Gray-backed Terns eat lizards.—On 15 June 1973 while on Enderbury Island (3° 08′ S, 171° 05′ W) in the central Pacific Ocean, I made some observations of an unusual feeding habit of the Gray-backed Tern (*Sterna lunata*). Initially about 5 adult terns were seen swooping low over an area of coarse coral rubble sparsely covered by low bushes (*Sida fallax*), a prostrate herb (*Boerhavia diffusa*), and dry moribund clumps of a bunch grass (*Lepturus repens*). The first bird I saw clearly rose from a swoop with a lizard in its beak. The lizard was almost certainly a snake-eyed skink (*Cryptoblepharus boutoni*) because the only other species of lizard found on Enderbury, the mourning gecko (*Lepidodactylus lugubris*) is nocturnal. Another tern, which I watched for about 8 min caught skinks on 2 of 3 swoops. At least twice during this period the tern made incomplete swoops probably because the lizard had seen the tern and had taken evasive action. Captured lizards were held across the mid-body and swallowed head first while the birds were in flight.

As far as is known, the normal diet of this species consists primarily of small fish and squid (Munro, Birds of Hawaii, 1944; Pacific Ocean Biological Survey Program, unpubl. data filed at the U.S. National Museum of Natural History). Small crustaceans and insects are also eaten but apparently quite uncommonly (POBSP, unpubl. data).

None of the species of terns treated in Bent (U.S. Natl. Mus. Bull. 113, 1921) was noted as having fed on lizards. However, Rowher and Woolfenden (Wilson Bull. 80:330–331, 1968) reported green anoles (*Anolis carolinensis*) in the digestive tracts of 4 of 6 Gull-billed Terns (*Gelochelidon nilotica*) collected in Florida. As these authors have indicated eating of lizards by this species was also noted by Jensen (Dan. Ornithol. Foren. Tidsskr. 40:82–83, 1946). Anderson (Dan. Ornithol. Foren. Tidsskr. 39:199, 1945) also recorded Gull-billed Terns eating lizards (*Lacerta vivipara* and *L. agilis*).

Such a feeding habit of the Gray-backed Tern is apparently unusual because no mention of it is made in the extensive files of the Smithsonian Institution's Pacific Ocean Biological Survey Program. Further, none of the Gray-backed Tern stomachs collected for the Program held anything other than that indicated above. It seems likely that this feeding pattern was an opportunistic response to the great abundance of these lizards on Enderbury at that time.—ROGER B. CLAPP, *National Fish and Wildlife Laboratory, National Museum of Natural History, Washington, D.C. 20560.* *Accepted 8 May 1975.*

Leaf-scratching in White-crowned Sparrows and Fox Sparrows: test of a model.—Many emberizine species turn leaves by a 2-footed scratching movement somewhat resembling hopping (Hailman, Wilson Bull. 85:348–350, 1973). To account for the number of successive leaf-scratches in a bout I offered a simple stochastic model in which the probability of adding another scratch to a bout is constant (Hailman, Wilson Bull. 86:296–298, 1974). The model predicts the relation between the number of scratches per bout (s) and the frequency (f_s) of bouts having s or more scratches as:

$$\log f_s \propto s.$$

Quantitative models aid understanding only if they accurately predict reality, and data from the White-throated Sparrow (*Zonotrichia albicollis*) and Dark-eyed Junco (*Junco hyemalis*) conformed to the relation (Hailman 1974, op. cit.).

I now have sufficient data to test the model against foraging in the White-crowned Sparrow (*Z. leucophrys*) and Fox Sparrow (*Passerella iliaca*). In the present test, data were collected from migrant Fox Sparrows in Madison, Wisconsin during October

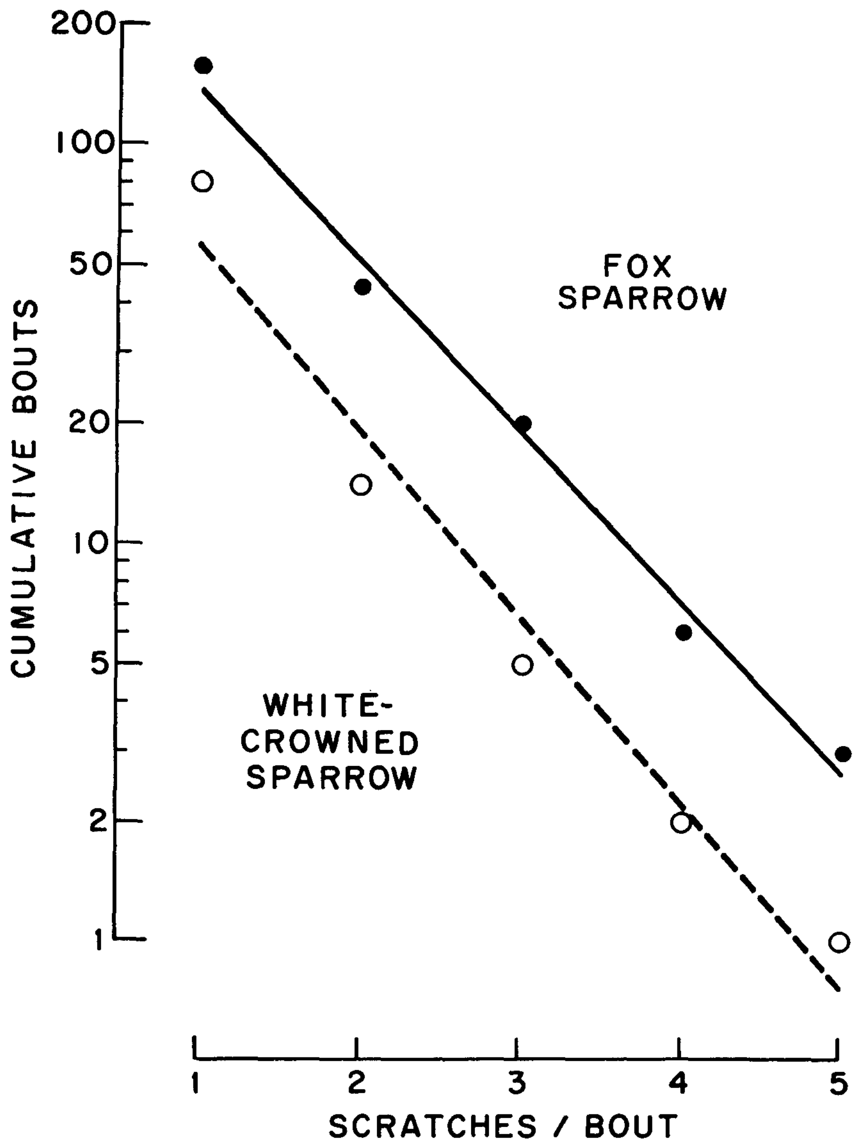

FIG. 1. The linear correlation between the logarithm of the cumulative number of bouts and the number of scratches per bout is predicted by the model of foraging in emberizines. Negative correlation coefficients exceed 0.98 for both Fox and White-crowned sparrows; the lines drawn are those of least-squares regression.

1972 and November 1973. All birds were observed outside my study window in an area baited with mixed bird seed, for a total of 157 bouts. White-crowned Sparrows rarely migrate through this area, but I made some observations of an immature on 28 October 1972 and further observations of a flock of adults at Falcon State Park, Texas on 4 January 1974 for a combined total of 80 bouts.

The data (Fig. 1) conform to the predicted "geometric decay" function, with correlation coefficients being –0.996 for the Fox Sparrow and –0.984 for the White-crowned Sparrow. Slopes of the least-squares regression lines are virtually identical, meaning that the constant probability of adding another scratch is the same for the 2 sets of data.

The match between prediction and data for all 4 emberizine species now observed seems sufficient to suggest that scratching bouts obey the same rules for all emberizines, although a check on the rather different towhees (*Pipilo*) would be desirable. The generality of results encourages investigation of the factors that dictate the value of the parameter (slope), which I suggested (Hailman 1974, op. cit.) might be governed by the environmental circumstances, particularly the amount of leaf-litter. The leaf-scratching of emberizines thus provides an opportunity for a detailed, quantitative understanding of how ecological variables affect avian foraging behavior.

For comments on the manuscript I thank E. H. Burtt, Jr., B. D. Sustare, and my wife Liz.—JACK P. HAILMAN, *Dept. of Zoology, Univ. of Wisconsin, Madison 53706.* *Accepted 25 Feb. 1975.*

Aerial fishing by Pied Herons.—Certain species of herons occasionally pursue prey in the air and may hover over the water, stirring it with their feet (see figure by G. Tudor *in* Meyerriecks, Nat. Hist. Mag. 71(6):48–59, 1962). Kushlan (Wilson Bull. 84: 199–200, 1972) and Mock (Wilson Bull. 86:280–282, 1974) have discussed aerial feeding in herons. At Waigani Sewage Farm, 10 km NW of Port Moresby, Papua New Guinea, I observed Pied Herons (*Notophoyx picata*) feeding in flight on 3 visits, 21 and 25 August and 20 September, 1972. About 120 to 175 Pied Herons were usually standing or foraging on foot at the margin of the ponds, but at almost any time, 1 to 10 birds were observed feeding in a tern-like fashion (often with Gull-billed Terns, *Gelochelidon nilotica*) over open water near the end of a sewage pipe. Cichlid fish (apparently *Tilapia* spp.) and perhaps other forms were abundant, and both terns and herons caught fish about 5 to 10 cm in length.

The herons circled or hovered about 1–2 m above the surface, their feet usually dangling down, but not touching the water. Fish were caught on downward swoops with the bill barely entering the water, the same manner in which the terns were fishing. One heron caught fish on 2 of 5 swoops, and a group of 4 caught 7 fish on 19 swoops. The manner of flight with extended neck and dangling feet was similar to behavior described by Mock (op. cit.) for the closely related Little Blue Heron (*Florida caerulea*). Only once, however, did I see a bird land and pursue prey on foot.

Kushlan (op. cit.) and Mock (op. cit.) discuss food scarcity as predisposing to aerial feeding. Fish were clearly abundant at Waigani, but were perhaps not uniformly dispersed. Possibly in sewage flats with high biological oxygen demand, fish concentrate near the surface offering an unusual advantage to herons that can exploit them by feeding in flight. The energetic costs and benefits of such behavior, habitual aerial feeding by individuals, and comparative success of aerial and ground feeders would be interesting to examine. I thank G. S. Keith, A. Keith, W. Keith and P. V. Rich for help in the