

late September in this region. Additionally, the rapid time taken from hatching to fledging, approximately 20 days, must be an adaptation to successful breeding in what is normally a ground nesting species. The recording of the courtship procedure and the male's behaviour at the roost also give new insight into the habits of this species.

As an aside I have a record of a male Large-tailed Nightjar catching a Malaysian Fruit Bat *Cynopterus brachyotis* in mid-air on the evening of 4 November 1995. After carrying the bat some way it released it. Four other birdwatchers also witnessed this event.

I am indebted to John Morgan who alerted me to the breeding birds, allowed me to make use of his notes, and let me use his apartment for observations. I am extremely grateful to Peter Kennerley for his comments and advice on an earlier draft of this paper and to Ng Bee Choo of "Nature's Niche" for access to reference books.

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Angus R. Lamont, 2 Ridgewood Close, Block 1, #17-04, Himiko Court, Singapore 276693

Malayan Night Heron *Gorsachius melanolophus* breeding in immature plumage

CHUAN-CHIUNG CHANG

Adult plumage, particularly the breeding plumage when applicable, has generally been considered to be the plumage that birds wear when they breed. By contrast, the immature plumage, if different from the adult, is an indication that the birds are not yet ready for breeding or are sexually immature. Although this appears to be true for most birds, it is not absolute, at least, for some birds-of-paradise Paradisaeidae (Harrison and Loxton 1993). It is also possible that the birds may be sexually mature but are excluded from the breeding population by a mate selection mechanism.

The Malayan Night Heron *Gorsachius melanolophus* is generally rare and currently considered near-threatened (Collar *et al.* 1994). Because of its scarcity and secretive behaviour, very little is known of its movements and breeding habits. The Malayan Night Heron ranges from India east to the Philippines and south to the Greater Sundas (Martinez-Vilata and Motis 1992). It inhabits lowland wooded swamps, streams and marshes in tropical and subtropical forest in areas of heavy rainfall. The nesting areas in Taiwan are mostly in low-altitude forests, consisting of tall trees and bamboo, often close to human residences, with suitable open places for feeding. They feed mostly on earthworms and frogs (Shen and Chen 1996) but rarely on fish. It is a spectacle to see them probing for and tugging out big earthworms (10 x 300 mm) from the soil. They usually nip off the worm's head by vigorous shaking and then swallow both parts after a few minutes. A peculiar behaviour pertinent to the ingestion of earthworms involves exaggerated, slowly repeated peristaltic movements of the neck.

Like other night herons, the immature Malayan Night Heron has a plumage very different from that of the adult. Unlike small bitterns *Ixobrychus*, there is no

sexual dimorphism in plumage and size (Wang *et al.* 1991, Martinez-Vilata and Motis 1992).

A normal breeding pair (adult male and female) of Malayan Night Herons nested on a branch, about 12 m up a tall tree in Yuan-Shan Park of Taipei. When found, on 4 June 1998, two young birds were about to fledge, and were perched on branches about 20 m away from the nest. Interestingly, the adult birds were noted copulating on a branch close to the nest, but they disappeared from the park in mid June and it is not known whether they laid a second clutch. This family had a helper bird that was in an immature plumage resembling that of the two young birds, but lacking down. This helper bird occasionally tried to approach the adult birds, but was chased away. After the parent birds disappeared, the helper fed the two young birds and began to show signs of partial moult into the adult brown plumage in early July. The moult was only half-complete in mid August when the bird disappeared from the park, leaving the young that remained until 10 September. It seemed that the parent birds, the young and the helper dispersed independently. On 19 December (during the rainy season in Taipei), an adult Malayan Night Heron, which had a dark bill and dark-bluish grey lores and looked as if it had recently moulted, had returned to the same site in the park, but no breeding pair was found in the 1999 breeding season.

A second breeding pair was found in April 1998, nesting on a branch about 7 m up in a camphor tree, close to an apartment located in a Taipei suburb. The birds were observed without causing disturbance from the third and fourth floor of the apartment and a video camera was used to record the breeding process. The parent birds consisted of one in adult plumage and one in dull brownish-grey plumage, with thin white stripes

on the black crown and the body plumage, features which are characteristic of the immature plumage. The adult, immature and juvenile plumages, however, were similar in having primary and secondary flight feathers that were black with white tips, yellowish-brown greater coverts and black alulas. The pair were inept at nest-building and the people in the apartment block helped them by fixing supports in between branches of the tree as a base for the nest. Four eggs were laid, the last one on 14 May, and they hatched from 11 to 17 June. The last two chicks to hatch were ejected from the nest by the chick that had hatched first. It was not established which bird had laid the eggs and pair-bonding was not observed and, therefore, the sex of each parent could not be definitely determined. Nevertheless, the long black crest of the adult bird suggests that it was the male. Both birds co-operated in nest-building, incubation of the eggs, brooding (day and night) and feeding the chicks for three weeks after hatching. However, as the chicks grew bigger, the bird in immature plumage started to neglect its share of breeding duties and eventually did not return to the nest, even though it remained in the area. All of the feeding was then undertaken by the adult bird, which continued, even after the birds had fledged, for about 43 days (23-25 July). The fledged young (already bigger than the adult) competed strongly to be fed, forcing the adult bird to continue foraging immediately after providing food. In the meantime, the immature moulted into adult plumage in early August and then disappeared. The two young birds also departed in September. However, the adult returned occasionally until the end of December. These observations, in conjunction with the movements of the family found at Yuan-Shan Park, suggest that the Malayan Night Heron may be a partial migrant in Taiwan, although it is the northern extremity of the range of the species.

Two more breeding pairs were registered in 1999; both of them composed of one in adult plumage and the other in immature plumage. The process of breeding was followed from the very beginning of pair-bonding and the sex of each bird could be determined. Both of the adult plumage partners were male and the immature-plumaged birds were female. One pair that bonded early in March, in Taipei Botanical Garden, laid a second clutch immediately after the two chicks of the first clutch had fledged in mid June. The change of coloration of the lores during the breeding period was closely monitored. The lores of males entering the breeding cycle changed to a conspicuous blue colour one to two months prior to pair-bonding. In contrast, the lores of the females were bluish green when they first appeared in the breeding area and changed to blue, comparable to that of male, during courtship. During incubation, the colour of the lores of both males and females faded gradually to bluish green, green and even to greyish green at the end of the breeding cycle. If a second clutch was laid, the lores regained the blue colour, though this was not as conspicuous as it had been for the first clutch.

In the case of the two pairs described above, third party immature males attempted to intrude during pair-bonding, but were chased away by one of the adult males. This indicates that immature males, as well as immature females, may attempt to take part in breeding.

In the literature on Malayan Night Herons in Taiwan, Tsao (1998) described an adult-plumaged breeding pair found in 1997, where the male had deeper blue lores and a longer black crest than the female. Shen and Chen (1996) reported on the growth of chicks up to fledging at 43 days (2 September 1992), and described the food constituents and the breeding behaviour of the parents, one of which was in adult plumage and the other in immature plumage.

Of the six breeding pairs described above, four had an immature-plumaged parent, suggesting that this phenomenon is neither rare nor exceptional. Whether or not a pair of immature-plumaged birds can breed awaits further observation.

The Black-crowned Night Heron *Nycticorax nycticorax* is known to attain sexual maturity at two to three years (Martinez-Vilata and Motis 1992). If one assumes that the closely related Malayan Night Heron takes the same time to reach sexual maturity, then birds breeding in immature plumage would have to be two years old, since they were close to moulting into adult plumage. It is likely that the scarcity of the generally solitary Malayan Night Heron may lead to limited opportunities for pairing between mature adults, and hence increase the opportunity for maturing immatures to associate with adults of the opposite sex. It is clear that birds of this species, at least in Taiwan, reach sexual maturity before they attain adult plumage. It is possible that the species is under stress in Taiwan, and that adult birds have difficulty in finding mates of comparable age. It would be of interest to determine whether the species has similar breeding habits in other countries.

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