hung down the wall from the nest, which contained 1 egg 25 x 18 mm and was obviously deserted. The oval egg was a light cream colour and was entirely covered with small brown spots, more heavily at the thicker end where they formed a brownish cap. The egg and nest are in the AMNH.

This nest and egg, found in June 1979, turned out to be those of *Cichlornis llaneae,* but this was not known until one year later when I again camped in the area in June and an identical nest was found in the very same niche as the one I had first seen. For further information on this nest and 2 other specimens of *C. llaneae* and photographs of the type and the nest, see Hadden (1981).

Acknowledgements: My wife Llane Hadden has spent many days alone while I have pursued my interests in photography and ornithology. It is as a token of gratitude for her support and interest that I have named this new species for her. I am also grateful to Elliot Harding, Francis Munau and Tony Anung and other village men without whose help I would not have found the thicket-warbler area. Considerable help has also been given by Jared Diamond and R. Orenstein, and in particular I am much indebted to Mary LeCroy and Ian Galbraith who gave invaluable assistance with comparison of specimens from the AMNH and BMNH respectively, as well as their time and expertise, especially that of Mary LeCroy in helping to draft this note.

References:

Mayr, E. 1933. Birds collected during the Whitney South Sea Expedition. XXII. Three new genera from Polynesia and Melanesia. *Amer. Mus. Novit.* 590: 1-6.

Cain, A. J. & Galbraith, I. C. J. 1955. Five new subspecies from the mountains of Guadalcanal (British Solomon Islands). *Bull.Brit. Orn.Cl.* 75: 90-93.

Gilliard, E. T. 1960. Results of the 1958-1959 Gilliard New Britain Expedition, 2. A new species of thicket warbler (Aves, *Cichlornis*) from New Britain. *Amer. Mus. Novit.* 2008: 1-6.

Hadden, Don. 1981. *Birds of the North Solomons.* Wau Ecology Institute Handbook No. 8. Wau, Papua New Guinea. 107 pp.

Address: Don Hadden, 288 Yaldhurst Road, Christchurch, New Zealand.

The relationship of male Lesser Honeyguides *Indicator minor* with duetting barbet pairs

by Lester L. Short and Jennifer F. M. Horne

Received 28 June 1982

Our field studies of barbets (Capitonidae) in East Africa have been disrupted regularly by honeyguides (Indicatoridae) interacting with the barbets, and with each other. We particularly elicit approaches by honeyguides when we use our tape-recorder to play back barbet duets, the approaches being to us or to the barbets, which are also stimulated by our playback activities. We reported (Short & Horne 1979) on these responses by *Indicator variegatus, I. minor* and probably *I. narokensis* to various barbet species and to playback of the barbets' voices. In that report we posed several questions relating to the honeyguide–barbet interactions. Further data now available allow us to narrow the quest for reasons underlying these honeyguide-barbet interactions.

If we assume that, generally, the honeyguides coming to barbet vocal activities are females seeking a nest in which to lay an egg, since honeyguides

are nest parasites especially of barbets (Friedmann 1955, 1968), the close approach of honeyguide females to singing, duetting barbets nevertheless would appear non-functional, the parasite being "interested" presumably in the hosts' nest, not in the other activities of the barbets. We suggested (1979: 17) that honeyguide females, and perhaps males, might use those activities of barbets associated with breeding as "cues" that could trigger breeding readiness in honeyguides and even bring together prospective honeyguide mates. However, we remarked that such functions seemed both energetically wasteful and disadvantageous in that they arouse the barbets and facilitate their recognition of the honeyguides as harmful, particularly since barbet pairs often have helpers. The non-breeding helpers presumably could gain experience that would eventually increase the likelihood of successful breeding if they were to learn to attack and drive honeyguides from their vicinity.

Observations

In our garden outside Nairobi we can at any time of year elicit White-headed Barbet *Lybius leucocephalus* responses to playback of its voice, the responses varying from chattering, aggressive overflights and close approach to the recordist, to excited calling and "greeting ceremonies" (see Short & Horne 1982). Between July and January we hear at intervals aggressive trills of Lesser Honeyguides *Indicator minor* in the garden. At those times, repeated playback of the barbets' greeting ceremonies inevitably results in the appearance and approach of a Lesser Honeyguide which, when perceived by the barbets, is chased by one or more of them. The honeyguide often returns, and indeed may retaliate by attacking one or another of the barbets.

Occasionally, *two* Lesser Honeyguides would simultaneously approach the playback recordist (this species is variable in plumage, but most individuals can be identified as *I. minor* by size and by the presence of a distinct moustachial stripe). In some 20 of such cases observed sporadically between 1979 and 1981, the honeyguides would attack one another, the pursuit taking precedence over honeyguide-barbet interactions (leaving the barbets perched, often "panting" from the exertion of chasing the speedier, more manoeuverable honeyguide). We assume that the Lesser Honeyguide parasitizes *L. leucocephalus,* for we have reported (Short & Horne 1979) this honeyguide entering and being evicted from a nest of *leucocephalus.*

Our studies of the Black-collared Barbet *Lybius torquatus* (Short & Horne 1979, 1982) in coastal Kenya have provided over 2000 additional observations of honeyguide-barbet interactions. (Less frequent interactions of honeyguides with the barbets *Lybius melanopterus, L. guifsobalito* and *L. rubrifacies* recorded in our unpublished notes are not reported here.) *Lybius torquatus* is a frequent host of *Indicator minor* (Friedmann 1955, Ranger 1955). We have supplemented our observations by collection of 6 Lesser Honeyguides taken (after some minutes of observation) from beside duetting, displaying pairs of Black-collared Barbets south of the Nature Reserve in Arabuko-Sokoke Forest (Britton & Zimmerman 1979). Five of the 6 honeyguides collected proved to be males, much to our surprise, and 26 seemingly separate, aggressive, sustained honeyguide–honeyguide interactions suggest that many if not most of these also involve males.

On the afternoon of 7 July 1979 we collected a Lesser Honeyguide that had been following a (playback-stimulated) frequently duetting pair of *L. torquatus* for some 15 minutes, moving from one duetting post to another, perching close to the barbets, interrupting them, being chased, and then returning to them. It was a male with enlarged (4 x 3 mm) testes. The next day we worked with another barbet pair, and at 08:00 spied a honeyguide following the pair, but at a greater distance than the previous day's bird. This individual followed the barbets on 4 consecutive flights to singing sites (trees scattered about their territory) and watched them sing 3 duets. In most cases we found that a honeyguide attracted to a pair of duetting barbets approaches them closely, landing beside or even between them, thus disrupting any duet attempt, though the barbets may sing an interrupted duet or perform a greeting ceremony. In this instance, however, the honeyguide perched 3–5 m from the barbets and did not attempt to join them or fly directly to the sites they occupied. We collected the honeyguide from a perch 3 m from the barbets; it was a female in slight moult but with a somewhat enlarged ovary.

In November 1981 we worked in the Arabuko-Sokoke Forest with a pair of Black-collared Barbets that were duetting regularly and excavating a cavity, whether for roosting or nesting is uncertain. At 06:30 on 19 November we observed one of the barbet pair chasing a honeyguide through the trees. The barbet then returned to its former perch and duetted with its mate. A honeyguide (uncertainly the same one) again appeared, flying to the barbet pair; all 3 flew off in a chase. We then saw what we thought was a barbet in flight fighting with the honeyguide, but both birds proved to be honeyguides and judged by voice were Lesser Honeyguides. They circled back and forth in pursuit of each other, tails fanned to exhibit the tail pattern, and called (trill calls); several times they grappled in the air, before they went off in a long pursuit flight. We stayed with the barbet pair and at 07:00 heard a honeyguide's trill call to which we played back a Lesser Honeyguide call (one recorded by C. Chappuis in Malawi), and this brought a honeyguide to us, calling. It was chased about by one barbet as we recorded the honeyguide's "ta-wee-wit" call – a major vocalization of *I. minor,* song-like, but not the note given at a call site reported by Ranger (1955) – and its trill, and then we collected it from beside the 2 barbets. It was a male *I. minor* with testes 4 x 3 mm and 3 x 3 mm (left and right respectively). We heard 2 calls and had one sighting of a second honeyguide about the barbets during the next 40 minutes. Late that day we "lost" the barbet pair (they proved later to have gone north, presumably toward a roosting hole, between 16:00 and 17:00 hours), but as we repeatedly played back their duet a Lesser Honeyguide circled back and forth overhead, "searching" for the barbets. The honeyguide stayed with us for 10 minutes flying about us from perch to perch, then flew off. A short while later we played back the barbets' duet and had 2 honeyguides circle overhead then go off in chase.

Nearby, at 17:20 hours on the same day our barbet playback brought to us a single *Lybius torquatus* and 2 honeyguides, apparently *Indicator minor*. The honeyguides seemed to try to approach the barbet, but the barbet attacked one honeyguide as the other honeyguide also attacked it, and all 3 birds circled in a furious "dogfight". We were unsuccessful in attracting a second barbet, but the one barbet was engaged with the 2 honeyguides, and they

with each other, for 50 minutes. The barbet chasing one honeyguide seemed to trigger an attack by the second honeyguide on the first, and this appeared to "confuse" the barbet, which shifted its attack to the other honeyguide. The barbet tired more readily and when it perched, the 2 honeyguides flew about in sweeping circles or directly off in a line, then back, still in pursuit of each other, to the barbet.

We continued working with several barbets, seeing honeyguides daily as they came to our playback of the barbets or to the calling of the barbets themselves. Not only the barbet duets but even greeting ceremonies and the sounds accompanying their courtship feeding attracted honeyguides, causing them to approach. At 08:05 on 21 November 1981, we watched 2 honeyguides attracted by the playback of a *Lybius torquatus* greeting ceremony as they engaged in a chase near the excavating pair of barbets. The 2 honeyguides perched in a tree north of the excavation, gave low grating calls with tails fanned, bowing to each other and raising and lowering the (spread) tail. One of the honeyguides was notably smaller than the other and held its bill open, but gave the same displays, its call being a buzzy trill. The 2 flew in pursuit of each other, circled and came together grappling, floating downward toward the ground clutching each other, with tails spread, then breaking apart. The larger bird flew away, and the other followed. At 08:18 we played a duet of *L. torquatus,* instantly bringing a moustached *I. minor* to us, then a second honeyguide; they attacked one another, then engaged in a fast chase, bursting through undergrowth and canopy, with tails spread, pecking and hitting each other in flight. They disappeared in a chase to the southwest. Again we brought the same 2 honeyguides back, this time with playback of the barbets' greeting ceremony, and the honeyguides fought and chased round and round until, at 08:25, a barbet joined the fray, attacking one honeyguide; but before the chase had gone 20 m the same honeyguide was chasing the barbet, being much faster in flight. After a while they perched side by side, the barbet "panting", and then gave chase again. The second honeyguide, apparently watching, overflew and disappeared as the barbet and first honeyguide chased to and fro.

At 07:43 on 22 November 1981 we employed honeyguide calls to bring the barbet pair to their excavation. After the barbets duetted near the excavation a honeyguide joined them. The barbets called and flew at the honeyguide, which zoomed upward in the air (the barbets dropped back down to a tree) and then without calling and with tail spread widely in a somewhat stilted flight, flew twice in a circle about 200 m in diameter centred over the area of the barbets' excavation. A honeyguide was near this pair until 09:00 on that day, although we were unsuccessful in attracting honeyguides to this same pair of barbets later in the morning. In fact our rate of success in drawing honeyguides to barbet playback was greatest before 10:00 and after 16:00; the barbets responded at any time, but their response was more sustained, with more frequent duets and less rapid habituation, to playback early and late in the day. Next day (23 November) we worked close to the excavating pair of barbets. Two honeyguide trills were heard between 07:00 and 07:26, but we did not playback, preferring to watch the behaviour of the barbets. At 08:10 the barbet pair flew to a tall dead tree and duetted, a honeyguide instantly appearing and getting between the duetters. The "lead" barbet, namely the one which initiated movement

to duetting sites and was presumably the male, viciously attacked the honeyguide. The barbet pair then flew and the honeyguide joined them and followed the lead barbet to another tree, where the 2 barbets performed their greeting ceremony. Again accompanied by the honeyguide, the barbets then returned to the dead tree and attempted a duet. At this point we fired at and missed the honeyguide; but one playback of the barbets' duet instantly brought the honeyguide, trilling, and then the barbet pair, back to the dead tree. We collected the honeyguide from within 1 m of this barbet pair at 08:30. It proved to be a male *I. minor* with testes 3 x 3 mm.

At 08:37, at the same site we played back the *L. torquatus* duet, and were rewarded by approach first to us, then to the excavating barbets, of another honeyguide. This honeyguide was chased by one barbet, but evaded it and flew back to the tree bearing the incompleted excavation. It landed near the excavation, then flew up to a perch and trilled. The barbets first gave chase, then the honeyguide chased one barbet off to the northwest. After a few minutes we played back a barbet duet and a barbet and honeyguide appeared together in a chase (apparently of the honeyguide by the barbet) before perching in the same dead tree from which we had just taken the male honeyguide as described above. A second barbet joined the first barbet and honeyguide and the 2 barbets attempted to duet, the honeyguide being perched only 1 m away when we collected the latter (at 08:57). This bird too was a male (testes 3.5 x 3.5 mm and 3 x 1.5 mm, left and right respectively).

Just after 09:10, having glimpsed yet another honeyguide nearby, we played the barbets' duet at a point between the tree bearing the excavation and the dead tree referred to above. The pair of barbets appeared immediately, with a honeyguide close behind them. A chase occurred, the lead barbet chasing the honeyguide, the latter reversing the pursuit, and over and over again. Another playback brought back the lead barbet, followed by the honeyguide, and then the second barbet; they all perched just west of the excavation site. L.L.S. went to the dead tree from which the 2 previous honeyguides had been collected, and played back the barbets' duet, bringing in all 3 birds. The barbets managed to duet as the honeyguide flitted about them in a tight circle; but, when the duet ceased the honeyguide moved away from the barbets and was collected (at 09:25). This honeyguide, taken from the same tree as the previous 2, and from beside the same pair of barbets as the previous 2, as well as the male of 19 November, also was a male, with testes 3 x 2 mm and 4 x 3 mm (left and right respectively, a reversal from the usual left testis being longer). Thus, within one hour, 3 different male Lesser Honeyguides were collected as they interacted strongly with the same pair of barbets in the same tree.

This barbet pair continued that morning to react, by duetting, to playback of their duet. One other dark-coloured honeyguide, of uncertain species, was seen to the west of this pair before we left the site and the area later that morning.

The testes of the Lesser Honeyguides that we collected seem sufficiently enlarged to consider the birds as in breeding or pre-breeding condition (also *fide* R. Payne). However, we saw no copulations of honeyguides, nor did the Lesser Honeyguide males employ singing or sites from which to call (Ranger 1955) in order to attract females. The vocalizations of the honeyguides during their interactions with each other and with the barbets

were usually trilling calls and squeak calls, which are those associated with aggression (Short & Horne 1979). It may be that the behaviour of the Kenyan honeyguides differs from that in more seasonally oriented populations in southern Africa (note, for example, the large testes of both July and November Lesser Honeyguides). We ourselves have noted that gonads are somewhat enlarged in most barbets and honeyguides that we have collected (even in subadults of such barbets as *Trachyphonus darnaudii*) in Kenya, suggesting that irregularity of the rains or other perhaps associated factors demand a state of readiness to breed (or to defend resources necessary for breeding) all the year round.

The above observations are summarized from our field and tape-recorded notes. We have noted many other honeyguide responses to calls and duets of various barbets (including, e.g. *I. minor* responses to *L. melanopterus* and *L. guifsobalito*), and also frequent honeyguide–interactions. The latter include some interspecific interactions (e.g. of *I. minor* to *I. narokensis*, of *I. indicator* to *I. variegatus*, of *I. variegatus* to *I. narokensis*, and of *I. indicator* to *I. minor*) as well as over a hundred instances of apparent *I. minor* intraspecific chases in the vicinity of barbet pairs. The behaviour of *I. indicator* (which is common in the areas worked) in regard to the barbets and our playback differed markedly from that of *I. minor*. Only rarely did a Greater Honeyguide appear when we played barbet duets, and it would either leave after a look at us, chase a Lesser Honeyguide if one was present, or (twice) commence guiding calls directed at us. Unfortunately not all of the honeyguides that we studied could be observed closely; some *I. minor* have very weak malar stripes that are not readily apparent (e.g. there is only a trace of the malar stripes in one of the 4 males just described, and the malar area varies in colour considerably in the other 3 birds) and small sized *I. minor* can be mistaken for *I. narokensis* or *vice versa*. Hence, identification of a honeyguide species (let alone determination of its sex) in the field was not always possible. Nonetheless, it is apparent that many, if not most (possibly nearly all) the honeyguide–honeyguide and honeyguide–barbet interactions involved male honeyguides.

Discussion

We have established that Lesser Honeyguides of both sexes, including many males, are attracted to singing (duetting) pairs of certain barbets. There is ample evidence that 2 or perhaps more honeyguides are attracted simultaneously to duetting barbets (or to playback of their duets), and that when this occurs they engage in fights associated with the presence and location of the barbets or of the latters' excavations. The collecting of 4 male Lesser Honeyguides, 3 within one hour in intimate association with the same duetting barbet pair clearly suggests that there is benefit to the males in such association, and the fighting we have described suggests that the honeyguides are exhibiting themselves with, and defending "ownership" of, particular barbet pairs against one another.

The possibility also exists (Short & Horne 1979) that the honeyguides could utilize the duetting barbets as "cues" triggering or enhancing reproductive development in the honeyguides (of both sexes), helping to bring them reproductively into synchrony with their hosts. This could be accomplished by the honeyguides observing the barbets without actually approaching them and interfering with their displays. On the other hand, the interactions of the honeyguides with barbets may create a disturbance

which draws the attention of male and female honeyguides to the presence of a conspecific territorial male. A female Lesser Honeyguide, by following a barbet pair, but not so closely as would a male, perhaps places herself in a favourable position from which to attract (through the barbets' activities) the attention of a possible mate.

We have no data on take-over of barbet holes by honeyguides. It is not even known where honeyguides roost, nor whether or not they require a cavity. They do not seem to usurp roosting holes from the barbets, for we have frequently watched barbets go to roost and in all cases in which honeyguides had been accompanying a barbet pair, the honeyguides disappeared well before the barbets roosted.

We do not know the number of Lesser Honeyguides that may both approach a duetting pair of barbets already "claimed" by another honeyguide and then depart without attracting our attention. We have heard calls of honeyguides at a distance when observing one honeyguide following a barbet pair; but whenever 2 honeyguides were present with a pair of barbets there have been pursuits and apparent or actual conflicts (some conceivably male-female courtship chases), resulting in only one honeyguide being left with the barbets. There also have been 7 instances of a small honeyguide, presumably *I. narokensis* (see Short & Horne 1979), present with a barbet pair and later replaced by a larger, moustached *I. minor*. Naturally, in some Lesser Honeyguide–barbet pursuits passing out of our view, the returning honeyguide may not have been the same individual. (We have circumstantial indications of this possibility from lengthy pursuits out of our sight accompanied by trilling bursts as if from 2 honeyguides.)

Further corroboration of these results is desirable, including their extension to other species of *Indicator*. The employment of barbet pairs in territorial proclamation, or as an essential element, of a honeyguide territory is intriguing and unique in birds. Indeed, territoriality itself and the pair bond in honeyguides require investigation, especially in view of the lek-like mating system of *I. minor* described by Ranger (1955) in southern Africa, and the fact that such behaviour contrasts strongly with that of host–parasite relations of the parasitic cuckoos (*Cuculus* spp.) and cowbirds (e.g. *Molothrus ater*), which we have personally observed, and indigobirds (Payne 1973).

Each female Lesser Honeyguide requires several host nests. Possibly a male, defending a territory containing several pairs of barbets, would thus try to ensure that only one egg (fertilised of course by the territorial male) is laid per host nest. (Note that young honeyguides kill other young in a nest, hence 2 honeyguide eggs in a nest would mean the death of one of the hatchling honeyguides.) Since honeyguides have hosts other than barbets and woodpeckers, one wonders if these other hosts' nests are used to "dump" eggs when preferred hosts are unavailable. In any event, further data are needed to treat these possibilities.

Acknowledgements: We are grateful to A. and P. Donnelly for assistance, to G. R. Cunningham-van Someren for suggestions and help, and to the authorities of the Kenyan Ministry of Tourism and Wildlife for permission to obtain specimens. D. Amadon and R. B. Payne kindly read and commented constructively on the manuscript. The field studies were supported by the L. C. Sanford Fund and the Ritter-Eisenmann Fund of The American Museum of Natural History.

References:
Britton, P. L. & Zimmerman, D. A. 1979. The avifauna of Sokoke Forest, Kenya. *Jour. East Afr. Nat.Hist. Soc. & Nat.Mus.* No. 169.
Friedmann, H. 1955. The honey-guides. *U.S. Nat.Mus.Bull.* 208.
— 1968. Additional data on brood parasites in the honey-guides. *Proc. U.S. Nat. Mus.* 124: 1-8.
Payne, R. B. 1973. Behavior, mimetic song and song dialects and relationships of the parasitic indigobirds (*Vidua*) of Africa. *Orn. Mon.* No. 11.
Ranger, G. A. 1955. On three species of honey-guide; the Greater (*Indicator indicator*), the Lesser (*Indicator minor*) and the Scaly-throated (*Indicator variegatus*). *Ostrich* 26: 70-87.
Short, L. L. & Horne, J. F. M. 1979. Vocal display and some interactions of Kenyan honey-guides (Indicatoridae) with barbets (Capitonidae). *Amer. Mus. Novit.* No. 2684.
— 1982. Vocal and other behaviour of Kenyan Black-throated Barbets *Lybius torquatus*. *Ibis* 124: 27-43.

Addresses: L. L. Short, American Museum of Natural History, New York, New York 10024, U.S.A.
J. F. M. Horne, P.O. Box 24622, Karen, Nairobi, Kenya.

Books Received

Flint, P. R. & Stewart, P. F. 1983. *The Birds of Cyprus*. Pp. 182. Maps, appendices. British Ornithologists' Union, c/o The Zoological Society, Regent's Park, London NW1 4RY.

£12 (£10 to members if ordered before end May '83).

This check-list, the sixth in the series of annotated avifaunal lists being published by the BOU, comprehensively covers an island of major importance to Palaearctic/African migrants crossing the eastern Mediterranean, but where even today several million birds are killed annually, mainly illegally. Besides the systematic list covering some 330 species and usefully providing a yardstick for estimating future population changes, there is discussion of past and present Cyprus ornithology, geography, geology, climate, vegetation, migration, breeding and conservation. The appendices include details of ringing recoveries, biometric data and sites of ornithological interest.

Dunning, J. S. 1982. *South American Land Birds. A photographic aid to identification.* Pp. 364.

Over 1000 coloured photographs. End paper maps. Harrowood Books, Newton Square, Pennsylvania, USA. $37.50 or $27.50 in paperback.

The author, with the expert collaboration of R. S. Ridgely, has produced a book identifying over 2500 South American birds, 1112 of them in clear cut colour portrait photographs, 8-12 to a page, with useful brief notes and tiny distribution maps. It is a remarkable achievement. The technique, developed over 15 years, of trapping birds and then photographing them, when they have regained a relaxed posture, in what amounts to a mini portable studio in the field, has never been exploited on such a scale or so successfully. The colours in some plates may appear slightly distorted, probably due to techniques and colour reproduction, but they are remarkably few and the resulting portrait gallery is as yet unique.

The author's main concern, in his capacity as a Director of the World Wildlife Fund, is to alert more people to the dangers menacing South American birds and he is generously donating all royalties to the WWF for purchase and protection of their threatened habitats.