OBSERVATIONS ON THE FEEDING HABITS OF SOME WOODPECKERS AND WOODCREEPERS IN COSTA RICA

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The observations reported here were made while I attended the Tropical Entomology Course offered by the Organization for Tropical Studies in Costa Rica sponsored by the National Science Foundation. In spite of the brevity of the study, I believe that the results are a useful addition to the scant knowledge on food and feeding habits of tropical woodpeckers and woodcreepers.

Observations on bird predation were made during the wet season in 1965 in three forest types (Holdridge, 1964): tropical dry forest (Playa Coco in Guanacaste), tropical moist forest (Puerto Viejo in Heredia and Palmar Sur in Puntarenas), and the subtropical wet forest life zone (Turrialba in Cartago). These locations represented four of Costa Rica's seven provinces.

Visual observations of the species of woodpeckers and woodcreepers present, their feeding habits, and behavior were made at various times of the day. Specimens of 6 of the 16 species of woodpeckers and 2 of the 16 species of woodcreepers were studied and collected in the various locations. Stomach analyses were made from a total of 21 stomachs representing 8 of these species.

Estimates were made on a visual examination of the entire stomach content, spread out in a petri dish; a piece of graph paper underneath provided a grid. The percentage of the identifiable portions was estimated from the area occupied on the grid. These figures seldom represent the actual volume of arthropods taken at the time of feeding because of autolysis. Although Martin (1949) claims that there is no need of preservatives if the stomachs are examined within 24 hours, Koersveld (1950) and Dillery (1965) found that digestion and autolysis of food continues for some time after death, depending on temperature and time interval between the death of the bird and examination of the stomach content. Immediate fixing of the stomach contents after killing is, therefore, desirable.

Scientific names of woodpeckers of the genus *Centurus* follow Selander and Giller (1963); all other names of birds follow Peters' check lists (1948, 1951) and Mayr and Greenway (1960).

OBSERVATIONS ON WOODPECKERS

Woodpecker activity begins at daybreak, shortly after 0500 in July and August. Skutch (1943) states that woodpeckers in the tropics as a rule "go early to bed and get up late." My observations indicate that the tropical predators' behavior is similar to that in the temperate region. Hutchinson (1951) and others (Otvos, 1965) found that feeding in the temperate zone started at the first light of the day.

Avian activity in the tropics increases as it becomes lighter, generally reaching its peak between 0700 and 0900, then slowly decreases to a minimum during midday. Activity increases again in midafternoon, reaching a second peak at dusk. This pattern is almost the same as that in the temperate region, with a slight difference in the time of peak activity (1000–1100 in the temperate region). Temperature is probably the main controlling influence. Foraging does occur in the heat of the day, at midday or in the early afternoon, but is less intense. Another factor affecting foraging in the tropics is the frequent heavy rain which usually comes in the early afternoon. Light rain does not inhibit foraging.

Not all the species of birds observed could be collected. Stomach analysis indicated that 3 of the 6 species of woodpeckers investigated are mainly insectivorous (70% or more) at this time of the year.

Picumnus olivaceus. This is the smallest woodpecker of those studied and is restricted to the southwestern part of the Pacific half of the country. Usually it occurs in pairs. This species prefers the understory of vine-covered jungle, near springs, apparently avoiding trunks and large limbs of tall trees.

Specimens of a male and two females were collected 20 km NE of Palmar Sur. Stomach analysis of these revealed that the diet of the females consisted entirely of ants; 90% *Camponotus* sp. and 10% *Pseudomyrmex* sp. in one, and 60% *Camponotus* sp. and 40% *Ceramatogaster* sp. in the other. The diet of the male was somewhat more variable. A species of *Camponotus* which lives in hollow *Olivicidia* twigs was found in all three stomachs and composed 65% of the male's diet. Cockroach cötheca made up 15% and miscellaneous Coleoptera 20%, about half of which was from the family Nitidulidae.

Centurus hoffmannii. This species is encountered mainly in open and semi-open country, associated with the following trees: *Caesalpinia eriostachys*, *Cedrela mexicana*, *Cordia alliodora* (?), *Enterolobium cyclocarpum*, *Gliricidia sepium*, *Guazama ulmifolia*, and *Tabebuia chrysotricha*. This woodpecker was usually seen in pairs, the birds following each other in flight from tree to tree.

The diet of the four specimens of *C. hoffmannii* consisted of 32.5% insects, of which 10% were lepidopteran. Three of the four specimens were collected at 3.4 to 4 km SE of Playa Coco. The fourth specimen was obtained near Turrialba at the station of the Instituto Inter-americano de Ciencias Agricolas (I.I.C.A.).

Centurus rubricapillus. This is a bird of humid, semi-open country. It seems to be less dependent on arthropods as a food source, at least during the wet season.

Two specimens for stomach analyses, one adult and one juvenile, were collected 16 km west of Palmar Sur. Stomach analyses revealed only insects in the adult's diet, the majority being formicids. The juvenile stomach contained only 8% insects and 92% plant material. Coleopteran and other woodboring larvae were essentially the same in the two stomachs, less than 5%.

Centurus pucherani is found in the forested areas, as well as in semi-open country, abandoned banana plantations, pasture, and similar habitats. This woodpecker was also usually seen in pairs, associated with *Cedrela mexicana*, *Aechmea mariae*, and *Guznia* sp. Nests of this species were found in a snag and a dead branch of *Cedrela mexicana* in two different localities.

It was seen to feed on the seeds of *Aechmea mariae*; on one occasion the male parent was observed carrying a seed of this bromeliad to feed the brood. The bromeliad *Guznia* sp. was also visited frequently. The arthropod fauna on five *Guznia* plants (a total of 184 leaves) consisted of 3 spiders, 3 tettigoniids, 1 lepidopteran larva, 1 lepidopteran pupal case, 3 small unidentified coleopterans, 1 elaterid, 2 unidentified annelids, 2 earthworms, and 1 sowbug.

To supplement this examination of the plants, two *Campylorhynchus zonatus* were obtained for stomach analyses. These specimens were part of a family unit which seemed to feed entirely on bromeliads. Stomach contents indicated that they fed exclusively on insects; lepidopterans (Noctuidae) composed 48% and coleopterans 52% of the diet of those examined. The two wrens were collected at Puerto Viejo.

Examination of five stomachs of *Centurus pucherani* suggests that this woodpecker appears to be the least dependent on arthropods (18.5%) as a food source.

Lepidopteran larvae made up 14%. The specimens for analysis were collected in two different locations: four at Puerto Viejo and the fifth one just outside of Turrialba (at I.I.C.A. station).

Dendrocopos villosus is a common bird in the highlands, singly or in pairs. Slud (1964) reports that it keeps below medium heights both on stubs and trees, and regularly descends to shrubs and stumps. On one occasion, I saw a pair land on the ground in an opening covered with oak leaves and dead branches.

A male was observed pecking on bamboo (*Chusquea* sp.) at heights of 30 cm to 2 m. Eighteen whole bamboos 2.5 to 4 m tall were selected at random, dissected, and were found to contain 7 spiders, 18 Dermaptera, 35 Hemiptera, numerous small Homoptera, 12 lepidopterous larvae, 2 chrysomelids, 1 curculionid, 1 elaterid, 2 staphylinids, and 4 unidentified coleopterans.

Unfortunately, only a single specimen could be collected for stomach analysis. It was taken near Pensión La Georgina, 91 km from San José along the Pan American Highway. On the basis of this limited sample, this woodpecker seems to be the most insectivorous of those studied, having 95% insect food in its diet. Woodboring larvae (buprestids, cerambycids, curculionids, scolytids, siricids and others) contributed the major part (60%) of the diet.

Phloeoceastes guatemalensis. This is one of the largest species in the family and is less numerous than the other members of the group. One male was observed pecking on a species of *Croton.* A close examination of this revealed no sign of insect attacks at or around the beak marks of the bird. Other nearby saplings exhibited callus growth over old wounds. Dissection of these callus growths revealed no sign of insect attack. Later it was learned that this plant genus is used in Colombia, South America, by many dentists as a pain killer because of certain alkaloids present in the genus (T. M. Idrobo, pers. comm.). This raises the interesting question of whether it was this attribute of the plant which attracted the bird.

P. guatemalensis has a more powerful, longer beak and longer tongue (72 mm vs. 25 mm) than *Dendrocopos villosus.* Consequently, one would expect that the former would feed more on woodboring insects than the latter, since it is better equipped for digging, excavation, and "harpooning" them. However, this is not supported by analysis of three stomachs. The specimens were taken 4 to 5 km ESE of Puerto Viejo. Insect food comprised 71.8% of its diet. Again, woodboring larvae composed the largest part, 43%, of which 16% were cerambycids.

In the temperate region *D. villosus* was also found to feed more on woodboring insects than did *Dryocopus pileatus* (Otvos, 1965), a species rather similar to *P. guatemalensis.*

OBSERVATIONS ON WOODCREEPERS

Two of the 16 species of woodcreepers known from Costa Rica (Slud, 1964) were studied, *Lepidocolaptes affinis* and *Dendrocolaptes certhia.* Stomach analysis indicated that both are highly insectivorous.

L. affinis was seen foraging on bromeliads on oak trees in the highland. This species, based on the analysis of one stomach, seems to depend for 90% of its food on arthropods, only 60% of which were insects. Coleopterans made up the major part of the diet (37% of the total). The specimen for analysis was collected 91 km from San José on the Pan American Highway.

D. certhia forages later in the evening than woodpeckers. One bird was seen

foraging on the lower part of the trunk of *Cedrela mexicana* at 1820, 10 to 35 minutes after woodpeckers enter the nest.

Analysis of two stomachs of this species indicated that insects composed 87% of the diet, orthopterans being the prime food source (60%). One of the stomachs was obtained at the I.I.C.A. station, near Turrialba, the other 0.5 km W of Puerto Viejo.

SUMMARY

Observations on the feeding behavior of six species of woodpeckers (Picidae) and two species of woodcreepers (Dendrocolaptidae) were made in four of the provinces of Costa Rica. The birds in order of increasing dependence on insects as food in this study were: *Centurus pucherani, C. hoffmannii, C. rubricapillus, Phloeoceastes guatemalensis, Dendrocopos villosus, Dendrocolaptes certhia, Lepidocolaptes affinis,* and *Picumnus olivaceus.*

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