

FIGURE 5. Order of selection of red and yellow peanuts in the evening. One pile of 20 red (black dots) and 20 yellow (white dots) peanuts was set out.

ber of tests by shaking of red shells appeared to decrease with each session, as well as the number of initial selections being red.

Following these five learning sessions, we tested the birds for their initial color selection from only five green and five red peanuts. The pile of peanuts was restored to its original composition after every two selections. The purpose of this test was to determine how long the birds would continue to select green over red when provided with no differential reward for green. Within 48 h after the last learning session, the birds reverted to their natural color preference (Table 1).

Our findings support those of earlier studies of avian color preference in demonstrating that color serves as an important discriminator stimulus in the

selection of food (Grant, *Am. Nat.* 100:85, 1966; Collias and Collias, *Condor* 70:273, 1968; Miller and Miller, *Condor* 73:309, 1971). By not varying the position or quality of the food supply, we found that Steller's Jays exhibit a natural order of color preference of red, yellow, blue and green; this order was the same regardless of how many different colors of peanuts were set out. This preference scheme becomes more important when competition for food is increased. As might be expected for an omnivorous bird with opportunistic feeding habits (Hardy, *Condor* 76:102, 1974; Alcock, *Behaviour* 46:174, 1973), we found that the jays could readily be trained to adopt an inverted color preference scheme in response to a short-term negative stimulus. Furthermore, they tended to persist in using this inverted scheme after termination of the negative stimulus. Because we did not mark individual birds, we do not know the constancy of the members of the population under observation. Demonstration of short-term learning by the birds, however, indicates that for the most part we saw the same individuals on each visit.

This particular color preference scheme may, of course, pertain only during the summer season within the locale of this study. Our observations demonstrate, nevertheless, that the jays use this scheme as one of their primary factors in selecting food. They depend upon it even more when competition is keener and abandon it only on a short-term basis if there is a differential reward for doing so. Our findings thus indicate that Steller's Jays, either innately or as a result of long-term experience, are more likely to take advantage of a potential food source if it is red or yellow rather than blue or green. If, however, they encounter a desirable food with a color low on their natural color preference scheme, they quickly learn to associate this color with the particular food and use it as one of the primary visual cues in their search for this food supply.

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FORAGING RATES OF STARLINGS IN TWO HABITATS

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Williamson and Gray (*Condor* 77:84-89, 1975) found that Starlings (*Sturnus vulgaris*) forage in at least four types of habitat. Starlings thus seemed a good species with which to study foraging behavior

in more than one habitat. I hypothesized that Starlings alter their foraging rates in short and tall grass habitats, increasing their speed in short grass as predicted by Cody (*Am. Nat.* 102:107-147, 1968) for different species. Cody did not consider habitat differences when analyzing the foraging behavior of grassland species of birds.

The study was conducted between 0600 and 0930 from 1-28 May 1975 at Griggs Reservoir Metropolitan Park in Columbus, Ohio. Temperatures ranged

TABLE 1. Starling foraging data obtained from two grassland habitats.

Foraging measure	Habitat type		W ^a	P ^b
	Tall grass (≥6 cm)	Short grass (<6 cm)		
Average speed (m/s)	0.1 (25) ^c	0.2 (69)	2.101	0.0174
Duration of average stop	2.8 (25)	1.3 (69)	1.705	0.0401
% of time stationary	31.7 (25)	18.5 (69)	9.500	0.00003

^a Wilcoxon value for Wilcoxon matched-pairs signed ranks test (Siegel 1956).
^b Probabilities associated with the Wilcoxon value (Siegel 1956).
^c \bar{x} (N).

from 13°C to 26°C; wind velocities from 1 to 5 m/s. I watched Starlings foraging in short grass (<6 cm) and tall grass (≥6 cm). These two habitats were all within a 1.5-ha area of the park. Measurements of vegetation height were taken at four randomly selected points within each foraging area and the average was used to determine habitat type. Behavior of individual starlings that moved from one habitat type to another during a single foraging bout has been omitted.

Foraging techniques were measured with a modification of the method used by Cody (Competition and the structure of bird communities, Princeton Univ. Press, 1974). The duration of each foraging bout and the time a bird remained stationary were measured on separate stopwatches. The total number of stops and an estimate of the total distance travelled were also recorded. In all cases the total observation period was 100 s. Uniformity of observation times allowed comparisons between habitats with Wilcoxon matched-pair signed rank tests (Siegel, Nonparametric statistics for the behavioral sciences, McGraw-Hill Book Co., New York, 1956).

Starlings foraging in tall grass moved more slowly ($P = .0174$), were stationary longer ($P = .0401$), and had stops of a greater average duration ($P < .00003$) than did Starlings in short grass (Table 1). These foraging measures were transformed into easily visualized saw-tooth foraging profiles (Fig. 1; Cody 1968, 1974). Each saw-tooth connotes an average move-stop unit. In tall grass, the Starlings moved 0.1 m/s and stopped for 1.7 s; in short grass, they moved 0.2 m/s and stopped for 1.2 s. As a result, the curves are quite disparate.

These results extend Williamson and Gray's (1975) statement that Starlings modify foraging patterns as a function of season and flock composition. Habitat may now be added as another variable worthy of consideration. The same findings conflict with Cody's (1968:114) assertion that "the [saw-tooth foraging] curve plotted is characteristic for each species and serves as a valid basis for comparing species." This may have been accurate for the grassland birds that he studied; but, in the case of Starlings, a distinctive curve for each of the two grassland habitats is evident.

REDISCOVERY OF THE CRESCENT-FACED ANTPITTA IN COLOMBIA

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As a Peace Corps Volunteer assigned to the Colombian agency Inderena, Silliman surveyed the avifauna of the Parque Nacional de Puracé, located in the Central Andes of southwestern Colombia, 30 km southeast of Popayán, Department of Cauca. At an altitude of 3050 m on the west slope of the Andes in 1972, he collected a small antpitta not reported from Colombia (Meyer de Schauensee 1964, 1966, 1970), which proved new to the avifauna of that country. Silliman took the specimen to Lehmann, who concurred that it most closely matched the rare Crescent-faced Antpitta (*Grallaricula lineifrons*; Chapman 1924), known

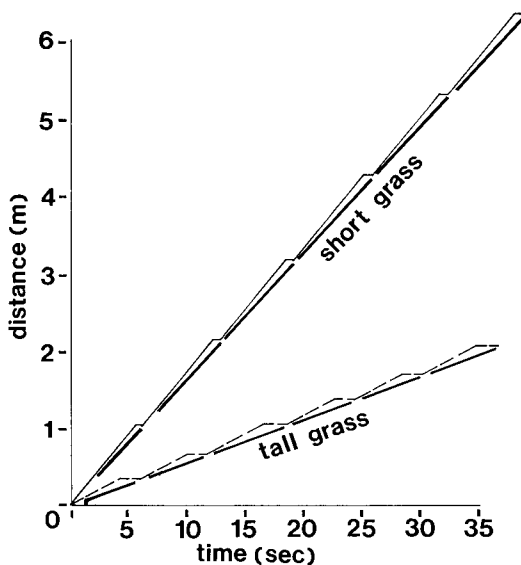


FIGURE 1. Foraging rates of Starlings in two grassland habitats.

Foraging behavior as a species specific characteristic without regard for environmental differences must be considered cautiously.

Possible explanations for the foraging differences I noted include: (1) tall grass physically impeded movement, and (2) tall grass presented a greater surface of vegetation to be searched for prey, thus slowing down rates of movement.

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only from the unique type (a female) collected at Oyacachi in the Andes of Ecuador, some 300 km south. Chapman (1924:5-6) had described the new species in a new genus, *Apocryptornis*, and had included a color illustration by Louis Agassiz Fuyertes in a later work (Chapman, 1926: pl. 27, Fig. 2, where the misspelling "*Aptocryptornis*" appears). Peters (1951:260) merged *Apocryptornis* in *Grallaricula*; this treatment was followed by Meyer de Schauensee (1966, 1970).

Lehmann noted differences in the coloration of the Colombian bird as compared to the Fuyertes color plate, and suggested that these might justify the description of a new subspecies. He deposited the specimen in the American Museum of Natural History and asked Eisenmann to compare it with the Ecuadorian type. The differences noted by Lehmann, although slight, proved real; but the two specimens were of different sexes, and as there was no series adequate to indicate the range of individual or age variation, the description of a new form appeared unwarranted. We here indicate the differences in color and provide new data on soft-parts, weight, habitat, and behavior.