

**Comparative foraging behavior of *Myiozetetes similis* and *M. granadensis* in Costa Rica.**—The study of food-competition among tropical sympatric congeners is most interesting in light of recent speculations on the diversity of tropical species (Klopfer and MacArthur, 1961. *Amer. Nat.*, 95:223–226; MacArthur and Levins, 1964. *Proc. Natl. Acad. Sci.*, 51:1207–1210; and Klopfer, 1962. “Behavioral Aspects of Ecology,” Prentice-Hall, Inc., Englewood Cliffs, New Jersey). Two species that have received some attention are the flycatchers *Myiozetetes similis*, Social Flycatcher, and *M. granadensis*, Gray-capped Flycatcher. Skutch (1960. “Life Histories of Central American Birds,” part II, *Pacific Coast Avifauna*, 34:403–446) studied *Myiozetetes* in Costa Rica and concluded (p. 405) that “the chief difference in the mode of foraging in these two species is that the Vermilion-crown [*similis*] very often picks up things from the ground, as on a lawn, close-cropped pasture or bare shore, either darting down from a rock or other low perch or else actually hopping over the ground; whereas I have not seen the Gray-cap [*granadensis*] hop over the ground, and it darts down to the ground from a rock or other low perch far more rarely than the Vermilion-crown.”

During July and August, 1965, I studied the foraging behavior of *similis* and *granadensis* in four areas of Costa Rica: the tropical dry-forest area of Las Cañas (Guanacaste Province) and the wet-forest areas of Puerto Viejo (Heredia Province), Palmar Sur (Puntarenas Province), and Turrialba (Cartago Province). Only *similis* was found in Guanacaste; both species occurred in the other areas.

Both species are found in semi-open to open situations. They are especially abundant in areas under cultivation and have adapted to suburban situations. Away from towns they are commonly found along streams and at forest edges; neither species inhabits deep forests (Skutch, op. cit., p. 403; Slud, 1964. *Bull. Amer. Mus. Nat. Hist.*, 128:247–248).

The frequency of observations of various perch heights is tabulated in Table 1. Both *similis* and *granadensis* preferred the higher perches, and little difference could be found between the two species in their perch-height distributions. However, comparison of the perch-height in relation to tree-height (see Table 2) reveals that *similis* perches about 25 per cent more often in the upper half of the tree than *granadensis*. This difference appears also to be reflected in the direction of their foraging flights. *M. similis* (76 total observations) was observed to flycatch above the horizontal (perch level) about 14.2 per cent more often than *granadensis* (43 total observations), while *granadensis* was observed flycatching at perch level about 18.3 per cent more often than *similis*. Probably this behavior results from the decreased field of view of the upper strata that a low perching bird experiences. Conversely, *similis* flycatches above the level of the perch more often than *granadensis* because of the greater field of view overhead afforded by the higher perches.

Both species were found to be very similar in their preferences for flycatching targets. They would most often capture insects in the air (72 per cent of 118 observations in

TABLE 1  
PERCH-HEIGHT PERCENTAGES IN *MYIOZETETES*

Height (ft)	1–3	4–6	7–9	10–12	13–15	16–18	19–22	22
<i>similis</i> (267 obs.)	1.9	8.2	11.2	12.4	7.9	12.7	8.6	37.1
<i>granadensis</i> (138 obs.)	1.4	17.4	11.6	8.0	10.1	6.5	10.9	34.1

TABLE 2  
PERCH-HEIGHT/TREE-HEIGHT PERCENTAGES IN *MYIOZETETES*

Percentage	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	100
<i>similis</i> (115 obs.)	0	0	2.6	11.3	9.6	13.9	13.9	15.6	15.7	17.4
<i>granadensis</i> (78 obs.)	0	10.3	6.4	9.0	23.0	19.2	9.0	7.7	10.3	5.1

*similis*; 77 per cent of 175 observations in *granadensis*), would occasionally descend to the ground (20 per cent and 17 per cent, respectively), and would rarely capture insects by flycatching to foliage (8 per cent and 6 per cent). Similarly, both species preferred shorter foraging flights, although flights of up to 40 or 50 feet were observed.

I observed both species feeding at localized food sources. In Palmar Sur these sources were the berries of *Ficus goldmanii* and the Royal Palm (*Roystonea*); in Puerto Viejo the sources were mistletoe berries (*Struthanthus*). The only antagonistic behavior I observed between these species took place at one of these localized food sources.

Competition from noncongeners did not seem to be great. *Tyrannus melancholicus* was most like *Myiozetetes* in habitat preference and foraging behavior. However, at each site studied except Cañas (and here both *similis* and *granadensis* were uncommon) *melancholicus* was less common than either of the two species of *Myiozetetes*. Other flycatchers (e. g., *Megarhynchus pitangua* and *Pitangus sulphuratus*) foraged in the higher canopy and were uncommon. At Puerto Viejo several small flycatchers of the genera *Elaenia*, *Contopus*, and *Myiarchus* (plus two unidentified, small flatbilled species) foraged commonly in the lower strata, thus probably accounting for the fewer numbers of observations of *similis* and *granadensis* in these strata.

In conclusion, the foraging behavior of *M. similis* and *M. granadensis* is very similar, but *similis* does appear to spend more time in the upper strata than *granadensis*. It must be pointed out that foraging behavior can change during the year in correlation with the seasonal abundance of food and the time at which young are being fed. Only a year-round study can fully elucidate food-competition relationships between these two species.

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**Attack behavior of a Loggerhead Shrike.**—Bent (1950. *U. S. Natl. Mus. Bull.* 197) gives an extensive summary of shrike feeding behavior in which it is stated that shrikes do not use their feet as talons but characteristically depend upon the bill for seizing and carrying prey. The feet are used somewhat in holding prey to the perch during feeding and some individuals may exchange their prey between bill and feet while in flight. An exception to this general behavior was observed by myself in several encounters between a Loggerhead Shrike (*Lanius ludovicianus*) and old-field mice (*Peromyscus polionotus*).