Tamborine Mountain, Queensland revealed the following:- 7 grasshoppers *Austracris guttulosa*, 2 female spiders *Dinopus subrufa*, remains of one grasshopper *Bermius brachycerius*, an insect cocoon, 1 piece of waxed paper. During a grasshopper plague at Coolabunia all coucals examined had only grasshoppers in their stomachs. A Fence Skink *Cryptoblepharus boutonii* and a Juvenile Bearded Dragon *Amphibolurus barbatus* have been seen to be taken by the Coucal also. From the diversity of food that has been recorded as being eaten by the coucal I would infer that the coucal is an opportunist feeder.

Description

There are four recognised plumage phases. Those described below are taken from specimens in the Queensland Museum.

Juvenile.

Upperparts: crown and back cinnamon brown streaked with white shafts.

Underparts: cinnamon brown with buff and brown belly.

Wings: cinnamon brown with many brown bars.

Tail: barred and speckled with buff and brown.

Non-breeding.

Upperparts: crown and back cinnamon brown streaked with white shafts.

Underparts: cinnamon brown with brown belly.

Wings: cinnamon brown with many bars.

Tail: very lightly barred and speckled with buff and brown sometimes with white-cream tail tip.

Intermediate. (extremely variable)

Upperparts: head and back black.

Underparts: cinnamon brown with black feathers scattered throughout.

Wings: cinnamon brown with many brown bars.

Tail: black barred with speckled grey.

Breeding.

Upperparts: head and back black.

Underparts: black

Wings: cinnamon brown with black and brown barring.

Tail: black barred with speckled grey.

After moulting out of the juvenile phase the Coucals plumage is in the non-breeding phase. Coucals have a yearly breeding cycle similar to many Asiatic Coucals. As the breeding season approaches they start to moult and for a period have what is termed an intermediate phase. As moulting continues the intermediate phase is succeeded by the breeding phase. At the end of breeding the Coucals moult through the intermediate phase back in to the non-breeding phase and so the yearly cycle continues.

The examination of 117 Pheasant Coucal reference skins provided the following 'typical' measurements of their external morphology (Table 1).

TABLE 1

External measurements of the Pheasant Coucal in millimetres
(mean)

Sex	Length	Wing	Tail	Bill Length	Bill Depth	Bill Width
M	583.2	241.5	344.9	37.5	14.6	8.9
range	690-480	293-212	420-293	46.3-33.5	17.3-13.0	10.5-7.2
F	608.7	250.8	360.1	39.2	15.0	9.0
range	690-420	304-224	404-320	43.0-32.6	17.0-12.0	11.0-7.3

The iris is red or red brown and the feet and legs, slate grey. The bill is pale brown to black. Albinism and melanism are rare in the Pheasant Coucal. Enwright (1945), in describing a Black Pheasant Coucal stated he "found melanism rare". During the examination of the Queensland Museums Coucal collection an Albino Pheasant Coucal was found, the first record of such. No date was available on this specimen. The bird was completely white except for two partly black primary feathers and five black feathers on the rump.

DISCUSSION

The breeding season of the Pheasant Coucal coincides with the wet season in each State by observation this is usually when the Coucal's food, primarily insects and frogs, is in most abundance. It is tempting to suggest that availability of food determines the length of the Coucal's breeding season as well as the number of broods hatched and reared. This is perhaps strengthened by the fact that in areas where the rainy season was prolonged several Coucal pairs reared two or three broods. Because of the low number of observations of the Coucal's courtship display it is hard to judge how significant the courtship is in relation to whether birds mate or not. One thing can be stated however that in all observat-

ions of copulating coucals the female always stiffened her body prior to copulation. This would seem a necessary adjunct to mating. Sex differentiation is difficult and indeed it is only by close comparison between individuals in a breeding pair that male and female can be separated, the female being slightly larger. Males and females sound to have differently pitched calls and this may perhaps be used for sexual differentiation if sonogrammal analysis confirms this. The taxonomy of the Coucal remains a subject of controversy. Although one sub-species is still regarded as valid no definite work has been done to support or reject these claims. During the measurement of the museum specimens I found it impossible to classify many of the Coucals into these subspecies because of the large variation in colouring and the extreme overlap in measurements between the seven subspecies. This highlights the confusion over the taxonomy of the coucal.

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NOTES OF THE BREEDING HABITS OF THE BRUSH TURKEY

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INTRODUCTION

I observed the activities of the Australian Brush-turkey *Alectura lathami* in Dorrigo National Park, N.S.W., on ~~2nd~~ **2nd September 1978**. Brush Turkeys are relatively abundant in the Park and are commonly seen in the "Glade" picnic area. At the time of my visit up to 30 turkeys were seen daily, the highest number yet recorded by the ranger. Only one of these had the full yellow wattles of the reproductive male; he was engaged in construction of an incubation mound, where these notes were made.

THE MOUND

The mound was located within 20 m of a main walking track in a warm-temperate rainforest with sparse ground vegetation. It was on a slope of about 30° and as a result was elliptical with the apex close to the uphill side. The mound (1.25 m high, 4 m wide and 5.5 m long) was composed of leaf litter and twigs mixed with a considerable amount of soil and according to the Ranger, had been constructed this season. An area of approximately 20 m by 30 m, mainly uphill from the mound, was cleared of almost all leaf litter, exposing a large slope of bare soil.

OBSERVATIONS

Observations were made within 2 - 3 m of the mound and apparently caused no disturbance to the birds. The male arrived soon after dawn (0611 hours) and immediately inspected the mound. With head drooped and neck wattles inflated he gave a deep booming call atop the mound. A small group of turkeys including females and possibly immature males, approached and the male left the mound rapidly and rushed toward them calling. The group retreated quickly but remained within 20 m of the mound throughout the morning, feeding in the leaf litter.

Territorial activity by the male continued for about half an hour; he toured the perimeter of the cleared area, called at intervals, and chased any turkeys trespassing in this area. Thereafter, I heard no other calls.

The male spent most of the day in constructing and maintaining the mound. Material from the forest floor was collected using strong backward sweep of the legs, moving slowly up to the mound and then kicked onto the sides and top. Almost all the dead plant material had already been gathered and much of the material moved during this day was soil.

Throughout the day, the male frequently visited the mound. At time intervals varying from one to six minutes, he stopped scratching the ground and moved hurriedly to the mound. The interval between these visits seemed to depend on the distance from the male to the mound. Visits were most frequent when he was working within a few metres of it. Other turkeys often came into the cleared area, and once three climbed the mound and dug about the surface. Intruders were always immediately chased off by the male.

The scratching-mound visiting routine continued from 0630 until about 1500 hours. Around noon, in the absence of the other turkeys the male only moved to within sight of the mound before returning to his scratching. He left the area only once during the day and during this brief period was seen feeding in the glade. He did not appear to feed or rest at any other time, although he did eat small red berries uncovered in the leaf material.

Between 1500 and 1555 hours the male dug a small, shallow depression in the mound and continued digging until it was deep enough (50 cm) to contain most of his body; only the tail was visible. A few minutes later, a turkey (presumed to be female) was seen at the base of the mound. The male made no attempt to chase her. She walked up the mound and the male, crouched inside the depression with his head downwards, remained completely still for about 60 seconds. The female was joined by another turkey on the side of the mound. This individual departed quickly when the male began to emerge from the depression.

The male then approached the female; she ruffled her body feathers and dropped her wings. She remained on the side of the depression rim farthest from the male and always moved away when he approached. The male crouched head down in the depression on two more occasions. At about 1600 hours the female squatted on the rim and copulation took place. This lasted about 20 seconds and immediately afterwards the female began to scratch and dig in the hollow. The male watched and did not interfere. After a few minutes of this activity, the female left and the male spent about half an hour filling in the depression and reshaping the mound.

DISCUSSION

Both Fleay (1937) and Frith (1962) have noted that the male scrub turkey does not tolerate other turkeys at the mound except for mating and egg-laying; my observations are in agreement with theirs. Fleay (1937: 155) stated that observing the mating of the birds is "apparently an exceedingly rare event" but reported that a mating of captive turkeys at Melbourne Zoo took place on the mound and was followed by scratching of material by the hen. This corresponds with my observations of wild birds.

Because the surrounding area was almost completely bare of material and soil was being shifted to the mound, I thought that the mound was near completion. However, the temperature just below the mounds surface was

only 0.5°C above ambient temperature, indicating that no active fermentation had commenced.

The outward appearance of the mound may not indicate its stage of construction or completion, temperature being a more reliable indication.

The male probably entered the depression to detect or regulate the mound's temperature. Frith (1976) reported that a male tests the temperature of the mound by digging small holes in the surface and burying the head. The greater depth rated here (about 50 cm) may have been an attempt to detect fermentation activity at a level closer to the core of the mound. This would be especially important during the laying stage of the breeding cycle. This deep depression would also facilitate the laying of eggs at a depth within the mound and it is likely that eggs are laid at a depth corresponding to the depth to which the male turkey had dug.

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BIRDS AND BIRD NAMES FROM WARABER ISLAND, TORRES STRAIT

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INTRODUCTION

Waraber Island (also known as Sue Island) is one of the central group of Torres Strait Islands; it is located at 10°12'S, 142°49'E, and is about 60 km from Cape York, the nearest point of the mainland. During the summer of 1977/78 the island's insects were studied by a team from the Division of Entomology, C.S.I.R.O., and as part of this project I spent six weeks on Waraber from late January to early March 1978. This paper contains an account of my ornithological observations during this period, together with a list of the islanders' names for the birds. Both the observations and the names may be compared with those reported by Ingram (1976); he made a day's visit to Waraber in July 1974, and listed the bird names used on Mer (Murray Island, 9°55'S, 144°02'E) in the eastern island group.

Waraber is a low wooded cay about 1300 m long by 700 m wide. Parts of the woodland are quite thick and apparently little frequented by the islanders, elsewhere there are artificial clearings, often overgrown, and coconut plantations. Within the woodland there are several groups of quite tall trees. Along the southern shore of the island there is a broad belt of open grassland with a few scattered bushes, and the island is bisected by a grass airstrip where regular mowing keeps the vegetation down to a height of about 200 mm or less. There are no mangroves and, except for three or four recently excavated ponds, no fresh surface-water. The population of about 100 all reside in a village at the north-eastern end of the island.

Waraber Island is surrounded by a coral reef enclosing shallow water, and at low tide several square kilometres of mud and sand are exposed, especially to the south-east. Two uninhabited neighbouring islands, Burar (Bet Island, 7 km to the north) and Guijar (Poll Island, 5 km to the south) have similar reefs, but are separated from Waraber by deep channels; these three islands form a group known, from their English names, as the Three Sisters.

My visit to Waraber took place during the island's rainy season. The weather was variable and included dry periods when there was a calm or a light south-easterly wind. The prevailing wind, however, was from the north-west and was often accompanied by rainstorms. On two occasions this wind rose to near gale force, and the rain then fell in fierce squalls.

Observations of Birds

Observations relating to particular species are presented in the systematic list, where the scientific names will be found. The order of species, the nomenclature and the English names follow R.A.O.U. (1978). In this section the more general features of the island's birdlife are described.

It is clear from the systematic list that the land-bird fauna of the island is very limited. Three species are numerically dominant - Pale White-eyes in the woodland, Chestnut-breasted Mannikins in the grassy areas, and White-breasted Woodswallows in the air overhead. Of the remaining woodland birds only one, the Yellow-bellied Sunbird, can be regarded as common, and the lack of diversity in the woodland avifauna was one of the most striking features of the island's birdlife.

The majority of the birds seen on the island can be classed either as shorebirds or seabirds, and it is remarkable that exactly half of the 54 species recorded were of the order Charadriiformes. These species depend on the extensive tidal mudflats and the surrounding shallow seas for food, and use the island primarily for shelter and as a roosting-place. At high-tide large numbers of waders especially Lesser Golden Plovers, Ruddy Turnstones, and Mongolian/Large Sand Plovers, were to be seen in compact groups in the grass of the airstrip, and the top-most branches of the tallest trees were filled with roosting Whimbrel and Grey-tailed Tattlers. On one occasion this treetop site was also used by two Terek Sandpipers. The Bar-tailed Godwits apparently roosted mainly on Guijar Island, where they would have been free of human disturbance; they were sometimes observed flying across the intervening channel and arriving at Waraber just as the first mudflats were exposed by the ebbing tide. The birds on the airstrip fly up in dense flocks

when disturbed, and must present a significant bird-strike hazard to aircraft.

Many of the shore-birds and sea-birds on Waraber during this period were northern-hemisphere breeders and were presumably about to depart for the north. During late February and early March seven of these northern-breeding species - Lesser Golden Plover, Mongolian/Large Sand Plover, Red Knot, Great Knot, Sharp-tailed Sandpiper, Red-necked Stint and White-winged Tern - were seen in partial or complete breeding plumage, and changes in the numbers of two other species - Grey Plover and Greenshank - suggest that migration was already in progress. Two species - Red Knot and Sanderling - were seen on one occasion only, which suggests that the birds observed were passage migrants.

The location of Waraber approximately halfway between the Cape York Peninsula and the Papuan coast should make it an ideal place to observe the Australia-New Guinea migration system. The northward movement of Torresian Imperial-Pigeons was very obvious, and it seems certain that the Uniform Swiftlet and the Rainbow Bee-eaters were passage migrants, but the Sacred Kingfishers and the Common Koel were probably southern-hemisphere winter visitors. The most interesting event, however, was the observation of a good number of Black-faced Monarchs on March 3rd; this had all the characters of a 'fall' of migrants, especially as none of the birds could be located on subsequent days. It is interesting to note that this species was not known to the island elders. Some of the other infrequently-seen land-bird species may also have been migrants, but the possibility of a small resident population cannot be excluded.

In his discussion of the birds of the Cape York Peninsula, Kikkawa (1976a, 1976b) gives an up-to-date list of species recorded in the Torres Strait. Of the 54 species reported here from Waraber Island, eight (marked with an asterisk in the Systematic List) form additions to Kikkawa's list. Seven of these additional species are known migrants, but the migratory status of the eighth, the White-browed Crane, is uncertain. The pattern of records of these eight species during my stay on Waraber suggests that one, Bar-tailed Godwit, is a non-breeding season visitor to the island, whereas the remainder are probably passage migrants. During his July visit Ingram (1976) observed five species - Brahminy Kite *Haliastur indus*, Red-capped Plover *Charadrius ruficapillus*, Black Noddy *Anous minutus*, Spectacled Monarch *Monarcha trivirgatus* and Spangled Drongo *Dicrurus hottentottus* - not seen by me; the last three of these species, at least, are known migrants, and evidently visit the island only seasonally. R. Draffan (pers. comm.) observed a Brown Honey-eater *Lichmera indistincta* on the island on March 8th, shortly after my departure. In addition, the island's avifauna includes a Quail (Phasianidae) or Button-quail (Turnicidae) and probably a second species of Rail (Rallidae). These birds were extremely elusive during my stay, but both adult and juvenile 'quail' were seen by my colleagues during early January.

Names of Birds

The bird names were collected from two of the island elders, one of whom also suggested the spellings. The identifications were made from the illustrations in Slater (1970, 1974). Many of these names are well-known to all the islanders, but a few have apparently fallen into disuse.

The language of Waraber is Mabuiaq, which is spoken throughout the western

and central groups of Torres Strait Islands; a second language, Miriam, is spoken in the eastern group. According to Wurm (in Walker 1972) Miriam is a typical Papuan language, but Mabuiaq words are derived from both Australian and Papuan sources. A list of Miriam bird names has been given recently by Ingram (1976). Ray (in Haddon 1907) and Lawrie (1970) have both given bird names for these two languages, but the identifications in these works are often inexact. The present list contains 14 names that do not appear to have been given previously.

Of the 36 names collected on Waraber, at least 23 refer, in effect, to particular taxonomic species, whereas about eight are group-names used for a number of species; two species - Osprey and Reef Heron - each have two names. The 23 identifiable specific names are included in the appropriate entry in the systematic list, the remaining 13 names are listed separately at the end of this section. Ingram obtained almost exactly the same number of names on Mer, but only about half the names in each list refer to species or groups that appear in both lists; of these comparable names, slightly less than half are essentially the same and the remainder are apparently unrelated. A few of the names in both lists have evidently been derived imitatively from the birds' calls.

The 13 non-specific or inadequately identified names are: *bukiri*, used for both the Sacred and the Straw-necked Ibises; *bazi* and *bazu-guru*, for, respectively, a large and a small Quail or Button-quail; *elu*, for a species of Rail; *pai*, for both the Pied and the Sooty Oystercatchers *Haematopus longirostris* and *H. fuliginosus*; *sui*, for all small Waders; *kalu*, for both Whimbrel and Eastern Curlew; *sileu*, for all small 'white' Terns; *sara*, for the Larger Terns; *dua*, for the Black Noddy and/or the Common Noddy *Anous stolidus*; *keu*, for both the Forest and the Sacred Kingfishers; *mut*, which apparently means simply 'small bird', but which is used particularly to refer to the Yellow-bellied Sunbird and the Pale White-eye; and *sasere*, for a Small Passerine, probably the Willy Wag-tail *Rhipidura leucophrys*.

Systematic list

The Mabuiaq names are given in brackets after the scientific names. Figures in parentheses indicate the maximum number of birds seen. Unless there is a statement to the contrary it may be assumed that the population of a species showed no obvious changes during my visit.

- Australian Pelican *Pelecanus conspicillatus* [awai] (19). Seen only during March.
- Darter *Anhinga melanogaster* [gamai] (1). Late January and early February.
- Least Frigatebird *Fregata ariel* [omer or womer] (9).
- Eastern Reef Egret *Egretta sacra* [karbai (white phase) or kunai (grey phase)] (67 white phase and 13 grey phase).
- Rufous Night Heron *Nycticorax caledonicus* [gau (pronounced 'gow-oo')] (2).
- Sacred Ibis *Threskiornis aethiopia*. A party of 33 flew over from north-east to south-west on February 23rd.
- Straw-necked Ibis *Threskiornis spinicollis* (3). Late January.

Osprey *Pandion haliaetus* [kuia or arser-arser] (Not seen).

White-bellied Sea-eagle *Haliaeetus leucogaster* [kuzi] (1 ad. and 1 juv.). Both birds seen once only, during February. According to the islanders, kuzi nests on one of the two neighbouring islands, and kuia on the other.

Orange-footed Scrubfowl *Megapodius reinwardt* [surka]. (Not seen, but the presence of a number of large mounds on the island suggests that this species formerly bred there.)

*White-browed Crake *Poliolimnas cinereus*. One record only - on February 7th a bird was found in an insect trap, apparently attracted by the light of a mercury-vapour lamp.

Beach Thick-knee *Burhinus neglectus* [taniu] (2).

Pied Oystercatcher *Haematopus longirostris* (3). Late February and early March.

Masked Lapwing *Vanellus miles* [tria-tria] (2). The northern subspecies, *miles*. Usually found on the grass of the airstrip.

*Grey Plover *Pluvialis squatarola*. In late January a flock of about 30 were seen, and, although most of these soon departed, a single bird was still present in early March.

Lesser Golden Plover *Pluvialis dominica*. Very numerous.

Mongolian/Large Sand Plover *Charadrius mongolus/leschenaultii*. "Sand-plovers" in non-breeding plumage were very common on Waraber, but difficult to identify specifically; probably both species were present. The birds in partial breeding plumage looked more like *leschenaultii* than *mongolus*, but it seems wise to regard all birds simply as 'sand-plovers'.

Ruddy Turnstone *Arenaria interpres*. Numerous.

Eastern Curlew *Numenius madagascariensis*. A few present.

Whimbrel *Numenius phaeopus*. Very numerous.

Grey-tailed Tattler *Tringa brevipes*. Numerous.

Greenshank *Tringa nebularia* (c20). More were present at the end of my stay than at the beginning.

Terek Sandpiper *Tringa terek*. Moderately common.

*Bar-tailed Godwit *Limosa lapponica*. Moderately common.

*Red Knot *Calidris canutus* (1). A single bird in breeding plumage on February 24th.

Great Knot *Calidris tenuirostris*. Moderately common.

Sharp-tailed Sandpiper *Calidris acuminata* (3).

- Red-necked Stint *Calidris ruficollis*. Very numerous.
- *Sanderling *Calidris alba* (2). Two in non-breeding plumage on March 5th.
- Silver Gull *Larus novaehollandiae* [kipru]. A few.
- White-winged Tern *Chlidonias leucoptera*. A few were usually to be seen flying low over the grassy parts of the island.
- Gull-billed Tern *Gelochelidon nilotica* (1). A single bird in breeding plumage present during late February and early March.
- Common Tern *Sterna hirundo*. Birds in non-breeding plumage with the black bill and legs of the race *longipennis* were moderately common.
- Black-naped Tern *Sterna sumatrana*. A few.
- Sooty Tern *Sterna fuscata* [kangan] (Not seen).
- Bridled Tern *Sterna anaethetus* (2). An adult and a juvenile were seen on a beach on January 30th, apparently taking shelter from the wind; this observation followed a period of very heavy weather from the north-west.
- Little Tern *Sterna albifrons*. Moderately common in late February and early March.
- Crested Tern *Sterna bergii*. Common.
- Lesser Crested Tern *Sterna bengalensis*. A few in January.
- Rose-crowned Fruit-Dove *Ptilinopus regina* [weaba] (pronounced 'way-ba'). Present in the woodland in small numbers.
- Torresian Imperial-Pigeon *Ducula spilorrhoa* [gainau]. Several small flocks seen flying to the north, especially in late February.
- Bar-shouldered Dove *Geopelia humeralis* [kuku]. A few present, usually around the bushes in the open grassland area.
- Common Koel *Eudynamis scolopacea* [karpui] (1). A female on March 6th.
- *Uniform Swiftlet *Collocalia vanikorensis* (1). A single bird hawking over bushes at the edge of the open grassland area on the morning of February 23rd, following a period of north-westerly winds and rain.
- Forest Kingfisher *Halcyon macleayii* (1).
- Sacred Kingfisher *Halcyon sancta* (3). Several sightings in late February and early March.
- Rainbow Bee-eater *Merops ornatus* [biru-biru] (5). A single party seen, on February 28th.
- Dollarbird *Eurystomus orientalis* (1). Occasional sightings of a juvenile in late February and early March.

- Noisy Pitta *Pitta versicolor* [popo]. This species was never seen, although a dead bird was found by a colleague before my arrival. The distinctive call was often heard during the day until mid-February, and the species was probably not uncommon in the wooded part of the island. In late February and early March the call was heard occasionally, but only at dawn or dusk. The islanders did not recognise the illustration of this species, which they said they had never seen; however they immediately recognised an imitation of the call.
- Mangrove Golden Whistler *Pachycephala melanura* (1). A single male seen twice in late February and early March was assumed to be this species rather than the Golden Whistler *Pachycephala pectoralis*.
- *Black-faced Monarch *Monarcha melanopsis*. Seen only on two dates - February 17th, when a single bird was seen, and March 3rd, when about ten were found in a number of different locations.
- *Satin Flycatcher *Myiagra cyanoleuca* (2). A few sightings in mid-February and early March.
- Red-headed Honeyeater *Myzomela erythrocephala* [welli (pronounced wee-lee)]. Occasionally sighted in the wooded areas; apparently a small resident population.
- Yellow-bellied Sunbird *Nectarinia jugularis*. Moderately common. Found mainly in the wooded areas, but also in the bushes of the open grassland.
- Pale White-eye *Zosterops citrinella*. Very numerous. Like the Sunbird this species is found both in the woodland and in bushes in the more open areas. The breeding season apparently ends about the beginning of February, as fully fledged juveniles were seen then, and as by mid-February the previously quiet adults were signing profusely. The song is an attractive warble of high-pitched notes, given in a short phrase with a distinct rhythm. Two calls were noted: a loud 'tew' used by young birds as a begging call, but also probably used by adults in feeding parties as a contact call, and a quiet 'chirr-chirr-chirr' flight call.
- Chestnut-breasted Mannikin *Lonchura castaneothorax* [bai mut]. Common. Restricted to grassland areas: 'bai' means 'grass'.
- White-breasted Woodswallow *Artamus leucorhynchus* [buli]. Common. Seen regularly in flight above all habitats.

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I visited Waraber as part of my work for the C.S.I.R.O., and the observations reported here were made incidentally to my official duties. I am grateful to the Waraber Island Council for granting me permission to visit the island, and to my colleagues, without whose support I would have found no time for ornithology. I am especially indebted to the two islanders, Sario Bob and Edward Mari, for supplying the bird names, and to Robert Draffan of Thursday Island for his advice and encouragement.

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SUSPECTED BOTULISM POISONING OF WATERFOWL AT SEVEN MILE LAGOON, SOUTH-EAST QUEENSLAND

P.F. WOODALL

INTRODUCTION

Botulism (also known as limberneck and western duck sickness in the U.S.A.) is caused by toxins produced by the bacterium *Clostridium botulinum*. This bacterium is widely dispersed in the soil but only produces the poisonous toxins during periods of active growth and multiplication. This requires anaerobic conditions and so outbreaks in waterfowl are usually associated with warm temperatures and shallow, stagnant and slightly alkaline water with decaying vegetation (Levine 1965, Seddon 1965). In some cases, the disease can be spread by birds eating fly maggots that have fed on rotting carcasses. The toxin is one of the most powerful poisons known, being 16 times more potent than cobra venom (Levine 1965).

The first symptoms of botulism are paralysis of the leg and wing muscles. The neck muscles may also be affected so that the head hangs limp, hence the description "limberneck". Afflicted birds refuse to eat they are weak, inactive and have ruffled feathers. In mild cases they may gradually recover from the weakness and paralysis in 2-3 days, particularly if they are moved to a new environment. In severe cases death results in a few hours (Levine 1965, Seddon 1965).

In North America botulism is considered a major cause of mortality in

waterfowl, and millions of birds are reported killed annually. There have been several reports of waterfowl deaths caused by botulism in Australia (Grubb 1964, Seddon 1965).

OBSERVATIONS

Observations on this suspected outbreak of botulism were made during three visits to Seven Mile Lagoon, Lowood (27°27'S, 152°26'E).

(1) 11 June 1978. During a QOS outing, large numbers of Whistling Kites *Haliastur sphenurus* and Marsh Harriers *Circus aeruginosus* were seen near the water's edge. Closer inspection revealed that they were feeding on the carcasses of many ducks and swans. Most of the carcasses appeared to be 3-4 weeks old, but some, particularly those of the Black Swan *Cygnus atratus*, were fresh. A passing farmer told us that during the previous month many ducks had been found paralysed, unable to walk or fly. However, some had recovered after several days when taken home and given fresh food and water.

It appeared that the water level in the lagoon had recently receded (possibly the result of a previous hot spell), exposing many of the aquatic plants which were rotting in the shallow stagnant water. Some decomposing carcasses of dead birds were also present in the shallow water.

(2) 17 June 1978. Many Whistling Kites and Swamp Harriers were again seen feeding on the carcasses. Freshly killed Eurasian Coot *Fulica atra* and Black Swans were found and specimens of gizzard and intestines were collected from these. Dr. A.J. Frost (Department of Veterinary Pathology and Public Health, University of Queensland) kindly tested these for the presence of botulism toxin but the results were negative.

(3) 24 June 1978. Two Black Swans were watched displaying clear signs of botulism. Both were resting in shallow water, apparently unable to stand with wings drooping alongside their bodies. They also exhibited "limberneck" with their heads drooping and one individual had much difficulty keeping its head above water. These birds were watched for approximately 10 minutes in this condition, but when approached they managed to swim off slowly. A nearby landowner also reported that his children had found many dead and dying ducks and swans during the previous month and that some of these had subsequently recovered after being brought home.

A representative collection of skulls and legs was made on this occasion and through the courtesy of Mr. D.P. Vernon (Curator of Ornithology, Queensland Museum) these were compared with identified specimens and the results are presented in Table 1.

DISCUSSION

It is important to consider whether botulism was, in fact, the cause of these deaths. Although the laboratory tests failed to detect the botulism toxin, Seddon (1965) states, "It is unusual to be able to confirm a diagnosis of botulism by the examination of material in a laboratory but the syndrome of botulism is so characteristic that a diagnosis on clinical grounds is usually quite reliable, especially when the epidemiology of the outbreak and a knowledge of other possible local causes, are taken into consideration". The environmental conditions at Seven Mile

Table 1. Birds found dead at Seven Mile Lagoon in June 1978

Species		Estimated Number of Deaths
Yellow-billed Spoonbill	<i>Platalea flavipes</i>	1
Wandering/Plumed Whistling Duck	<i>Dendrocygna arcuata/eytoni</i>	20
Black Swan	<i>Cygnus atratus</i>	50
Pacific Black Duck	<i>Anas superciliosa</i>	500
Grey/Chestnut Teal	<i>Anas gibberifrons/castanea</i>	20
Hardhead	<i>Aythya australis</i>	50
Whistling Kite	<i>Haliastur sphenurus</i>	1
Purple Swamphen	<i>Porphyrio porphyrio</i>	10
Eurasian Coot	<i>Fulica atra</i>	10

Lagoon and the observed behaviour of the birds all strongly indicate botulism poisoning and I believe that one can be reasonably certain that it was the cause of mortality. At this time, botulism (type C) was identified as the cause of some of the deaths of Australian Pelican *Pelecanus conspicillatus* in the Brisbane and Rockhampton areas (Anon 1978).

The species listed in Table 1 represent the common species found at Seven Mile Lagoon; however, the numbers found dead do not altogether correspond with the numbers observed there, i.e. there was some differential mortality. It appears that the Pacific Black Duck *Anas superciliosa* was severely affected in relation to the low numbers of live birds seen there in June 1978, whereas the Hardhead *Aythya australis* was seen in much larger numbers compared with the few carcasses found. This can probably be explained by differences in feeding behaviour: the Pacific Black Duck, a Dabbling, would spend more time feeding in shallow water and would thus be more exposed to the toxin than the Hardhead which requires deeper water for diving. It was noticeable that only one scavenger, the Whistling Kite, was found dead. The vulture is reported to be very resistant to botulism toxins (Kalmbach 1939) and it seems that this may also apply to other scavengers.

In North America, botulism has long been recognised as a very important cause of mortality in waterfowl, but in spite of scattered reports from many States (Seddon 1965), its importance to Australian waterfowl has not been thoroughly assessed. It is hoped that this note will bring botulism to the attention of field workers and stimulate further reports.

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Presence of botulism (Type C) in waterfowl at Atkinson's Dam has been confirmed (Qld National Parks and Wildlife Service 3rd Annual Report 1977-78).

MAGPIE OF VARIANT PLUMAGE FROM CENTRAL QUEENSLAND

I.N. WALTERS

At the Willows (23°39'S, 147°29'E), Queensland Central Highlands, in August 1976 I observed a bird of variant plumage in a group of Australian Magpie *Gymnorhina tibicen*. This bird was seen for only a few minutes on the first occasion, but later I watched it perching, flying, and foraging for approximately twenty minutes. The aberrant individual had small patches of black on the lower left, and on the lower centre of an otherwise white back, giving the impression of broken extensions to the black scapulars as shown for (what was then considered to be) the White-backed Magpie *G. hypoleuca* in Slater (1974:76). As the black patches were not in the region of the angle of the wings, and certainly occupied less than one third of the back area, I judged the dorsal colour pattern to be most closely aligned with the zero category in the 0-5 hybrid index of Burton and Martin (1976). That is, the category having completely white back.

White-backed and Black-backed forms interbreed across a complex hybrid zone in south-eastern Australia (Burton and Martin 1976), but coexist in central Australia where they apparently do not interbreed (Macdonald 1973:471). Condon (1951) claimed that the inland race of *G. tibicen* had the black saddle so narrow that it is scarcely visible in life. This, he said, accounted for the white backs in the vicinity of Alice Springs, to which Serventy (1953:140) added 'and elsewhere as well'. The present sighting extends the range of this plumage pattern into central Queensland, but explanation of such a phenomenon need not be dependent upon the 'inland race'.

If the south-eastern hybrid zone (of plumage patterns at least) is stationary (Burton and Martin 1976:35), the northern introgression of white-backed genes may have reached an area previously unrecognized. Alternatively, if the zone is moving southward (Burton and Martin 1976:35), the area through which the front is considered to have passed may have to be extended (though this does not necessarily demand extension as far as central Queensland). Mayr (1963:173-176) regarded the evolutionary significance of mutation as 'quite small'. However, were such an individual a product of mutation, monitoring of any introgressions into the local black-backed population may assist understanding of the evolution of these plumage patterns. Such work may also further substantiate the complexity of the gene pool of *Gymnorhina*, and vindicate the usefulness of the monotypic genus.

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LEAF-EATING BY BIRDS-OF-PARADISE AND BOWERBIRDS

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During a visit to Papua New Guinea in December 1977 approximately 50 hours, over 7 days, were spent intensively observing captive birds-of-paradise (Paradisaeidae) at the Baiyer River Sanctuary, Mt. Hagen, Central Highlands. The majority of this time was spent watching pairs of *Parotia wahnesi*, *P. lawesii* and *Paradisaea raggiana* specifically for display activity. Birds observed were in pairs in large, well planted, outdoor aviaries, constantly provided with mixed diets of fruits, meats, insects etc. A number of instances of leaf eating were observed as summarized below.

Parotia wahnesi Wahnes' Six-wired Bird-of-Paradise

A mature-plumaged male fed on leaves on five occasions over the seven days. This usually involved the ripping off of part of or an entire leaf, taking it to a perch and holding it beneath one foot whilst ripping off and swallowing small pieces. One leaf was devoured in nine small pieces. The male flew to the ground, picked off a small piece of fern-like plant and swallowed it. The female once ripped off and ate a leaf.

Parotia lawesii Lawes' Six-wired Bird-of-Paradise

A female took a hard red leaf from the aviary roof, held it to a perch with a foot, then tore off tiny pieces and swallowed them.

Paradisaea raggiana Count Raggi's Bird-of-Paradise

On eleven occasions over the seven days a fully plumed male picked a fresh green leaf, or leaf piece, held it to a perch by one foot and ate it in small fragments.

Whilst not involving the eating of leaf matter, it is worth noting that a mature male extensively pruned large leaves of a sapling by very neatly and efficiently picking them off with its bill at the petiole base. This bird also pulled a long springy sprig of leaves toward him with his

bill, held it to the perch by one foot, and plucked off each leaf. Identical behaviour is described for *P. rubra* (Frith 1976:74).

DISCUSSION

Lavery and Grimes (1974) recently recorded an observation of a Tooth-billed Bowerbird *Scenopoeetes dentirostris* (Ptilonorhynchidae) eating the leaf margins of a boxwood, apparently the Northern Yellow Boxwood *Planchonella obovata* in July at Mt. Spec, Queensland. The bird concerned was collected and the crop found to contain a few leaf fragments whilst the gizzard was full of leaf remains. In another three individuals of seven taken during July and August in the same area, exclusively unidentifiable leaf material was found, thus clearly indicating that the bird habitually eats leaves in this area at least for part of the year. Subsequently CBF has observed Tooth-billed Bowerbirds during August and September 1978 eating pieces of Lawyer Cane, *Calamus* sp. and Elkhorn leaves, *Platycerium* sp., and the leaves or pieces of leaves of various trees and climbing vines. To eat complete young leaves of new growth, approximately 5 x 2.5 cm, Tooth-billed Bowerbirds were seen to neatly fold them repeatedly, into a small tight bundle before swallowing.

Lavery and Grimes (1974) concluded that the function of the peculiar notches or 'tooth' on the bill in both sexes and all ages of this bowerbird is to facilitate leaf eating, rather than leaf cutting exclusively by the male for display-ground decoration as had been previously considered the case (Marshall 1954, Gilliard 1969:276). Certainly in view of Lavery and Grimes' observations and those of CBF, and the fact that both sexes possess a 'toothed' bill, it would seem unlikely that the notched bill of the bird is solely an adaptation to leaf-cutting by males. Marchant (1974) provides a record of Satin Bowerbirds *Ptilonorhynchus violaceus* apparently eating grass leaves and certainly eating leaves of a small dock plant *Rumex* sp.. Both Bell (1960) and Hirst (1944) have remarked upon captive *Ptilonorhynchus violaceus* avid appetite for the leaves of green vegetables. H. Bell (pers. comm.) has observed a wild Green Catbird *Ailuroedus crassirostris* tear at and eat in small pieces a leaf. Buchanan (1978) recorded *P. violaceus* eating bean leaves and the leaves of Wandering Jew, *Tradescantia albiflora*. Moreover, Donaghey (pers. comm.), in the course of long-term intensive ecological studies, has found that wild *A. crassirostris*, *P. violaceus* and *Sericulus chrysocephalus* commonly eat leaves and other green matter. It should be noted that all species mentioned above have considerably smaller, narrower, and presumably weaker bills than *Scenopoeetes*. This does not appear, however, to prevent them from feeding on leaves. One would have to assume, therefore, that the latter bird eats leaves of plants with thicker and/or stronger leaves than those utilized by other bowerbirds and birds-of-paradise; or that its 'toothed' bill in fact has some other, or additional, function. In view of the apparently widespread habit of leaf-eating in bowerbirds a more likely function of the Tooth-billed Bowerbird's peculiar bill is for tearing into larger and/or harder fruits that cannot be swallowed whole, or that require tearing up to facilitate digestion, for masticating leaves or leaf pieces to aid digestion or even possibly for folding leaves.

Obviously we need to know to what extent these birds feed upon leaf matter in the wild (if at all in the case of birds-of-paradise), and upon what plant species. Certainly the present observations indicate that leaf-eating is widespread in bowerbirds, as previously suggested by Marchant (*loc cit*), and quite possibly in the birds of paradise, and not solely a

habit of *Scenopoeetes*.

In view of the extreme rarity of significant leaf-eating in non-aquatic birds generally (Lavery and Grimes 1974, Buchanan 1978) and the wide-spread behaviour of display perch/area-clearing of fresh growing vegetation in the birds-or-paradise, such as is known for the genera *Parotia* (Frith and Frith in preparation), *Diphylloides* and *Paradisaea* (Gilliard 1969, Dinsmore 1970¹, Frith 1974, 1976) and the bowerbirds (Marshall 1954, Gilliard 1969, Cooper and Forshaw 1977) the obvious speculation that the two distinctive habits are possibly associated in some way would seem justifiable.

We thank Harry L. Bell and Dick Donaghey for pertinent information.

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TORRESIAN CROW BURYING AND HIDING FOOD

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Amadon (1944) has shown that food storage is common in the Corvidae, whereas Goodwin (1976:21) claimed that the "hiding or storing of food is widespread in the crow family; it may well occur in all species."

¹Footnote: Dinsmore (1970, p. 307) stated of *Paradisaea apoda* that he "never saw birds clearing leaves from the courts", but subsequently (p. 312) wrote "On 11 occasions a male tore off sections of leaves in or near the display ground" (*Italics ours*)

Goodwin (1976:108) cited Heinroth (1903) as reference for such behaviour in the Torresian Crow *Corvus orru*, and a further documentation has appeared (Chapman 1978). In a Brisbane suburban garden on 16 January 1978 I was feeding thinly sliced pieces of cheese (ca. 1 cm square) to a bird of this species. After it had eaten a number of pieces, it took a fallen leaf in its beak and covered one piece that I had placed on the ground. The same was done to another piece. I then placed several pieces of cheese on the ground. The bird put one piece in a small empty plastic pot, took the rim of the pot in its beak, lifted, and manoeuvred the pot (trying to upturn it?). This was repeated with another piece. Then the bird dug its beak into friable soil, put a piece of cheese into the depression so constructed, and covered it with a small clod. The bird then picked up and placed a stone over a section of the cheese that had remained exposed. After it drank water from a garden hose, the bird took another piece of cheese and flew to a nearby perch (2m above ground), where it ate that piece.

Goodwin (1976:21) presented some 'general principles' of corvid food hiding, including raking or pulling over of adjacent soil or vegetation, and placing stones, leaves or other objects to cover the food. Rowley (1973:30) noted that the Australian Raven *C. coronoides* buried food in holes specially dug for the purpose. This behaviour has also been reported for the Forest Raven *C. tasmanicus* (Leonard 1978). The present observations reveal similar behaviour for *C. orru*, and, with the other forms of caching described above, augment earlier observations.

Goodwin (1976:22-23) discussed the function of food hiding in terms of a reserve food store, perpetuation of habitat through the planting of food trees, and the removal of surplus food from the territory. Chapman (1978) suggested that caching by Torresian Crows in the vicinity of Ayers Rock may be associated with serendipitous food gluts, and implied that competition (for such increased intakes) could account for this behaviour. In suburban regions much available food would possibly be of this type, and consequently novel forms of caching may arise as adaptive responses to competition for the use of such food. Food hiding is not necessarily dependent upon satiation (Goodwin 1976:22). That the present individual ate after storing lends support to that claim.

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