

OBSERVATIONS ON THE BEHAVIOUR OF TWO SPECIES OF HONEY-GUIDES

Indicator variegatus (Lesson) and *Indicator exilis* (Cassin)

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ABSTRACT: Twenty-two specimens of *Indicator exilis* and eight specimens of *Indicator variegatus* were collected either at or in the close vicinity of three wild bees' nests situated in one part of the Malabigambo Forest. The high density of both species, particularly *I. exilis*, at the beehives and not elsewhere, suggests that the birds had pre-located the hives and visit them periodically. The possibility of olfactory attraction as an aid to beehive location is discussed, together with other locating aids. A method of capturing Honey-guides is described.

Between 2 February and 19 February, 1968, the authors of this paper made records of possible numbers of Honey-guides visiting three wild beehives. The short study took place in Malabigambo Forest, 0° 57' S, 31° 36' E, southern Uganda, at an elevation of 3,000 feet. Twenty two specimens of *I. exilis* and eight specimens of *I. variegatus* were secured and preserved as study skins. The seemingly large series of *I. exilis* obtained was deemed necessary due to the great similarity of five sibling Honey-guide species, *I. exilis*, *I. pumilio*, *I. willcocksii*, *I. meliphilus* and *I. minor*. The three wild beehives located were all situated in similar presently dry seasonal swamp forest, and were easily accessible for checking a minimum of three times a day and frequently four or five times. Experience showed that the hours most favoured by Honey-guides for hive visitations were between 10 am and 5:30 pm, which coincided with the normal peak periods of sun during the day.

For the purpose of this paper the three hives are identified as A, B and C. All three hives were located within 40 yards of a straight abandoned rail track cut by a logging company into the heart of Malabigambo Forest. Hive C lay some 1,600 yards to the north of hive B, whilst hive B was situated approximately 750 yards north of hive A. The greatest distance between the two outside beehives was therefore 2,350 yards in a straight line. It must be stressed however that the distances between the hives were not accurately measured but are only approximate.

The intention of this paper is to demonstrate that it seems probable that the opportunity to collect numbers of each of these two species of Honey-guides was a result, not of their constant density within the limited area, but rather of their habit of making periodical visits to all wild beehives known to them, possibly over a larger area of the forest. It should be pointed out that a total of twenty five days were spent collecting in Malabigambo and despite there being an aggregate total of over 2,500 yards of mist nets utilized within

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TABLE I (HIVE A)

Indicator exilis

No.	Date	Netted at hive	Shot at hive	Netted adjacent to hive
SB.278	2.2.68	male	—	—
SB.301	3.2.68	female	—	—
SB.413	6.2.68	—	—	male
SB.439	7.2.68	—	—	male
SB.440	7.2.68	—	—	female
SB.623	14.2.68	male	—	—
SB.635	14.2.68	male	—	—
SB.636	14.2.68	female	—	—
SB.656	15.2.68	—	male	—
SB.657	15.2.68	—	female	—
SB.760	19.2.68	—	male	—

Indicator variegatus

SB.279	2.2.68	—	male	—
SB.351	5.2.68	—	—	female

this period, not a single Honey-guide was netted except in the immediate vicinity of the beehives. In addition, neither of us observed *I. exilis* away from a hive in the field and on only one occasion was *I. variegatus* seen. One specimen of *I. exilis* was netted in Namalala Forest in a line of nets set at random.

Details follow for the three wild beehives, giving the number of Honey-guides secured at each and the time intervals involved.

Hive A: This hive was located on 1 February 1968. The natural bees' nest was some ten feet up in the hollow of a living tree. It was chopped out the same day and contained mainly empty comb with a little honey and few larvae. After the bees had settled down, Archer erected a mist net at the base of the tree and with the aid of three poles was able to completely circumpose the trunk. Pieces of comb, some with honey and larvae, were used as bait and were either wedged into bark on the trunk or impaled on twigs at a level about half way up the net, between the tree trunk and surrounding mist net. The bottom of the net was at ground level. Pieces of comb were burnt over the embers of a small fire used to keep the bees away when the hive was being cut out. The resulting aroma of melting beeswax could be detected by a human at over twenty yards distance.

The first Honey-guide, an adult male *Indicator exilis*, was netted the following day. During the next seventeen days a total of four more *I. exilis*

TABLE II (HIVE B)

Indicator exilis

No.	Date	Netted at hive
SB.327	4.2.68	male
SB.333	5.2.68	male
SB.334	5.2.68	male
SB.519	11.2.68	male
SB.520	11.2.68	male
SB.572	12.2.68	female
SB.637	14.2.68	female
SB.740	18.2.68	male
SB.741	18.2.68	male

Indicator variegatus

SB.332	5.2.68	male
SB.476	9.2.68	female

were netted at the hive; in addition three others were shot while feeding at the cut-out bees' nest and three more were caught in mist nets set up within 50 yards of the hive. (See Table I for dates specimens were collected.)

No specimens of *Indicator variegatus* were captured at hive A; however, one specimen of this large Honey-guide was shot within a few yards of the hive and a second was netted in the line of mist nets set up close by.

It is of importance to note that on no occasion was fresh comb added to the original bait used at hive A. The last specimen of *Indicator exilis* was collected at this hive eighteen days after it was first chopped out, a bird shot by Glen while it perched at the mouth of the abandoned bees' nest.

Hive B: Located on 3 February 1968; Glen on the same day erected a mist net after the bees' nest had been opened up. This hive was contained in a dead hollow tree which had fallen but remained propped up at a 45 degree angle, the entrance being approximately 12 feet from the ground. The net was set up below the hive and baited in much the same way as at hive A; it encompassed all the bait but a gap of about 18 inches was left between the ground and the bottom of the net. This method proved to be more successful than that used at hive A, possibly because the birds could enter the net from below as well as from above.

Between 4 and 18 February a total of nine *Indicator exilis* and two *Indicator variegatus* were caught at hive B. (See Table II for dates.)

As in the case of hive A, no fresh bait was added to the original honey comb. This comb, after exposure to a considerable amount of rain and damp-

TABLE III (HIVE C)

Indicator exilis

No.	Date	Netted at hive
SB.559	12.2.68	male
SB.680	17.2.68	male

Indicator variegatus

SB.460	8.2.68	male
SB.517	10.2.68	male
SB.649	15.2.68	male
SB.717	18.2.68	female

ness, developed a coating of mould and although pieces were knocked to the ground it did not appear that any wax was eaten.

Hive C: This hive possibly produced the most interesting results. Unlike hives A and B, hive C was not cut out because the bees' nest was situated in the trunk of a dead tree which had been smothered by a large parasitic fig, *Ficus*. The mechanics of chopping out the hive were made impossible by the abundance of latex issuing from the *Ficus* on every axe blow, the latex being particularly aggravating to the eye. After more than two hours the attempt was given up. The entrance to the hive was some 15 feet from the ground and on this occasion our mammal trapper, Mwangi Kariuki, set up a mist net at the base of the tree on the same principle used at hive B. Pieces of honey comb from elsewhere were used as bait. It should be noted that although the bees' nest itself was untouched, the usual procedure had been adopted, with a fire being lit and highly audible chopping taking place.

The initial attempt to cut out the hive and the setting of the net took place on 7 February. On 8 February a specimen of *Indicator variegatus* was caught. This was followed, during the next ten days, by a further catch of three more specimens of *I. variegatus* and two of *Indicator exilis*. (See Table III for dates.)

Once again no fresh honey comb was added to the bait and the bees remained unmolested.

Discussion: The data shown above gives rise to two interesting possibilities. In the first instance it has been shown that no specimens of *Indicator exilis* were either netted or observed at a distance greater than 50 yards from a known natural bees' nest in Malabigambo Forest. The three hives under discussion were situated in a straight line with the greatest distance between the two end hives being the relatively short space of approximately 2,350 yards. Despite extensive netting undertaken along the track which linked the three hives, all the Honey-guides collected were obtained at these hives except for

the three caught in the nets within 50 yards of hive A. These factors give weight to the presumption that the three hives were all known to the Honey-guides secured and the fact that the birds were caught over a period of nearly three weeks supports this hypothesis. The conclusions from these results is the strong possibility that wild bees' nests throughout a large area of forest are known to Honey-guides frequenting it and are visited periodically by the birds in the hope of obtaining beeswax and other dietary items. A number of natural hives have sufficiently large entrances to allow a Honey-guide to enter and obtain beeswax without the hive being opened by human symbionts. It must be assumed that Honey-guides cover a large area of forest if specimens can be consistently secured at a single hive over a period of two weeks or more.

The second problem lies in how the natural hives are originally located by Honey-guides. It seems unreasonable to assume that in dense forest a Honey-guide would be capable of following an insect as fast in its movements as a bee. A possible alternative is that Honey-guides are vested with a highly developed sense of smell, as indicated by Stager (1967). Both of us, in other Uganda forests, have had experience of trapping Honey-guides, well away from any known bees' nest, by simply burning honey comb and setting up mist nets designed to trap any bird investigating the smell. In Bwamba Forest of western Uganda, at least three specimens of *I. maculatus* were thus secured and in Budongo Forest a single *I. conirostris* fell victim to this ruse. It would seem probable that the location of many bees' nests is assisted through olfactory attraction by Honey-guides, although undoubtedly a number must inevitably be discovered by chance. It is possible that the sight or sound of bees swarming at a hive could attract a Honey-guide to a nest. This possibility must not be overlooked and in all probability does apply in some instances. It must be borne in mind, with regard to the three hives under discussion, that the bees had vacated two of the three nests within 48 hours of their being opened up. In spite of this, Honey-guides were captured for up to nearly two weeks after the bees had disappeared from hives A and B.

An interesting exercise over a long period would be the banding and releasing of Honey-guides netted at known hives in a large given area of forest. The results would undoubtedly bring a closer understanding of the behaviour patterns regarding this complex avian family.

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LITERATURE CITED

- FRIEDMANN, HERBERT. 1955. The Honey-guides. U. S. Natl. Mus. Bull., 208: 1-292.
STAGER, KENNETH E. 1967. Avian Olfaction. Amer. Zoologist, 7: 415-420.

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