

BREEDING THE WRINKLED HORNBILL AT PALMITOS PARK

By Rosemary Low (Gran Canaria)

The large Hornbills are among the most interesting and dramatic of bird species found in zoological collections. Because of their size, it is expensive to feed and house them, thus few are kept in private collections. In recent years, several Hornbill species which previously were little known in captivity have been imported from Asia. This is probably because logging has resulted in trappers entering new areas.

One of the Asiatic species which was imported on a few occasions during the late 1980s is the Wrinkled *Aceros corrugatus*. Apparently it is nearly extinct in Thailand, rare in Borneo and more common in Sumatra and Malaysia. Most captive birds are believed to have originated from Sumatra. This species is increasingly threatened by habitat destruction, as it inhabits lowland forests. However, not much appears to be known about it in the wild.

Adult birds can be sexed at a glance. In the male the side of the head is white, the gular (throat) pouch is white and the cheeks, neck and part of the upper breast are yellow-buff. The female's gular pouch is dark blue and her plumage is entirely black. The male's casque is mainly red and his beak is yellow and pink with the lower mandible partly brown. The female's beak and casque are yellow.

In both sexes the iris is brown and the skin surrounding the eye is bright blue. As in all the large Hornbills, the long black eyelashes are the envy of many a human female! Length of this species is about 28-30 in. (70 - 80 cm). In our two pairs at Palmitos Park, Gran Canaria, the male is noticeably larger than the female.

Both pairs resided in the breeding centre, away from the public, until 1991 when one pair was placed on exhibit. Because they were not used to the close proximity of people they had remained quite nervous. Within a month of being in the park they were very steady and soon became so tame that they did not object to visitors touching them through the welded mesh.

One day in early 1993 I saw the male chasing the female, but not aggressively. Interpreting this as a sign that he was interested in nesting, I exchanged the locations of the two pairs. Again it was interesting to observe how the nervous pair from the breeding centre soon became tamer in the park.

In February I attended a meeting at Rotterdam Zoo for participants in EEP (European Endangered Species Programmes) for several species. One of these was the Great Indian Hornbill *Buceros bicornis* of which we have one pair. Koen Brouwer, of the EEP executive office in Amsterdam, described the importance of the correct nest site for Hornbills. The entrance must be narrow and not too high; the female must be able to reach up when standing on the bottom to take the food offered by the male. There should be no perch in front of the entrance.

When I returned from the meeting I asked assistant curator Mike Gammond to modify the nest-box for our pair of Wrinkled Hornbills. But he had a better idea and offered them a log. I thought perhaps it was too small - but I was wrong. It measures 3ft. 4in (101cm.) high and 12in (31cm) wide at the widest point. At the base it is only about 8in. (20cm.) wide. There is a perfect natural entrance, neither too high not too wide.

During the last week in March I was surprised to see the female inside the log looking out, on several occasions. No courtship behaviour had been observed - but very little time can be spent in observation. In both pairs, regurgitation of a piece of fruit is often seen, perhaps as a prelude to courtship behaviour which was interrupted.

The breeding behaviour of Hornbills differs from that of all other birds. The female is sealed inside the log from just before laying until the young fledge. In the large species, this is a period of at least 14 weeks. I have often speculated on why this should be so. After all, a large bird with a fearsome beak has less need to protect itself from predators than most other bird species, yet none other practices this form of incarceration. If the reason is not for defence purposes, what can it be?

Being ignorant of Hornbill behaviour, and believing that the female might need some mud to close the nest entrance, a tray of mud was provided. I was to discover, however, that she uses the faeces from inside the nest. I also suspect, but have no proof, that it is the female who closes the entrance. In the log provided, the entrance is an irregular shape, measuring 20cm (8in) high; the width varies between 6cm and 7cm (2½ in to 3in) and 9cm in the centre. On 3rd April I found that the female was sealed inside the log, which was closed but for a slit 1.5cm (4in) wide. Almost daily one could see fresh faecal material smeared down the slide of the slit, making a smooth surface.

A wooden lid was nailed on top of the log and there was a hinged

door in the side - but for emergency use only. These were not used, however, as we had no wish to disturb the female. From a very informative paper which recorded the breeding of this species at Audubon Park Zoo (New Orleans) (Singer and Myers, 1992), the incubation period of this species is given as about 29 days and the usual clutch size as three. This zoo was the first to record breeding this Hornbill, the first success occurring in 1988.

The log for our pair is situated in the enclosed shelter of the aviary; it stands on a concrete base. While the female was nesting, the male spent most of his time in the outside flight which is 5m. (16ft.) long, 2.5m. (8ft.) wide and 2.4m. high. It is covered in self-planted weeds, one of which grew into a tree on which the Hornbills clean their bills.

The maintenance diet for these birds consists of about 90% chopped fruits (banana, grapes, guavas, apple, pear, orange). Soaked dog chow is also accepted. Crickets are refused; no other livefood was offered prior to the nesting attempt. Mice and lizards which enter the aviary are killed and eaten also, on one occasion, an unfortunate sparrow.

On 9th May, after 35 days of the female being sealed in, a chick was heard. A few days previously dog chow had been discontinued as I feared it might swell up in a small chick and prove difficult to digest. Now there was an urgent task: to find sufficient animal protein on which the chick could be reared. The female accepted food from us as readily as from the male. As he refused crickets, these were offered directly to her four times daily. She took them for the first few days but thereafter ejected them angrily, usually injuring them first. Fruit, mainly papaya and banana, was taken eagerly in almost any quantity offered. She would also take mealworms. The male relished the large kind and would have consumed unlimited quantities but he was usually given about 30 at a time. He would accept them quite gently from the hand or from a container held in the hand.

The female was hand-fed through the slit four times daily for the entire duration of the rearing period, between 9 am and 6 pm. It was time-consuming but well worth the effort, as we were confident that she was receiving sufficient food. She never refused food and she often seemed very hungry. Although the male was feeding her, I suspect he did not give enough and preferred to feed her on mice, lizards and mealworms. Two species of endemic lizards, which are extremely common, were offered live to the male. He would feed only small ones to the female, eating the large, tough ones himself.

Mice were fed, as available, especially after the chick was 30 days old, averaging about eight daily, until the chick was 50 days old, then only about two daily. They varied in size from new born to adult. The small ones were fed directly to the female, the large ones to the male. He would run them backwards and forwards through his bill, breaking all their bones, before offering them to the female. David Gammond, who did most of the hand-feeding, noted that the female became very vocal when given live mice. She would feed the small ones to the chick.

Yolks of hard-boiled eggs were also offered to the female, varying in number between two and four daily. When the chick was feathered he would sometimes try to intercept the food offered to the female but she did not permit this. I noticed, however, that she often fed yolk to the chick as I offered it, yet seldom let him take fruit. Who can say whether this was because she preferred fruit or because instinct told her the chick needed the protein?

Little could be recorded about the development of the chick, which was not seen through the slit until it was four weeks old. During the first few days of its life I sometimes wondered whether I was hearing a cricket chirping inside the log or a chick! Both made a rapid chirping sound. As the chick grew, its voice altered; it would solicit food from its mother with a rapid chirping sound. She would pass perhaps only one item in seven to it; others were no doubt regurgitated later.

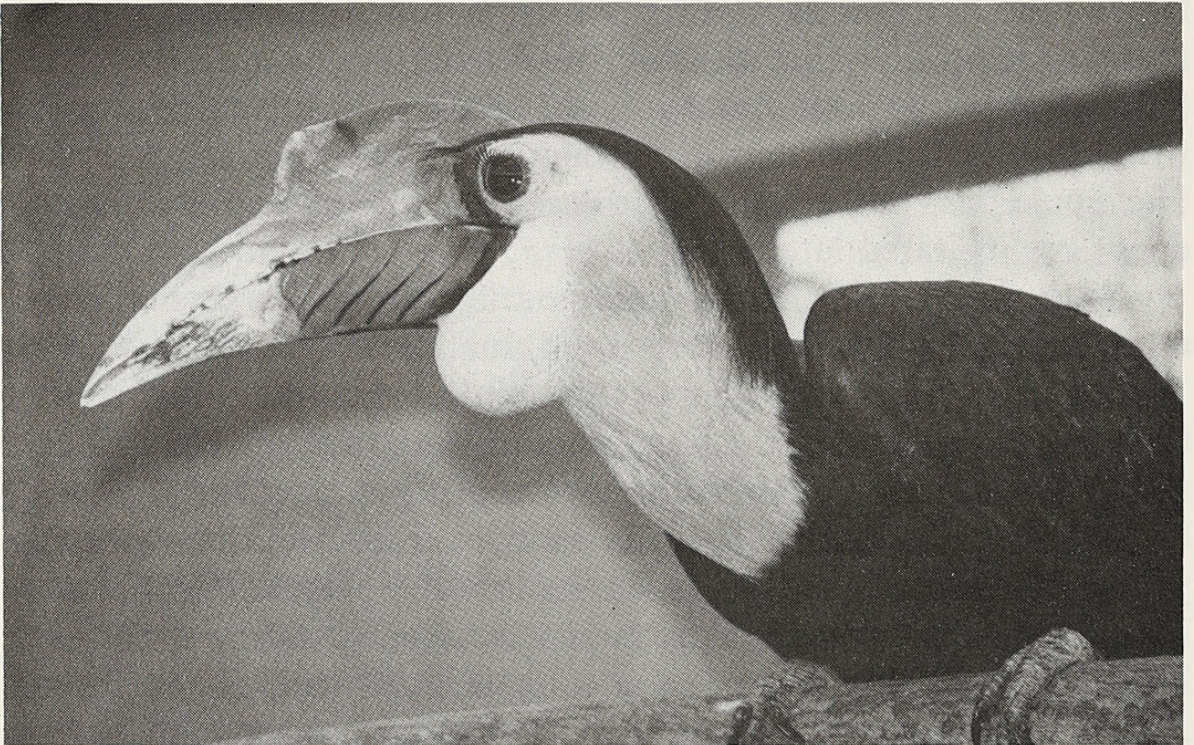
As the chick grew, it was only possible to see his head clearly, a notable feature was the very light blue iris of the eye.

On 17th July, a small part of the seal of the nest entrance was broken. Next morning the female was sitting in the flight with the male. He was obviously excited to see her; I saw him jumping backwards and forwards over her on the perch. Next morning the young Hornbill was sitting on the floor of the outside flight. Later in the day he was on a low perch and there he spent the night with his father at his side. Next day, at noon, he was sitting on the ground in the full glare of the sun, panting. He made no attempt to struggle when moved to a shady place. The following day, however, he did not permit such familiarity. Next day I saw the male fly to him with food in his beak. It was not accepted, perhaps because the young one was conscious of being observed. The following day and thereafter the young Hornbill was almost invariably on the highest perch with one parent on each side. The individual distance (the space between each bird) was always the same.

According to Singler and Myers, all young resemble males on

fledging in the colour of the face and gular pouch. A feature of the plumage of our young bird which was not mentioned by them was the coloration of the shaft of the feathers of the underside of the tail. This was black, whereas in adults the shaft is white. A small area at the base and tip of the tail feathers was also black. The skin around the eye was bright blue - but not as pronounced as in adults. The casque on the upper mandible was absent. This enables one to see that Hornbills and Kingfishers are related for, without the casque, the bill is more reminiscent of that of a Kingfisher.

On fledging, the young one was equal in size to the female, or slightly larger, but with a shorter tail than that of the male. The female had emerged from the log with only one or two tail feathers. The young bird's casque developed almost imperceptibly; by the time he was six months old it was nearly as large as the female's. Only then was his sex certain, indicated by the red on the casque and lower mandible. The female's bill is entirely yellow. In contrast to the adults, the base of upper and lower mandible was black. By then, the iris of his eye was pale brown.



Rosemary Low

Male Wrinkled Hornbill

On 31st July, 14 days after she had emerged, the female was seen in the nest again. On 4th August, she started to plaster up the entrance. Two eggs were laid. However, the female deserted the nest on 13th September. One egg was infertile and the other contained an embryo which had died. At the end of September or

the beginning of October, the female laid yet again. She deserted the nest on 12th October when it was accidentally soaked by a keeper cleaning the aviary. It was then I suspected the same thing had happened on the previous occasion. The single egg was placed in an incubator. It was not known whether the embryo died before or after this but it was at an early stage of development. The nest log was then removed.

At the time of writing, the end of December, the young male remains with his parents. His rearing was the unexpected success of 1993. It provided a fascinating insight into the breeding behaviour of Hornbills. More importantly, it was one more small step in the direction of establishing this Hornbill in captivity. To date, young have been reared in few collections but with every year which passes, another collection records success. In 1992 the breeding station of Vogelpark Walsrode in Majorca was successful and at about the same time, Kuala Lumpur Zoo in Asia.

After only one season's experience with this species, it seems to me that two of the factors important for success are the provision of a box or log with a suitable entrance (not too wide and at the right height) and plenty of livefood of the size of small and adult mice and small lizards.

The larger Hornbills will never be common in aviculture. The expense of feeding and housing them means that they are mainly confined to zoological (not private) collections. However, knowledge gained from captive breeding may one day contribute to the survival of this increasingly threatened group of magnificent birds.

REFERENCE

- SINGLER, E.U. and MYERS, M.S. 1992. Breeding the Wrinkled Hornbill at the Audubon Park and Zoological Garden, *International Zoo Yearbook* 31: 147 - 153.

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TOOL-USING BY PARROTS: THE PALM COCKATOO AND THE HYACINTHINE MACAW

By Paolo Bertagnolio (Rome)

Summary

Poorly known aspects of the nesting behaviour of the Palm Cockatoo *Probosciger aterrimus* in north-western New Guinea are described. The tool-using feeding behaviour reported by Wallace in 1875, is critically re-evaluated in the light of a recently discovered "natural" feeding technique in Hyacinthine Macaw *Anodorhynchus hyacinthinus*.

The usual habit of the Palm Cockatoo, which fills the bottom of the nesting cavity with a layer of interlocking fresh twigs, has been reported by various ornithologists and partially observed in captivity.

Different hypotheses have been put forward on the role of this particular substratum. It has been said it may prevent plumage soiling by the semi-liquid tarry faeces of the single chick, the flooding of the nest cavity by heavy monsonic rains, or the collapsing of the whole chamber subsequent to termite activity in a dead or partly dead tree.

During 1982 and 1983 I had the opportunity to carry out brief field observations in north-western Irian Jaya (Triton Bay area), which add to the sparse existing data on this primitive species.

Nest selection in Palm Cockatoos seems to be a rather slow process, due to the wary nature of the parrot. The first step, once an apparently suitable nesting hole has been located in a mature tree, is to select a few metres from it a couple of young trees some 10 cm. in base diameter.

After being quickly deprived of their branches, leaves and part of their bark, these small trees are truncated more or less at the level of the nest-hole. The two heavily pruned trees are then used as safe observation posts, to which the birds daily return for a number of weeks.

This behaviour had been independently observed by Dr. Soendji, senior associated ornithologist to the Ragunan Zoo, who extensively travelled through Irian Jaya and the Aru islands. He drew an explanatory sketch on letter head of the Ragunan Zoo, Jakarta (Fig.1).



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