

SOME OBSERVATIONS OF SUNBATHING IN SWALLOWS

CHARLES R. BLEM AND LEANN B. BLEM

Virginia Commonwealth University
Department of Biology
816 Park Avenue
Richmond, Virginia 23284-2012 USA

Abstract.—Tree Swallows (*Tachycineta bicolor*), Violet-green Swallows (*T. thalassina*) and Barn Swallows (*Hirundo rustica*) were observed sunbathing under conditions that produced apparent hyperthermia as evidenced by gaping, posture and timing of exposure. Sunbathing was observed only on days having air temperatures above 30 C, medium to high humidities and low wind velocities. Duration of sunning behavior was short, never exceeding 2 min. The substrate of sunning sites under these conditions always exceeded 47 C. It appeared that swallows were sunbathing in a fashion that led to short-term heat stress. This implies that the function of this form of sunbathing in these swallows is for a purpose other than thermoregulation.

ALGUNAS OBSERVACIONES SOBRE BAÑOS DE SOL EN GOLONDRINAS

Sinopsis.—Se observaron tomando baños de sol a individuos de *Tachycineta bicolor*, *T. thalassina* y *Hirundo rustica*, en condiciones que aparentemente produjeron hipertermia, basado en conducta de jadeo, postura de las aves y período de exposición. Esta conducta tan sólo se observó en días en que la temperatura del aire estaba sobre los 30 C, la humedad relativa entre mediana y alta y la velocidad del viento era baja. La duración de los baños de sol resultó corta, nunca excediendo los 2 min. La temperatura de los sustratos en donde se tomaron los baños, siempre excedió los 47 C. Aparentemente los baños de sol dieron lugar a cortos períodos de estrés causados por el calor. Esto implica que la función de estos baños de sol debe ser otra diferente a la termoregulación.

Sunbathing, also called sunning or basking, has been documented for more than 170 species of birds in 48 families (Kennedy 1969) and has been described extensively (Simmons 1986, Terres 1980). It appears that many birds deliberately expose themselves to direct sunlight to accumulate heat for thermoregulation, but alternative functions have been suggested (Kennedy 1969, Mueller 1972, Simmons 1986, Terres 1980). There is little information in the literature regarding sunning by swallows (but see Barlow et al. 1963, Johnston and Hardy 1962, Prytherch 1981). The present paper describes observations of sunbathing in three species of swallows and presents evidence that such activity is not always related to conservation of energy.

Throughout July 1990, we observed sunbathing of Tree Swallows (*Tachycineta bicolor*), Violet-green Swallows (*T. thalassina*) and Barn Swallows (*Hirundo rustica*) at Flathead Lake Biological Station, 30 km north of Polson, Montana (47°41.4'N, 114°09.3'W). All three species of swallows breed at the station and are roughly equal in abundance there. Swallows were seen basking in mixed groups one or more times each week, but it is not known if the same individuals were always involved. We were able to make observations of basking on 15 occasions over about 8 h on six different days. Most birds sunned at the same location, a roof on one of the buildings at the station. During each observation period we

TABLE 1. Flock size and physical conditions associated with sunning in three species of swallows ($n = 15$ for all measurements).

Variable	Mean \pm SD	Range
Flock size	7.5 \pm 3.0	1-12
Air temperature ($^{\circ}$ C)	33.5 \pm 1.9	30.0-36.5
Relative humidity	53.2 \pm 4.5	32.3-81.0
Substrate temperature ($^{\circ}$ C)	52.4 \pm 2.8	47.0-56.0
Time of day (MST)	13:25 \pm 0:56	11:54-14:36
Duration of bout per individual (min) ^a	1.2 \pm 0.2	0.9-1.8

^a From alighting to departure.

timed the interval between arrival and departure of individual birds. We also used a 10-gauge thermocouple attached to a Bailey BAT telethermometer to measure air temperature and the temperature of the substrate on which swallows were sunning. Relative humidity was measured with a Vaisala HMI33 meter. The maximum number of birds basking at any one time was recorded (Table 1).

Sunbathing only occurred during mid-day and at relatively high ambient temperatures and humidities (Table 1). Although we had no way of measuring wind velocity, basking was observed only during still, hot periods when the wind was insufficient to move leaves in the trees. Basking bouts of individual birds were short, the longest being less than 2 min. Basking postures were similar to those described by Johnston and Hardy (1962) for Purple Martins (*Progne subis*), Barlow et al. (1963) for Bank Swallows (*Riparia riparia*) and Cliff Swallows (*Hirundo pyrrhonota*), and level III and IV sunbathing as described by Hauser (1957) for various passerine species. Swallows typically spread their wings, erected body feathers, spread their tails at upward angles, and tilted their bodies forward (also see Hauser 1957, Johnston and Hardy 1962, Simmons 1986). Most birds appeared to enter a trance-like state during prolonged sunning (Cade 1973, Hauser 1957). The ventral surface of each bird's body appeared to be in contact with the hot roof. Substrate (roof) temperatures were high (47-56 C; Table 1), and were similar to the few measurements in the literature (41-60 C; Hauser 1957). These temperatures exceed ambient levels that most small passerine birds can tolerate for extended periods (Dawson and Hudson 1970). Near the end of basking bouts, most swallows gaped and extended their tongues from their open mouths. In all instances the conditions under which basking behavior occurred were remarkably similar and indicated that the birds were selecting environments that would lead to their overheating. For example, although a variety of rooftops was available, swallows basked only at a single site, a shiny metallic roof, and only in direct sunlight. Nearby shingle roofs or dark metal roofs were never used by swallows for sunning, although we did observe a few swallows sunning in a gravel roadway. The substrate temperatures of sites other than the metallic roof were cooler by 2-5 C

during basking periods. Shaded portions of the metallic roof seemingly were avoided.

Kennedy (1969) and Storer et al. (1975) listed several possible functions of avian sunbathing including: (1) absorption of heat for thermoregulation (also see Lustick 1969, Ohmart and Lasiewski 1971), (2) increased vitamin D production or oil gland secretion, (3) drying wet plumage, (4) molting and (5) removal of ectoparasites. In the present instance the high ambient temperature, gaping and short basking periods indicate that swallows were not sunning themselves for thermoregulation. Basking for acquisition of heat usually occurs only when ambient temperatures are below lower critical temperatures (Ohmart and Lasiewski 1971), which for passerine birds of 20 g are approximately 23 C (Kendeigh et al. 1977). Furthermore, panting is not consistent with heat absorbance for thermoregulation (Cade 1973). Exposure of the plumage to sunlight for production of vitamin D likewise seems to be a tenuous explanation. Swallows naturally were exposed to the sun more than 16 h per day most of the season and never were observed avoiding sunlight except during incubation. Sunning was not for drying the feathers as their plumages never appeared wet. We suspect that sunning was somehow related to maintenance of plumage because swallows were observed preening intensively both before and after bouts in the sun. All of the swallows appeared to be in some phase of the late summer molt and at least some of them appeared to be young birds in postjuvinal molt. The sort of sunbathing demonstrated by these swallows is typical of that demonstrated by a variety of species of birds on cloudless, humid days at high ambient temperatures (30–35 C; Barlow et al. 1963, Cade 1973, Hauser 1957). Although Potter and Hauser (1974) found that sunning was related to elapsed time since the last heavy or prolonged rain, at our study site rainfall was relatively rare in July yet sunning occurred nearly every day.

It appeared that high ambient temperature was a requirement for sunbathing. Given that hot substrates also were chosen, it seemed that the swallows were subjecting both dorsal and ventral surfaces to extreme heat. This behavior is consistent with the hypotheses that sunning may dislodge ectoparasites (Simmons 1986) or that application of heat might be soothing to areas of the skin involved in molt (Potter and Hauser 1974). We have no direct evidence regarding either of these possibilities.

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