trolled" the pond perimeter as if searching for frogs. One frog was caught during an hour of observation.

The food habits of Killdeers have been well studied in many parts of the country (e.g., New York: Eaton, Memoir 12, New York State Museum, Albany, New York, 1910:351; Nebraska: Aughey, First Rept., U.S. Entomol. Comm., App. 2, 1878:49; U.S.: McAtee and Beal, U.S.D.A. Farmer's Bull. No. 497 (revised) 1924:14–16). Food washing has been previously reported (Bunni, The Killdeer, *Charadrius v. vociferus* Linnaeus, in the breeding season: ecology, behavior, and the development of homoiothermism. Ph.D. dissertation, Univ. Michigan, Ann Arbor, Michigan, 1959:174), but to our knowledge the only previous report of Killdeers eating vertebrate prey is that of Weston (Auk 80:550–551, 1963) who saw a Killdeer eat dead minnows. A review of the literature for other charadriids suggests that the Black-bellied Plover (*Pluvialis squatarola*), the American Golden Plover (*P. dominica*), and the Snowy Plover (*Charadrius alexandrinus*), in rare circumstances will take vertebrates. These records included small fish (both *Pluvialis* species: Palmer, pp. 153–159 *in* The Shorebirds of North America, Stout, ed., Viking Press, New York, New York, 1967; Sprunt and Chamberlain, South Carolina Bird Life, Univ. South Carolina Press, Columbia, South Carolina, 1970), lizards (*P. dominica*) (Palmer 1967), and small frogs (*C. alexandrinus* in Egypt) (Latham, A General Synopsis of Birds, Vol. III, Leigh & Sotheby, London, England 1785:204). The involvement of several Killdeers and the frequency with which they ate frogs could have been related to the concentration of frogs along the edge of the drying pond and to the extremely hot, dry weather in the area which may have reduced arthropod food resources during the previous month.—BETTE J. SCHARDIEN AND JEROME A. JACKSON, *Dept. Biological Sciences, Box GY, Mississippi State Univ., Mississippi State, Mississippi 39762.* *Accepted 22 Dec. 1980.*

Wilson Bull., 94(1), 1982, pp. 87–89

Possible use of legs as dissipators of heat in flying Cliff Swallows.—Several authors have shown that unfeathered portions of the legs of passerine birds can function as dissipators of heat (Steen and Steen, Acta Physiol. Scand. 63:285–291, 1965; Tucker, J. Exper. Biol. 48:67–87, 1968; Murrish, Comp. Biochem. Physiol. 34:859–869, 1970; Frost and Siegfried, Zool. Afric. 10:101–108, 1975) but quantified description of leg extending behavior in a large number of wild passerines over a range of temperatures appears to be lacking.

The purpose of this paper is to document the range of temperatures at which wild Cliff Swallows (*Petrochelidon pyrrhonota*) extend their legs, probably to dissipate heat.

Methods.—I observed up to 138 post-breeding Cliff Swallows sunning on the roof of the Creston Valley Wildlife Interpretation Centre, approximately 10 km west of Creston, British Columbia, on warm, sunny days between 21 July and 7 August 1980. During the period I recorded the air temperature in direct sunlight using a thermometer held 1 m above ground level approximately 7–10 m from the swallows. The air temperature on the roof was recorded on only four occasions because it disrupted the swallows' sunning activity. I counted the number of Cliff Swallows that left the roof following a bout of sunning with their legs extended and retracted. I also recorded the proportion of Cliff Swallows with legs extended after sunning that panted upon perching in willows (*Salix* sp.).

Results and discussion.—When the air temperature and roof temperature exceeded approximately 21°C and 29°C, respectively, approximately 50% of the Cliff Swallows extended their legs (Fig. 1). Nearly all the swallows extended their legs at an air temperature of 28°C (roof temperature 38°C) (Fig. 1). The reasons why the Cliff Swallows extended their legs are unclear. Perhaps the swallows were simply cooling their feet. However, that Cliff Swallows

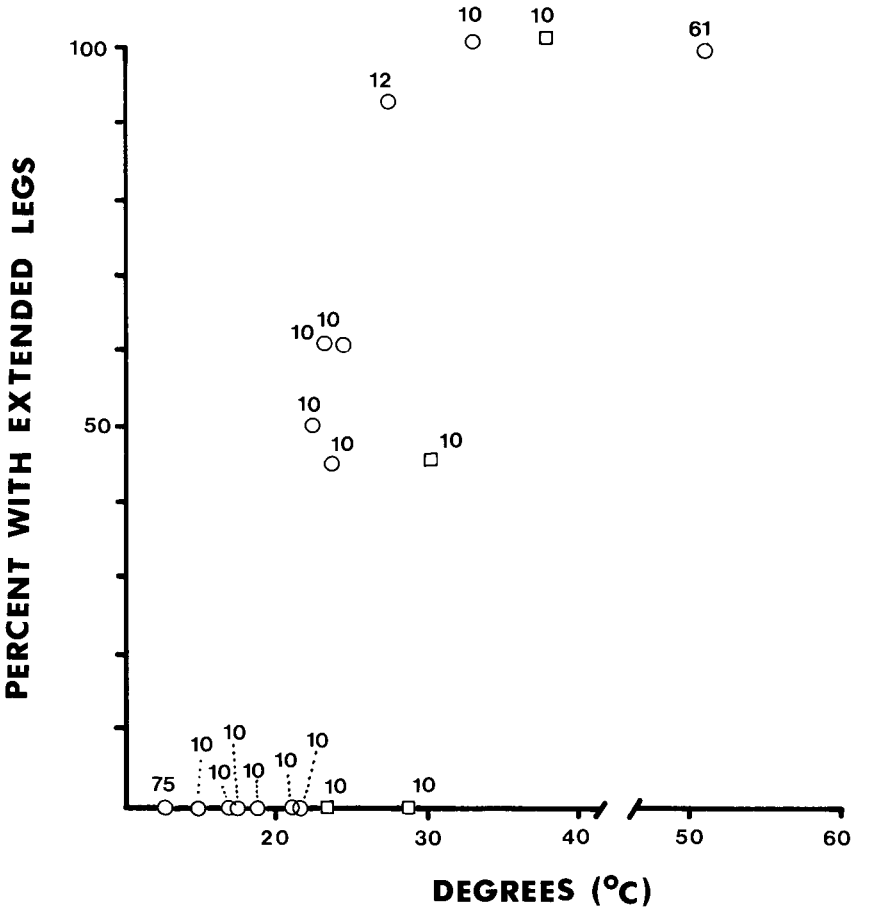

FIG. 1. Percentage of Cliff Swallows that extended their legs and temperature. Sample sizes are indicated opposite each data point. ○ = air temperature, □ = roof temperature.

used their legs to dissipate heat following sunning is suggested by several facts. On 21 July, when the roof temperature was 51.7°C, 60 of 61 Cliff Swallows that left the roof following a bout of sunning extended their legs, whereas only one of eleven swallows returning to the roof to begin sunning had its legs extended. In addition, 20 of the swallows that extended their legs alighted in a willow and all of those swallows panted. It is well known that birds pant to dissipate heat (Welty, The Life of Birds, W.B. Saunders, Philadelphia, Pennsylvania, 1975:130). Only two swallows were seen leaving the roof with their legs retracted and neither of them panted. On occasion individual Cliff Swallows appeared to drag their extended legs in ponds and sloughs, possibly to increase heat dissipation. This was quite different from the skimming behavior of Cliff Swallows that drank while flying. Drinking swallows lowered the head, opened the bill and appeared to scoop water into the mouth which left a V-shaped

ripple on the water surface whereas leg-dipping swallows appeared to plop their legs and perhaps tail in and out of the water in a quick motion.

Frost and Siegfried (1975) found that two species of swallow (*Hirundo cucullata* and *H. albigularis*) in South Africa extended their legs in 90–100% of the cases at a mean ambient temperature of 38°C. Those results compare closely with mine for the Cliff Swallow. However, unlike my findings, the same authors found no leg extension response in either species at mean temperatures of 27°C or 33°C. Possibly South African swallows are adapted to breed in warmer climates than the Cliff Swallow population at Creston and, therefore, have a higher tolerance to high temperatures.

I thank D. Flook, A. Gaunt, S. Lustick, K. Vermeer and an anonymous referee for commenting on the manuscript.—ROBERT W. BUTLER, *Canadian Wildlife Service, P.O. Box 340, Delta, British Columbia V4K 3Y3, Canada.* *Accepted 7 Feb. 1981.*

Wilson Bull., 94(1), 1982, pp. 89–90

Active anting by the Yellow-shouldered Blackbird.—Many temperate species (Potter, Auk 87:692–713, 1970), including Red-winged Blackbirds (*Agelaius phoeniceus*), display anting behavior (Nero, Auk 68:108, 1951). Other than records for the Puerto Rican Tanager (*Nesospingus speculiferus*) (King and Kepler, Auk 87:376–378, 1970), there are no reported cases of anting by West Indian birds. Reports of this behavior in the widespread genus *Agelaius* are rare. For these reasons, the following observations of active anting by the Yellow-shouldered Blackbird (*A. xanthomus*) are of interest. An actively anting individual applies ants to its body, as opposed to merely allowing ants to invade the body surface.

We saw Yellow-shouldered Blackbirds ant once on 6 March 1974, at 08:20 (1 h 33 min after sunrise) near La Parguera, Puerto Rico. A group, varying from 15–20 birds, gathered on bare ground at the edge of a scrubby pasture. The birds were within 10–15 cm of each other. At least 19 different Yellow-shouldered Blackbirds actively anted during the 8-min period that the flock continued this activity. Also in the flock were three Shiny Cowbirds (*Molothrus bonariensis*) and a Greater Antillean Grackle (*Quiscalus niger*), none of which actively anted. The anting behavior resembled that described for other passerines (Simmons, Zool. Soc. London 149:145–162, 1966). The Yellow-shouldered Blackbirds applied the ants mainly to the remiges, but also to the rectrices, breasts and upper tail coverts. Their tails were often under the body while the birds anted their remiges, the tips possibly in contact with the tails. Five times individuals fell on their sides while applying ants to their wings. Whitaker (Wilson Bull. 69:195–262, 1957) noted such tumbling by an anting Orchard Oriole (*Icterus spurius*). The plumages of the anting yellow-shoulders were fluffed and wings were drooped, while the remiges were spread.

Ant density at the site was about 100 per 0.1 m^2, and we could only find the workers of a harvest ant (*Pheidole* sp., Myrmicinae). The night before it had rained 23 mm, the first heavy rain in several months. Potter (1970) suggested a relationship between rainfall and anting. She also pointed out that anting is most likely during periods of molt, but in this instance it is doubtful if any of the blackbirds were molting, as most, if not all, of the birds were adults, and the Yellow-shouldered Blackbird's postnuptial molt takes place during August–December. There is no prenuptial molt in adults.

Anting could reduce infestation by Mallophaga and Acarina. In 1974–1975 at La Parguera, 69% of 265 blackbirds had Mallophaga (Post, J. Field Ornith. 52:16–22, 1981). The chemical constituents of ants which are of value to anting birds vary between ant subfamilies. Harvest ants do not secrete formic acid, as do members of Formicinae, which are commonly used by anting birds (Simmons 1966). Myrmicinae are usually avoided because of their stings. How-