

SHORT COMMUNICATIONS

USE OF LEGS AS DISSIPATORS OF HEAT IN FLYING PASSERINES

P. G. H. FROST and W. R. SIEGFRIED

*Percy FitzPatrick Institute, University of Cape
Town*

Steen & Steen (1965) demonstrated the role of unfeathered parts of birds' legs as dissipators of heat. A rapid flow of air over bare legs increases convective heat-loss by reduction of the boundary layer of still air adjacent to the skin. Tucker (1968) observed the budgerigar *Melopsitticus undulatus* extending its legs into the slip-stream when flying in a wind-tunnel at ambient temperatures of 36–37°C. We know of no published descriptions of this behaviour in heat-stressed, wild passerine birds.

In November 1973, near Kimberley, C.P., we noted a considerable number of birds flying with legs extended on days when ambient temperatures averaged 37°C (33–46°C) during the period 0900–1500 hours.

Cape turtle dove	<i>Streptopelia capicola</i>
grey-backed finch lark	<i>Eremopteryx verticalis</i>
red-capped lark	<i>Calandrella cinerea</i>
red-breasted swallow	<i>Hirundo semirufa</i>
ant-eating chat	<i>Myremcocichla formicivora</i>
fiscal flycatcher	<i>Sigelus silens</i>
buffy pipit	<i>Anthus vaalensis</i>
white-browed sparrow weaver	<i>Plocepasser mahali</i>

These observations were not quantified. However, in all species, with the exception of *Myremcocichla formicivora*, the behaviour occurred frequently enough to be strikingly obvious. Conversely, during the relatively cooler post-dawn period (0600–0900 hrs) when ambient temperatures averaged 30°C (24–37°C) all birds were observed flying with their legs in normal retracted positions.

Subsequently, we observed similar behaviour by greater stripe-breasted swallows *Hirundo cucullata* and white-throated swallows *Hirundo albigularis* at Stellenbosch, C.P. Observations were made on two pairs of *H. cucullata* and one pair of

TABLE I

Percentage frequency of leg extension in two swallows

Time (hours)	Mean air temperature (°C)	<i>H. cucullata</i>		<i>H. albigularis</i>	
		% with legs extended	No. Observations	% with legs extended	No. observations
1500–1600	41 (39–44)	88	43	93	27
1600–1700	38 (41–36)	90	50	100	20
1700–1800	33 (36–28)	0	35	0	19
0830–0930	27 (31–24)	0	32	0	15

H. albigularis during 1500–1800 hrs and between 0830–0930 hrs on the following day. Table 1 summarizes the relevant data. No bird was recorded more than once per minute.

All three pairs of birds were feeding large young at the time. In neither series of observations were the flights display flights. All involved either feeding flights, flights to a waterhole or away from a source of disturbance. We believe that under certain conditions of high ambient temperature, high incident radiation and intense activity (flying), birds become heat-stressed to the point where normally employed heat-dissipating mechanisms become overloaded. The extension of legs into the slip stream, while creating extra drag, appears to facilitate the unloading of, at least, part of this heat-load. It seems unlikely that the birds deliberately undertook flights to increase convective cooling through increased air flow

over the whole body surface, as has been reported by Marder (1973) for the brown-necked raven *Corvus corax*.

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THE CUTICULAR LAYER OF THE SKIN OF CERTAIN CYPRINIDAE

J. HATTINGH and K. T. VAN WARMELO
Departments of Zoology and Botany,
Rand Afrikaans University

It is well known that some fish are sensitive to rough handling and that when part of the mucous covering the skin, including scales if the fish has scales, is removed accidentally the fish usually die, especially when kept in confinement (see van Oosten 1957 for review). According to Whitear (1970) the cuticular layer in bony fish has a dual origin; one part is secreted from the surface epidermal cells and the other from the goblet mucous cells which spread over the skin. The two components are not histologically distinguishable and the cuticle is a homogeneous mucous layer containing mucopolysaccharides, albumin, lipids, various ions and *n*-acetyl neuraminic acid (Pickering 1974; van Oosten 1957). The functions assigned to this layer include the lessening of body friction in water, mud coagula-

tion properties, lubricating properties, osmotic regulating effects, nutrition and the protection from attack by bacteria and fungi (van Oosten 1957). In the latter instance it is not clear exactly how the mucous layer protects the animal and the possibility had to be considered that the cuticle may have an antimicrobial or such like function.

The animals used in this study were all freshwater teleosts of the family Cyprinidae. Mudfish (*Labeo umbratus* and *Labeo capensis*), yellowfish (*Barbus holubi*) and carp (*Cyprinus carpio*) were used. In the first instance the normal flora occurring in the mucous layer of these fish was investigated and compared to that of water. On difco deoxycholate agar and phenylethyl alcohol agar it was found that mucus supports a broad spectrum of gram negative and positive bacteria, including lactose fermenting bacteria, seemingly in larger numbers than in water. This is not surprising considering the composition of mucus. No antibiotic or bacteriostatic effects were observed.

In the second place, an unidentified zygomycetous fungus was isolated from lake water and