INTERSPECIFIC TERRITORIALITY OF MIGRANT CALLIOPE AND RESIDENT BROAD-TAILED HUMMINGBIRDS

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Cody (Condor 70:270, 1968) summarized the present knowledge of interspecific territoriality in hummingbirds. Apparently there is no known instance of interaction between Broad-tailed (*Selasphorus platycercus*) and Calliope (*Stellula calliope*) Hummingbirds. Reported here are two instances of interspecific territoriality between males of these two species in the Spring Mountains, Clark County, Nevada.

The Broad-tailed Hummingbird is a common breeding bird in the montane forests of southern Nevada (Johnson, Condor 67:103, 1965) and territories are established by mid-May (pers. observ.). The Calliope Hummingbird is a rare transient in the same region (Austin, Condor 70:391, 1968).

Interactions between the two species were first observed in Lee Canyon, 8900 ft, on 23 May 1966 in an open forest of aspen (*Populus tremuloides*), ponderosa and bristlecone pines (*Pinus ponderosa* and *P. aristata*), and white fir (*Abies concolor*), with an understory of snowberry (*Symphoricarpos* sp.) and currant (*Ribes* spp.). The latter were in bloom and are an important nectar source in spring and early summer. Here a calliope was first observed perched at the tip of a small fir. It flew down to feed on the *Ribes* several times and once hovered at the tip of a fir branch, apparently catching small insects. It always returned to the perch where it was first observed. A broad-tail flew to a currant about 10 ft from the perched calliope. The latter immediately attacked the former, pursued it up the canyon about 30 ft, and returned immediately to its perch. Shortly, another broad-tail approached from the opposite direction and was similarly pursued for about 15 ft. On both occasions both species called continuously. During the next 30 min, no further encounters were observed, although the broad-tails fed just beyond the point to which they had been pursued. An hour later the calliope, still perched in the same spot, was collected. A week later broad-tails were observed feeding in the area from which they had previously been chased.

The second encounter was also in Lee Canyon, 8400 ft, on 3 June 1966. This area is dominated by ponderosa pine and white fir. The canopy is not as open as at the above site and there is less understory. Here another calliope was observed on the tip of a larger fir. Several times it hovered near the tips of branches. A broad-tail flew to a currant near the base of the fir and was pursued for about 20 ft, after which the calliope returned to the fir. No other encounter was observed in the succeeding 20 min. Two hours later the calliope was observed again, still in the same place.

These appear to be the first records of interspecific aggression between Calliope and Broad-tailed Hummingbirds and add to the paucity of records of a migrant species occupying habitat which would otherwise be used by a related resident species.

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FEEDING HABITS OF THE DIPPER IN SOUTHWESTERN WASHINGTON

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Very little has appeared in the literature regarding the feeding habits of the Dipper (*Cinclus mexicanus*). It has been known for some time that stream-dwelling insects and other invertebrates are the primary constituents of their diet (Muir, The mountains of California, Century Co., New York, 1894). Burcham (Condor 6:50, 1904) observed Dippers feeding on insect larvae, water bugs, and salmon eggs and fry. Bakus (Auk 76:190, 1959) observed them feeding on Plecoptera and Ephemeroptera nymphs and Trichoptera larvae. He examined the stomach contents of two birds. One was empty; the other contained an adult Coleoptera, adult Plecoptera, pieces of Oligochaeta, and sand grains.

Six specimens became available when permission was granted by the Bureau of Sport Fisheries and Wildlife to exercise some control over the number of Dippers in a study area in the Cascades. Dipper predation had been responsible for serious losses of fingerling trout in an experimental stream study.

The six birds were shot on or around 29 December 1967 and the stomach contents of each were examined and enumerated. Samples had been collected with a Hess sampler and a dip net from the streams in the study area for some time prior to collection of the Dippers, and the benthic fauna was well characterized. This made it possible to identify the source of the small sclerotized insect parts in the Dipper stomachs. Further, since the relative abundance of the various stream organisms was well known, I was able to compare the availability of food items with their presence in the Dipper's diet.

For each specimen at the time of collection, a single food item proved to be predominant; this item was generally either case-bearing caddis larvae or Chironomidae (midge) larvae (table 1). Snails, adult and larval aquatic beetles, and Plecoptera (stonefly) nymphs were also commonly encountered. Coarse sand grains and small pieces of woody stems were also found. No terrestrial forms were encountered. It might be expected that terrestrial insects would constitute some small portion of the Dipper's diet in the spring and summer.

The percentages contributed to the total stream fauna by each of the major taxonomic groups are presented in table 2. The streams were sampled at about the same time the birds were collected. The results have been divided into the percentage composition in slow-flowing pool areas and fast-flowing riffle areas. In both areas, midge larvae and oligochaetes were abundant. The Acari (mites), Ephemeroptera (mayfly) nymphs, and the Diptera other than the Chironomidae were also found in both habitats. The clams, snails, case-bearing caddis larvae, and the larval and adult beetles were typical of the pool areas; the mayfly and stonefly nymphs and the free-living caddis larvae were typical of the riffle areas.

In specimens 4 and 5, all of the major food items were from pools. Apart from those organisms found in like numbers in both pools and riffles, 11 of 19

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

Specimen No.	1	2	3	4	5	6
Chironomidae[a]	198	95	59	0	0	0
Other Diptera	2	1	6	0	0	0
Trichoptera (case-bearing)[b]	8	0	10	272	80	0
Trichoptera (free-living)[c]	2	3	2	0	1	1
Coleoptera[d]	3	3	12	6	8	1
Ephemeroptera[e]	2	3	0	0	0	3
Plecoptera[f]	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

[a] Included several diamesine and hydrobaenine species.
[b] Almost all were *Micrasema* sp.
[c] Included four species of *Rhyacophila*.
[d] Most belonged to the genus *Agabus*.
[e] Included two species of *Ephemerella*.
[f] 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 Dipper. In slowly-flowing water, however, many kinds of animals can be found crawling about on the surface of stones or on the mud.

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

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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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 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