

FURTHER FIELD OBSERVATIONS OF THE PALM COCKATOO *Probosciger aterrimus* IN THE CAPE YORK PENINSULA, QUEENSLAND

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Received 1 August, 1986; Revised 15 July, 1987

Observations of the Palm Cockatoo *Probosciger aterrimus* made between August 1983 and January 1986 in the Iron Range and Bamaga areas, Cape York Peninsula are reported. These are subsequent to those reported in an earlier communication (Wood 1984, *Corella* 8: 94-95).

INTRODUCTION

Within Australia, the Palm Cockatoo is found on Cape York Peninsula, northern Queensland. Storr (1973a) stated that on the eastern coast of Cape York Peninsula, the range of the Palm Cockatoo extends south to Massey Creek and inland to the western slopes of the Tozer and McIlwraith Ranges, while on the western coast, it extends to the Archer River and inland to Kinlock Creek (Forshaw 1969). There is disagreement as to the birds' habitat preference. Thomson (1935) reported that the usual habitat of Palm Cockatoos is scrub or jungle country, but they do range into surrounding savannah woodland to feed. The opposite view was expressed by Barnard (1911), who claimed that they breed in savannah and seem to move to the rainforest to feed (Forshaw 1969). Forshaw has found them to be very much birds of the ecotone habitat.

In the Iron Range area, I resided at Scrubby Creek (12°40'S., 143°19'E.) 14 km from the east coast for a period of 30 months. In this situation, daily observations of Palm Cockatoos were possible. My residence was on a ridge, to the east of, and overlooking Scrubby Creek and the large area of closed forest to the west of it. East of Scrubby Creek is predominantly savannah woodland, divided into patches by strips of closed

forest along the watercourses and slopes. This savannah woodland appears to be the preferred habitat of the Palm Cockatoo. Birds were rarely observed to penetrate more than the margins of the large area of closed forest west of Scrubby Creek.

METHODS

Birds were stalked and observed with binoculars. After I became familiar with their attachment to tree hollows and identified the ones to which they were particularly drawn, a number of hides were erected. Three hides were all-weather constructions, complete with bed. This was necessary to avoid disturbing the birds which often arrived before sunrise. Most of my nights at Scrubby Creek were spent in these hides. Fellow naturalist M. W. Norris was able to record unique behavioural video footage from these hides, which enabled closer scrutiny of the Palm Cockatoo's actions and calls.

Examination of the hollows upon which display centred was made to describe and measure the nest platform (when present) and retrieve objects used in the drumming behaviour. Hollows containing egg or young were rarely examined, as my interest was more in behaviour than breeding biology.

OBSERVATIONAL DATA

Territoriality

Within an area of approximately one square kilometre, around where I lived, resided two pairs of Palm Cockatoos. Although none of the birds was banded, this statement can be made with certainty, as the birds are quite conspicuous, particularly when preparing to nest. While observing one pair, the other pair could be heard nearby.

Within this square kilometre were 23 display sites. Display sites invariably focus on a tree containing a potential nest hollow. Birds show continual interest in these throughout the year, usually visiting their particular sites at the beginning and close of the day. During these visits, the potential nest hollow is usually examined, nesting material is occasionally added and drumming performances may be witnessed. At these times of the day a number of birds may congregate on some neutral ground that may contain a food tree but lacks a potential nest site. On such occasions, preening may be observed, much amiable calling can be heard and various displays witnessed. Feathers are preened with the claws or between the upper mandible and tip of the tongue. Birds have also been observed to rub their cheek patches along a branch. Displays involve crest erection, bowing, outstretching of wings and swaying. In these situations, mock combat may be observed, birds chasing each other from branch to branch. This situation lacks the raucous screeching, body contact and seriousness that marks territorial disputes between males.

Approaching these congregations or a pair at a display site, may elicit a foot stamping reaction in the birds. This seems to be an automatic response and is usually accompanied by raucous alarm calls. Birds at display sites will occasionally engage in drumming performances after such a disturbance. Birds disturbed at a display site will occasionally leave the area and return shortly after with others. On one occasion, five birds arrived with the resident pair. The fact that I was still standing at the base of the tree containing the nest hollow did not greatly disturb them. Several birds initially engaged in foot stamping and all displayed obvious curiosity. Birds may also retreat some distance, conceal themselves in thick foliage and use their cheek feathers to conceal their red cheek patches. This covering of the cheek patch has also been observed during cold winds or rain.

After a morning patrol of their territory the cockatoos usually flew off toward the coast, returning late in the afternoon. In open situations, small flocks can be seen returning, pairs peeling off when they reached their respective territories. After a dusk patrol of their territories, the birds retire to a tall tree in a sheltered situation to roost, the birds roosting separately in the same tree. One pair used the same group of Leichhardt trees in which to roost over the entire 30 month period. On a number of occasions I have observed Palm Cockatoos flying about on calm moonlit nights.

Local movements and feeding

The strength of the prevailing wind seems to be a determining factor on how far and in what direction Palm Cockatoos will venture from their display territory. During periods of strong wind they are more likely to be found in the forest nearby than venturing afar. In the absence of strong winds, the cockatoos make flights towards the coast.

Obviously there is some reason why birds should depart towards the coast almost daily. Observations in the coastal areas are very difficult because of the generally dense nature of the vegetation and lack of access. It is here, however, that the largest flocks of Palm Cockatoos are observed, a maximum of 30 birds being noted on one occasion.

Birds were observed feeding upon the kernels of the Indian Almond *Terminalia catappa*. On several occasions they were observed scratching in the dirt along creek banks. Examination at these sites provided no indication of what was sought. No wood had been chewed. Birds have been disturbed engaged in the same activity further inland, twice at the base of trees bearing colonies of Metallic Starlings *Aplonis metallica*. Naturalist J. H. Young (pers. comm.) has also disturbed Palm Cockatoos engaged in this activity. Perhaps fallen fruit, seed or small stones for the crop and stomach were being sought. As well as the obvious search for food, the coastal congregations may perform some social function, resident pairs usually being intolerant of other Palm Cockatoos entering their territory.

The tree upon which the Palm Cockatoo is most often observed feeding is the Nonda Plum *Pana-*

rian nonda. The kernels of this widespread tree of open situations are obviously a very important food item. Fruit of *Pandanus* species, *Grevillea glauca* and *Persoonia falcata* seeds are also eaten. The kernels of *Canarian australis* fruits are also sought after. One particular *Canarian* stands not more than 12 metres from a well guarded hollow. Here, the pair in whose territory the *Canarian* lies, tolerate the intrusion from others, with three pairs being observed at the one time. A pecking order was observed however, the birds feeding on the fruits, one pair at a time. It is interesting to note that all the food plants listed above are found in open forest, only *Canarian australis* being found in closed forest as well.

Nest site selection and associated behaviours

Interest in potential nest hollows is maintained throughout the year, increasing dramatically with the urge to nest. Impetus is provided by the first rains of summer although some birds will commence nesting even if the rains are late. Birds spend progressively more time at potential nest sites and guard them more diligently. A typical site is a hollow limb, inclined toward the vertical or a hollow, broken-off trunk. Hollows in which young were raised had entrances from 15 to 40 cm in diameter and were between 0.5 and 1.5 m deep. Nests with entrances of the lower limit invariably had larger internal dimensions. The entrances to these hollows were between four and 45 m above the ground. Eucalypt species, lending themselves admirably to the formation of hollows, are shown much interest by the Palm Cockatoos. *Melaleuca*, *Alstonia* and *Ficus* species are also used. Although Palm Cockatoos do nest within the rainforest, by far the majority of nest sites occur in open forest.

With the urge to nest comes the lining of a number of hollows with shredded sticks. Both sexes take part in this preparation, bringing sections of branches after removal of the leaves. These sticks range in size up to three centimetres in diameter and 20 cm long. Material from the upper size limit is cut by the birds rocking back and forth with their bills clamped around the branch, not unlike the action of a pipe-cutter. These sticks are then split into pieces. This is done at the nest entrance or within the hollow. The male, identified by his superior size and much larger beak, will usually give the stick to his mate

for shredding. The platform produced with these shredded branches ranges from a few centimetres to more than a metre deep. This depth appears to be dictated by the depth of the hollow. An obvious advantage of this porous platform is its drainage potential and ventilation properties in a tropical climate.

During the period of nest preparation intimate chattering may be heard and mutual preening and courtship is observed. Females may be heard uttering soft sounds, reminiscent of those produced by the Palm Cockatoo chick. Birds stroke each other's necks and head with their upper mandible. Males are observed to very delicately preen the female's crest feathers. To do this he takes the feather at its base between the tip of his tongue and tip of his upper bill. He then slowly pulls away, running to the end of the feather. This process is repeated along the crest. One cannot fail to be impressed by the very obvious concern the birds show for each other. They are also observed to tilt their heads sideways and take each other's neck between their bills. The most spectacular displays involve the outstretching of wings with comb erection and foot stomping. I have also observed a pair to stand opposite each other, throw open their wings and bow to each other.

During the period of nest preparation tools are produced for display and males engage in territorial disputes. Territories may include up to 12 visited hollows. These are not necessarily within one area. One pair at Scrubby Creek had a group of six sites in one area and a number on the other side of an intervening territory. Marginal sites of these territories may change sovereignty. It may happen that when a resident pair settle for a particular hollow, another pair usurps one of the remaining hollows. There is also competition for the use of hollows from other animals. These are occasionally lost to the intrusion of White-tailed Rats *Uromys caudimaculatus* (observed twice), which not only take over hollows but raid nests for eggs and young. The Rufous Owl *Ninox rufa* may also take over hollows as well as prey upon adult birds. While working on Rufous Owls at Iron Range, J. H. Young observed a male Rufous Owl to return to the nest hollow with an adult Palm Cockatoo. Intruding Sulphur-crested Cockatoos *Cacatua galerita* are driven off easily by adult Palm Cockatoos.

Only on two occasions have territorial disputes between pairs of Palm Cockatoos been observed. On both occasions the encroaching male was chased and attacked by the resident male whenever he landed. The resident male flew directly at the intruder, lunging feet first and throwing his wings back just prior to impact. The victim was usually knocked off his perch by the blow, but if he managed to hang-on, the attacker flapped madly trying to drag him off the branch. This attack was continued until the encroaching pair departed. Beaks are never used in these conflicts. Perhaps this has mutual value in that the power of their mandibles could easily result in broken wings. The females did not engage in this physical contact but flew beside their partners, screeching raucously.

Following both of these territorial disputes were outstanding drumming performances. Both performances commenced upon the departure of the encroaching pair. The resident male immediately removed a section from a branch, flew to the top of a hollow limb and pounded it loudly, calling intermittently. This performance lasted many minutes, the female perching nearby in silence.

Incubation and rearing of the young

Between July and March the single, white, elliptical-ovate egg is deposited in the selected hollow. Incubation is performed by the female and takes approximately one month. During this period she is fed by the male. After another three months the young, which is paler than its parents, is ready to leave the nest. During this entire period the young bird has been fed by the female which, in the early stage of the chick's growth, rarely left the nest site and was fed by the male. During the incubation period and raising of the young the parents are usually very quiet and secretive in their activity.

This behaviour changed markedly a few days prior to one particular young bird leaving the nest. Drumming displays took place at least once a day and on the day before the young left the nest, drumming was observed three times. During one of these performances both adults were performing at the same time. The young bird, a male, was observed to leave the nest. After flying approximately 15 m and landing awkwardly he was attacked by the male parent, being knocked

from his perch in the process. The parent bird then departed, followed by the female and several moments later by the young male.

On a number of occasions up until the next nesting season the young bird would return to the nest site with its parents, trailing behind and always keeping at a distance that did not involve it in displays of a pair-bonding nature.

Voice

The Palm Cockatoo has three basic calls, a raucous screeching, cackling whistle and a call reminiscent of that of the Spotted Catbird *Ailuroedus melanotis*. Only when examining video footage of the birds did I become aware of the complexity of these calls. This is very apparent in one sequence where the male is being filmed and the female is some 60 m distant at another site. The birds were continually calling to each other and the three basic calls are given great variation by changing the modulation and arrangement of their eight basic syllables. Birds in the Bamaga area, 200 km to the north, have the same calls but constantly different modulations.

Drumming display

During my studies of the Palm Cockatoo I heard knocking sounds at least 30 times. These were too loud to have been produced by foot stamping. I saw performances with the *Grevillea glauca* nut 12 times and the production and use of the drumstick seven times. A complete description of the drumstick display has been previously given (Wood 1984). Never have I observed birds using their beaks for producing a knocking sound.

Duration of the performance can range from two (a single tap was not considered to be a performance) to more than 100 taps. Percussion objects become progressively polished at the contact point. The two drumsticks shown in Figure 1 were retrieved after their production and use was witnessed. The shorter of the two sticks was percussed at least 50 times and is well polished at the percussion point. A polished area may be discerned around a black mark at the lower edge, two-thirds the length of the piece from the right (as indicated in Figure 1). Each object recorded showed varying degrees of polishing. At the

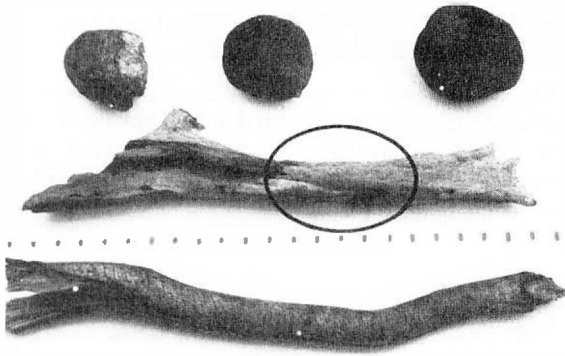


Figure 1. Several drumming implements three nuts of the *Grevillea glauca* tree and two drumsticks used by the Palm Cockatoo. Polished area on centre drumstick is circled. Graduations are in centimetres.

termination of a performance the object is randomly discarded although drumsticks are occasionally shredded and added to the nest lining.

Uniqueness of the Palm Cockatoo's tool

The drumstick produced by the Palm Cockatoo is a most complex tool. Few of the tools used by other animals are actually produced and modified as is the drumstick. It is certainly the most complex tool used by any bird. Several avian species

use objects such as thorns or stones to procure food but these are unmodified. Similarly, unmodified objects are utilized by non-human primates: blades of grass are used to remove termites from their nests, sticks are used to knock down fruit and a piece of lichen may be used as a sponge to retrieve water from a hollow limb.

The drumstick is unique in birds in that it is the only tool produced that is not used in procuring food. Its purpose is to acoustically delineate territory as well as perform a pair-bonding function.

ACKNOWLEDGEMENT

I wish to thank Helen Heath for typing the final manuscript.

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