

TABLE 1. Enumeration of food items in the stomachs of six Dippers.

Specimen No.	1	2	3	4	5	6
Chironomidae <sup>a</sup>	198	95	59	0	0	0
Other Diptera	2	1	6	0	0	0
Trichoptera (case-bearing) <sup>b</sup>	8	0	10	272	80	0
Trichoptera (free-living) <sup>c</sup>	2	3	2	0	1	1
Coleoptera <sup>d</sup>	3	3	12	6	8	1
Ephemeroptera <sup>e</sup>	2	3	0	0	0	3
Plecoptera <sup>f</sup>	4	5	0	0	2	24
Acari	5	1	5	0	4	7
Pelecypoda	0	0	0	0	0	0
Gastropoda	0	6	3	4	17	9
Oligochaeta	0	0	0	0	0	0

<sup>a</sup> Included several diamesine and hydrobaenine species.

<sup>b</sup> Almost all were *Micrasema* sp.

<sup>c</sup> Included four species of *Rhyacophila*.

<sup>d</sup> Most belonged to the genus *Agabus*.

<sup>e</sup> Included two species of *Ephemerella*.

<sup>f</sup> Most were *Nemoura cinctipes*.

food items were from pools in specimen 1; 9 of 20 in specimen 2; and 25 of 27 in specimen 3. Specimen 6 was an exception in that a riffle-form was the predominant food item; apart from this, however, 10 of the 14 food items were pool-forms.

The above data suggest that the Dipper is an opportunistic feeder, ingesting whatever is abundant in a particular place at a particular time. This behavior may conform to Tinbergen's hypothesis (Arch. Néerlandaises Zool. 13:265, 1960) of a search image; i.e., the birds may form an image for a particular prey item and search primarily for it during a given feeding bout. It also appears that, in spite of its celebrated ability to maintain itself in rapidly-flowing water, the majority of the food items in the Dipper's diet come from slowly-flowing water. This would include pools, backwaters, the edges of streams, and lake margins. The reason for this is easy to appreciate when it is recognized that most stream animals in riffle areas live between and underneath the rocks of the streambed so as not to be washed away by the current. In riffle areas, very few animals would be visible to a

## NIDIFICATION IN THE CHANNEL-BILLED TOUCAN (*RAMPHASTOS VITELLINUS*) IN TRINIDAD, WEST INDIES

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The Channel-billed Toucan (*Ramphastos vitellinus*), the sole representative of the family Ramphastidae in Trinidad, is a common species in most forested regions of the island, although typically it is a bird of the upper levels of vegetation and not often seen close to ground level. Like other toucans, it is a hole-nesting species, recorded as nesting high up in trees (Herklots, The birds of Trinidad and Tobago, Rev. ed., Collins, London, 1965), but, as in the case of many other species in this family, its breeding behavior is not

TABLE 2. Percentage composition of the major benthic taxa in the pools and riffles of the streams in the study area.

	Pools	Riffles
Chironomidae	51%	81%
Other Diptera	2	0.5
Trichoptera (case-bearing)	10	0
Trichoptera (free-living)	0	0.5
Coleoptera	0.5	0
Ephemeroptera	0.5	6
Plecoptera	0	1
Acari	2	0.5
Pelecypoda	20	0
Gastropoda	6	0
Oligochaeta	8	11

Dipper. In slowly-flowing water, however, many kinds of animals can be found crawling about on the surface of stones or on the mud.

Two groups of animals, the Oligochaeta and the Pelecypoda, although common in the streams, were absent from the diet of the Dipper. This is obviously a function of the habit of these invertebrates to burrow into the substrate and out of sight. The Pelecypoda were small (2-3 cm) members of the family Sphaeriidae and thus could have been eaten. The case-bearing Trichoptera, the Coleoptera, and perhaps the Plecoptera as well, were found in greater proportion in the stomachs of the Dippers than they were in the streams. The first two, at least, can always be found conspicuously moving about on the surface of the substrate in slowly-flowing waters.

Although the reason the birds were dispatched in the first place was because of their predation on fingerling trout, fish did not appear in the stomachs of the birds dissected. This absence is primarily a testimonial to the effectiveness with which the Dipper can decimate a fish population. Six birds killed about half of a population of 150 trout in a period from 16:00 to 10:00. The remaining fish were moved into the laboratory. The absence of fish in the stomachs of the Dippers studied would indicate that fingerling fish were not otherwise available.

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very well documented. There are only four breeding records for the species in Trinidad in the literature (Belcher and Smooker, Ibis, Ser. 13, 4:572, 1934; 5:279, 1935; 6:1, 1936; Ser. 14, 1:225, 1937; Chenery, J. Trinidad Field Naturalists' Club, p. 4, 1956). It thus seems worthwhile to place on record two additional records for Trinidad, especially since some aspects of nesting behavior noted at two nests cursorily studied during 1968 differed somewhat from the descriptions given by earlier authors cited above.

Both the nests studied were located in secondary forest in the northern mountain range, and one (A) was known to have been used additionally in the 1967 breeding season. They were 200-250 yards apart and 11.25 and 3.5 ft, respectively, above ground level, substantially lower than has been recorded for the species in Trinidad by other authors, although Skutch (In A. L. Thomson [ed.] A new dictionary of birds, McGraw-Hill, New York and London, 1964) notes that toucans occasionally use low nesting sites when higher ones are not available. The entrance holes

were remarkably small for a bird as large as the Channel-billed Toucan. The holes measure  $2\frac{1}{2} \times 2\frac{1}{2}$  and  $2\frac{1}{16} \times 2\frac{1}{4}$  inches, respectively, and the adult birds literally had to "wriggle" in and out with a type of lateral pivoting movement, their bodies totally filling the nest hole. Nest A was accessible by means of a short ladder, while nest B could be examined from ground level; the interiors and contents were examined by means of a small light and mirror. The visibility at nest B was better than at nest A.

Both nest holes were approximately 12–18 inches deep and both had a basal "lining" of seeds, mainly of one type measuring  $1.0 \times 1.5$  cm, though a few other larger and smaller seeds were present. Skutch (loc. cit.) has pointed out that a similar phenomenon is known for other species in the family, and that the seeds do not constitute a true nest lining fabricated by the parent birds, but are merely due to regurgitation when the parents are sitting.

Clutch sizes were four and three respectively (cf. Herklot's value of two, loc. cit.), the eggs being ovate and white with some dark fleck markings. Nest B was located, complete with three eggs, on 26 April, and at least two eggs hatched between 1 and 10 May. The chicks were (presumably) predated between 10 and 15 May and the nest unused again during the remainder of the season. The interior of nest A was first successfully examined on 1 April, and found to contain four eggs; the nesting birds had first been heard calling in the nest vicinity on 16 March, and one was flushed from the nest on 20 March. Three of the eggs hatched between 1 and 8 April. One chick may have died and been removed by the parents between 5 and 10 May, and only two fledged. Fledging was apparently asynchronous, one chick leaving on 21 May and the other the following day. Thus the minimal duration of the nesting period was 44–45 days, the maximal, 50–51 days. The first value corresponds almost exactly with that given by Chenery (loc. cit.) for a nest whose interior was not examined, the nestling period being judged from the adult birds' behavior.

A few other aspects of nesting behavior are worth mentioning. At one nest the egg shell remains were found approximately 100 ft from the nest shortly after

hatching. The young were completely featherless when hatched and development was slow; the eyes of the chicks opened in the second to third week after hatching and the first feather tracts emerged through the skin approximately three weeks post-hatching. The characteristic blue hue of the facial skin and the yellow throat feathers were apparent only 6–12 days prior to fledging. Both parents fed the young in the nest, sometimes coming simultaneously, sometimes separately. On synchronized visits first one and then the other parent would feed the chicks, completely entering the nest hole to do so, unlike the pair cited by Chenery (loc. cit.). Nest depth may be the critical factor determining whether or not the parents actually enter the nest to feed the young. The approach of a parent bird to the nest elicited vocalizations in the young audible to the observer at a distance of 35 yards. The few nest watches carried out indicated that there were distinct feeding bouts when both adult birds fed the young intensively for 30 min or so, gathering food near the nest site, while at other times adults visited the nest at widely spaced intervals. Although Channel-billed Toucans generally feed high in trees, the pair at nest A often descended to the forest floor to pick up fallen fruits and nuts to carry to the nestlings. During the early stages of nesting the same pair exhibited what appeared to be mobbing behavior towards a 6-ft long tree boa (*Boa enydris*) on the ground 20 ft from the tree in which the birds were nesting. Since this species of snake readily climbs trees, it may well be a potential predator of *R. vitellinus* eggs and young.

The main significance of the findings reported here is that they confirm the four previous records for the species in Trinidad in suggesting a main March–June breeding season, while indicating that clutch size and nest height are more variable than previously suspected. From the available information it seems that the major breeding season for the species coincides with that of the majority of Trinidad landbirds (Snow and Snow, *Zoologica* 49:1, 1964).

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## INGESTION OF STONES BY GOATSUCKERS (CAPRIMULGIDAE)

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Many birds regularly ingest small stones or grit, apparently to help grind their food. This seems primarily to be a practice of granivorous and herbivorous birds (Famer 1960:433; Meinertzhagen 1964). Although there are in the literature a few scattered reports (see below) of stone-eating by caprimulgids, which are almost strictly insectivorous, most of these reports state or imply that this is a novel occurrence among these birds. We here present evidence to the contrary, indicating that the practice of stone-eating is widespread in the family Caprimulgidae and that it occurs regularly in at least some species. The birds probably use these stones to help grind the heavy,

chitinous bodies of beetles (Coleoptera) which form a large part of their diets.

Unless otherwise stated, the specimens mentioned below are in the University of Kansas alcoholic collection or are ones for which skins are in the U.S. National Museum and for which carcasses have been sent to the University of Kansas. In most cases the stomach contents have been saved.

*Caprimulgus carolinensis*. In the springs of 1963–67, we made extensive observations of numerous Chuck-will's-widows, chiefly in an area of about one square mile near Lecompton, Douglas County, Kansas. As is well known, Chuck-will's-widows regularly sit on gravel roads at night, and we could often easily watch them there, without disturbing them, by using  $7 \times 35$  binoculars and the light of a nearly full moon, sometimes supplemented by the light of a sealed-beam flashlight covered with several layers of red cellophane. On many such occasions we saw a bird pick up a small stone in the tip of its bill, raise its head, tilting it noticeably upwards, and swallow. For example, our notes for 12 May 1965 read: "Clear, still night, 72° F, moon two days short of full. At 23:00