

PRE-TANDEM COURTSHIP IN *PALPOPLEURA SEXMACULATA* (FABRICIUS) (ANISOPTERA: LIBELLULIDAE)

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Abstract — Pre-tandem courtship behaviour is described in *P. sexmaculata* in a population active at a stream in the Periyar National Park of south India.

Introduction

Pre-tandem courtship is relatively common in the Zygoptera but it has been described in at most only five species of libellulid dragonflies, two of these being palpopleurines (JACOBS, 1955; CORBET et al., 1960; WILLIAMS, 1977; MILLER, 1982a, 1982b, 1991). In *Palpopleura l. lucia* (CORBET et al., 1960), a species in which the wings of both sexes are strongly marked, a courting male approaches a perched female and briefly hover-flutters in front of her. It is of interest to know how widespread courtship is within palpopleurines, and I was therefore glad of an opportunity recently to observe courtship in *P. sexmaculata*, a species in which both male and female have black markings on the wings although these are much less extensive than in *P. l. lucia*. In addition females and immature males have a suffused amber or light brown area

in the proximal part of the wings and mature males have a bright blue pruinosity on the abdomen.

Observations

Observations were made in the Periyar National Park in southern India (9° 35'N; 77° 10'E) on three days in September, 1990 (cf. MATHAVAN & MILLER, 1990), beside a boggy stream which flowed from a spring at the forest edge for ca. 100 m across open sloping ground and into the lake. The stream was largely hidden amongst coarse grass and by many clumps of *Cyperus*, the water surface being exposed in only a few places, principally where there were cattle hoof-prints. No *P. sexmaculata* was seen at the stream before 10.00 hr or after 15.00 hr. Between 11.00 hr and 13.30 hr on each day about 50 males were observed along the lower 60 m of the stream. They defended territories 1-2 m in diameter, usually in clearings among the *Cyperus*, and these included at least a small area of open water. A male perched prominently in his territory and interacted

with intruding males in one of three principal ways: (a) side-to-side hovering, facing the same way; (b) slow pursuits in which one male flew round the territory 20-40 cm in front of the other; (c) fast chases in which the two males sometimes rocketed upwards for several metres.

Ten female arrivals were noted and of these six allowed close observations of courtship to be made. After arriving, a female would perch within 20-30 cm of a male, usually doing so over a small area of open water. If the female's arrival caused no male response she flicked her wings or flew up and hovered, settling again within a few cm. The male then took off and flew rapidly 2-4 times round the perched female describing a small circle of diameter 15-25 cm; he then reversed without pausing and flew round her 2-4 times in the opposite direction; finally he reversed again and repeated the performance in the initial direction (Fig. 1). After this he settled facing her usually within 30 cm, the whole performance taking about 5 s. When the female remained perched the male might repeat the performance once more, but thereafter he remained perched nearby until she moved.

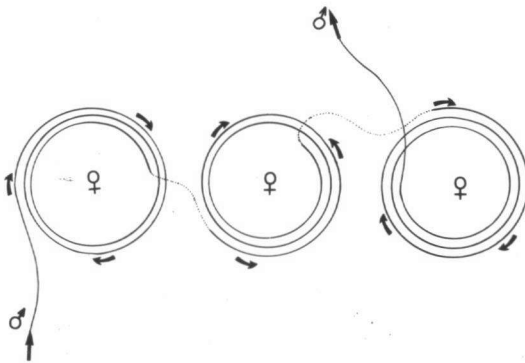


Fig. 1. Diagram illustrating the circling of a courting male round a perched female: in this case the male made $2\frac{1}{2}$ clockwise revolutions, $2\frac{1}{2}$ anti-clockwise and finally 3 again in a clockwise direction.

Other, less common components of male courtship included zig-zagging in front of the female and hovering, facing her, with the abdomen elevated to expose its blue surface. A female usually indicated acceptance by flying

slowly upwards whereupon she was promptly seized by the male; alternatively she might fly down to the water and make a few dips after which she would be seized. Unreceptive females flew away at high speed, sometimes pursued by the male.

After a female had been seized, copulation followed immediately with the pair landing on a perch and remaining in the wheel position for about 20 s. Subsequent oviposition commonly took place into water-filled hoof prints and the female, closely followed by the male, usually used several different sites in succession.

Discussion

MARTENS (1984) described a form of interaction in *Trithemis arteriosa* in which a male circled rapidly round another individual of the same species while it hovered: he suggested that this was a form of courtship behaviour. I have seen circling behaviour in *T. arteriosa* in Kenya, but there it involved a conflict between two males, one of which had entered the territory of the other. When a female approached she was seized without courtship. Thus although the circling behaviour of *P. sexmaculata* resembled that of *T. arteriosa*, its behavioural context apparently differs in the two species.

The courtship of *P. sexmaculata* is different from that of *P. l. lucia* in that a courting male of the latter hover-flutters in front of a perched female thereby exhibiting his strongly marked wings. A courting *P. sexmaculata*, however, exhibits his blue abdomen to the female by circling round her. In contrast a courting male *Brachythemis lacustris* appears to show the female a potential ovipositing site by hovering close to emergent vegetation at the water surface while she hovers nearby (MILLER, 1991), and courtship may have a similar function in some Zygoptera (ROBERTSON, 1982).

Courtship is generally believed to provide an opportunity for females to assess the quality of males, and it may also sometimes serve in species isolation (THORNHILL & ALCOCK, 1983). In some species of dragonfly it may

provide an opportunity for a male to judge a female's receptivity before forming a tandem with her (MILLER, 1991). If tandem formation sometimes causes damage to either partner, for example through wing-clashing, then the advantage of courtship may be in reducing the number of attempts to form tandems with unreceptive females, although this does not explain its apparent rarity within the Libellulidae. One possibility is that further field observations may show pre-tandem courtship to be commoner in the family than has hitherto been supposed.

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