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NOTES ON THE BEHAVIOUR OF GIANT KINGFISHERS

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INTRODUCTION

The order Coraciiformes is composed of rollers, kingfishers, bee-eaters, motmots, hoopoes, woodhoopoes and several other small groups. Members of the order are abundant in the tropics, most diverse in Africa. Their social and reproductive habits are varied (Douthwaite 1973, 1984; Fry 1980, 1984; Emlen 1982a, 1982b; Ryer 1980a, 1980b, 1984; Davis 1985; Thiollay 1985).

As a systematic group, kingfishers are divided among three subfamilies: Daceloninae, Alcedininae and Cerylinae (Fry 1980). Many daceonines hunt on land, taking arthropods, small reptiles and frogs. Cerylines are thought to feed exclusively in water, taking fishes and (in some cases) crustaceans. There are currently considered to be three genera of cerylines: Chloroceryle, Megaceryle and Ceryle (Fry 1980).

Giant Kingfishers are widespread in tropical sub-saharan Africa. They are the largest of kingfishers, weighing c.400g (Fry 1980). Their plumage is grey/black and white, males with rufous breasts, females with rufous bellies.

The species has a simple social organization, unlike its relative the Pied Kingfisher (Cerule rudis). This paper aims to demonstrate the simplicity.

METHODS

I saw Giant Kingfishers, at least 12 individuals, at irregular intervals in the Basse Casamance region of southern Senegal during the periods September 25 - December 9 1976, January 22 - March 1 1977, and October 27 - November 21 1985. I also saw at least 2 individuals in Gabon in December 1976. Overall, I was in areas containing Giant Kingfishers for 200 + hours. Of this, perhaps 75 hours were devoted to the species. The birds were observed, followed, photographed and recorded (Sony TDC-5M). They were not trapped, marked or ringed. Attention was paid only to certain kinds of behaviour. I concentrated on "courtship" and copulation in breeding areas.

RESULTS

Natural History

The habitats of the Basse Casamance have been described in numerous publications (references in Moynihan 1987). The region is flat and generally humid, an intricate network of tidal creeks, mangrove swamps, small lakes and irrigated rice fields among slightly higher ridges with forest, scrub, pastures, cropfields and plantations. The Giant Kingfishers seen in Gabon were found along the banks of the Ivendo River where it flowed over shallow rapids through high forest near Makokou.

I did not observe actual hunting by Giant Kingfishers, although several individuals were seen to carry fishes during sexual encounters (below). Some of the fishes were quite large, at least 12-14 cm in length. The Giant Kingfishers of the Casamance were not seen feeding in the shallow and muddy waters of the inshore mangrove swamps which provide most of the prey of the local Pied Kingfisher and so their prey may be obtained in relatively deep and clear waters elsewhere. In the Casamance, Giant Kingfishers often flew high over long distances, > 1 km, presumably going from one feeding site to another.

Social Structure

A few individuals were seen flying singly. The others (at least 8 out of 12 individuals) were found to be in pairs of one male and one female at any given time. There seemed to be no tendency towards gregariousness. With one or two possible and dubious exceptions. I never saw three individuals together. Either pairs were repelling and/or they were avoiding one another. Coraciiform birds tend to be very aggressive (e.g. Moynihan 1987 and in press). It seems likely, therefore, that Giant Kingfishers are territorial.

Acoustic Signals

The principal vocalizations of the species are "Yelps" and "Rattles". They were heard many hundreds of times in the Casamance and dozens of times at Ivendo.

Yelps sound rather dog-like. Individual notes are of appreciable length. They range from very loud, clanging and reverberating, to very soft and hardly audible at distances of a few meters. They can be uttered singly or in series. Series are extremely variable. A few fall into set patterns of 2, 3 or 4 notes. Rattles are accelerated, and they sound hard and mechanical. Both kinds of calls can be given by individual birds while perched or in flight. They do not seem to be accompanied by any specialized, ritualized movements in flight. There are no elaborate "flight displays" as in some dacelonine kingfishers. Sonograms are shown in Figs 1 and 2.

Rattles and Yelps are often uttered in mixed series or medleys. These also are extremely variable; but there are certain regularities of occurrence on close inspection. Thus, for instance, a medley is much more likely to begin with a Yelp than with a Rattle. Many series take the form of a few Yelps - one Rattle - a few Yelps - one Rattle... for minutes on end.

Rattles and Yelps occur together so frequently that they must be stimulated by similar (of course not identical) causes. Comparative data from other coraciiform birds and even passerines (Morton 1977) would suggest that both patterns are hostile. Yelps sometimes occur without Rattles. Rattles very seldom occur without Yelps. Yelps of one type or another are associated with copulations (see below). It seems possible, therefore, that Yelps, on the average, are produced by lower intensities of motivation and/or that they are less aggressive than their Rattling counterparts. Perhaps the two patterns together are the functional equivalent of passerine "Songs".

There are apparent homologies with vocalizations of other ceryline kingfishers,

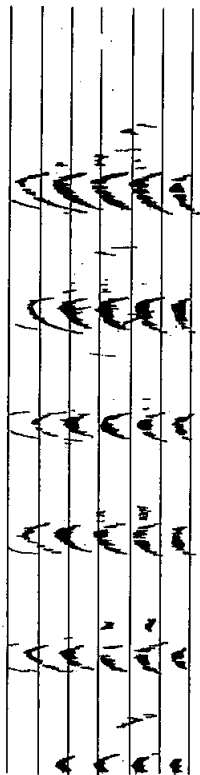


Figure 1 Yelps by a single individual. Range 8 kHz, duration of sonogram 25 s.

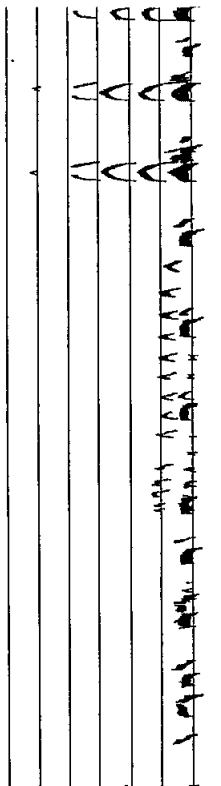


Figure 2 Yelps and a Rattle, involving two individuals. Range 8 kHz, duration of sonogram 25 s.

the North American Belted Kingfisher (Megaceryle alcyon) and two Neotropical species, the Ringed Kingfisher (M. torquata) and the Amazon Kingfisher (Chloroceryle amazona); but there are some differences in form and perhaps usage (Skutch 1972, 1983; Davis 1985; W.J. Davis pers. comm.; pers. obs.). The details of correspondence need to be studied more closely.

Visual "Displays"

All sorts of patterns may transmit information of social relevance at the same time that they subserve other practical functions (Smith 1977, Moynihan 1985). There are also patterns which are designed to convey social information and to do little or nothing else. When stereotyped in form or frequency, they can be called "displays".

Giant Kingfishers perform "Tailbobs" and "Headbobs". Both are sudden, rapid upward movements, sometimes single, occasionally repeated. Headbobs are relatively rare among Giant Kingfishers, as they are in Halcyon senegalensis and H. malimbica, much less frequent than in H. leucocephala or H. pileata (pers. obs.). Tailbobs, on the other hand, are much more frequent or vigorous among Giant Kingfishers than in either H. senegalensis or H. malimbica, although less highly developed than in some Australasian forms, e.g. Halcyon chloris and the kookaburras (again pers. obs.). I think that both Bobbing patterns of Giant Kingfishers may indicate nervousness or unease and an increased probability of flight.

Giant Kingfishers have elongated feathers on their crowns. The usual effect is merely shaggy. In some circumstances, the feathers are raised to form a definite (often slightly forked or bipartite) crest or, alternatively, smoothed down to look sleek: See Fig. 3. Crest-raising is another apparently hostile pattern, perhaps aggressive. It occurs at the approach of a human observer and during apparent disputes with other species. It can be accompanied by Tailbobs, Gapes, Wingspreads (see below) and/or Yelps and Rattles. Similar raising occurs in some other ceryline kingfishers (e.g. C. rudis). Crest-smoothing, the physical opposite, may function as appeasement.

"Gaping" is more distinctive. The bill is opened widely. This was a common reaction to attacks by other species such as the Pied Kingfisher and the Abyssinian Roller (Coracias abyssinica). It seemed to be hostile and defensive. There was no visible connection with feeding or digestion.

"Wingspreading" occurs in many kingfishers. The wings are raised, partly unfolded, and stretched out laterally. The movement and the resulting posture can be combined with a variety of other patterns, Crest-raising, Gapes, Yelps and Rattles. During my observations, the vocalizations accompanying this particular posture were given in the course of disputes with Abyssinian Rollers and, occasionally, when mates joined one another at a nesting site.

Tailbobs and Crest-raising are very common; they were seen hundreds of times. Headbobs, Crest-smoothing, Gaping and Wingspreading appear to be less common; they were seen only dozens of times. Gaping was recorded only at Ossouye, where it was performed by both members of the pair. Crest-smoothing was most characteristic of the female. The statistics that might be extracted from my field notes would be misleading. I was more interested in other patterns, and I stopped counting as the numbers rose. Besides

which, the patterns have different time spans. Crest-raising, Gaping and Wingspreading can be prolonged; single Bobbing movements are brief. The point to be stressed in this connection is that all these visual displays are regular and repeated components of the social repertory of the species.

Breeding Behaviour

The potential breeding site that I saw most clearly and closely was discovered near the town of Ossouye in the Casamance on November 15 1976. It was a hole, among others, 0.5 metres above ground level in a 2 meter sand and clay (laterite) bank near a major highway, overlooking a small pond in an area of second growth Acacia trees. At the time, a pair of Giant Kingfishers seemed to be in a phase of "investigating" or "refurbishing". Holes in banks are excavated by many kinds of birds, swallows and bee-eaters as well as some kingfishers. They may survive for many years. Only they do need to be fixed up by each successive set of occupants.

On the first day, the male Giant Kingfisher took the initiative. He visited the hole again and again. He either stuck his head and the forepart of his body into the entrance, or he went completely inside, disappearing from view. Sometimes he was obviously excavating or re-excavating; little jets of earth were thrown out. This sort of male activity is typical of several species of kingfisher, i.e. the Micronesian Kingfisher (Halycon cinnamomina) in captivity and the White-throated Kingfisher (H. snyderensis) in the wild (per. obs.). The female Giant Kingfisher stuck close to the male, in nearby trees or on a talus slope; but she was not seen to visit the hole at this time.

By mid-morning of the next day, November 16, she was making as many visits as the male (10 visits by each individual were recorded in my notes). By November 19, rather to my surprise, both the male and female had stopped excavation. Either the job was done or the birds had been discouraged by attacks by Pied Kingfishers (below).

Seven copulation attempts by the Giant Kingfishers of Ossouye were seen; the first on November 16, the last on December 1. (This is very high frequency for kingfishers, pers. obs.). Both the first and last attempts appeared to be successful; there were repeated contacts of cloacas. Other attempts appeared to be unsuccessful. The general format was similar throughout. The male and female would arrive, sometimes with loud Yelps and a few Rattles in flight. They would then sit quietly in a tree, performing a few Tailbobs with or without Crest-raising. One or both individuals might utter soft Yelps, often organized in doublet or triplet rhythms. After a short time, the male would then fly directly onto the female's back. The female assumed a submissive posture, head held low, crest smoothed, before the male flew or as soon as he landed. The male began copulatory movements immediately, lowering his tail and beating his wings. The female raised her tail. Some copulation attempts were prolonged for a minute or more. All the observed attempts occurred between 7:00 and 7:30 a.m., well after first daylight.

The male fed, or attempted to feed, fish to the female occasionally (five clear cases in my records). At the beginning of each episode there were many moves from perch to perch. The male always showed Crest-raising. The female either raised or smoothed her crest. When and if a fish was

successfully transferred, both individuals appeared to relax.

Showing the nest hole, copulation, feeding of the female by the male occurred on the same days, but never within a few minutes of one another.

Interspecific Interactions

The pair of Giant Kingfishers near Ossouye was repeatedly attacked (at least 15 times, for many minutes on end, over a period of 4 days) by some 4-7 Pied Kingfishers. The attacks were dives and swoops with aggressive vocalizations. There were no physical contacts. The Giant Kingfishers were not seen to retaliate. Since C. rudis and M. maxima were not seen to take the same prey in the same places (see above), one can speculate that these attacks may be an expression of competition for nesting sites.

Attacks by Abyssinian Rollers were slightly less frequent than those by C. rudis. These rollers can hardly be strong competitors of ceryline kingfishers for any resources (they feed on land and nest in holes in trees). They do, however, commonly redirect aggression upon a wide variety of other species (Moynihan, in press).

COMMENT

Pied Kingfishers are known to breed, in some areas of both West and East Africa, in groups or aggregations (sometimes large), with skewed sex-ratios (excesses of males), homosexual or pseudosexual pair bonding, and helpers at the nest (Douthwaite 1973, 1978; Reyer 1980a,b, 1984; pers. obs.). None of the first three features was characteristic of the Giant Kingfishers of the Casamance of Gabon (I had no opportunity to observe helping). The social and sexual, even signal, behaviour of the species seems to be relatively simple. Since most other species of kingfisher show equally 'simple' behaviours, it seems likely that the simplicity of Giant Kingfishers is conservative of "primitive", rather than a result of secondary simplification.

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SUMMARY

Giant Kingfishers (Megaceryle maxima) were studied in 1976, 1977 and 1985, mostly in the Basse Casamance of Senegal. They were found in pairs and no homosexual or pseudosexual behaviour was observed. Acoustic signals included "Yelps" and "Rattles"; visual signals included movements, intention movements and ritualized displays. Much of the social and signal behaviour of the species may be primitive among ceryline kingfishers.

RESUME

Des Martin-pêcheurs géants (Megaceryle maxima) sont étudiés, surtout au Basse Casamance du Sénégal, pendant 1976, 1977 et 1985. On les a trouvés en paires sans aucune évidence de comportement homosexuel ou pseudosexuel.

Pour signes acoustiques ils font des glapissements et des râles. Comme signes visibles ils bougent et font des mouvements d'intention et des parades du rite. C'est possible que le comportement de cette espèce est primitif parmi les *Cerylinae*.

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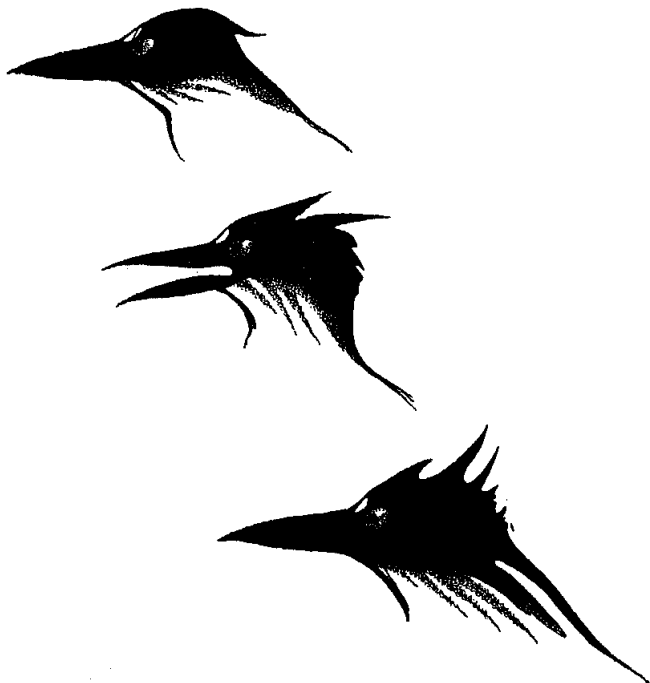


Figure 3 Crest patterns of M. maxima. Top: a male with feathers smoothed. Centre & Bottom: females crest-raising.