

**A NOTE ON *CACOIDES LATRO* (ERICHSON),  
A TERRITORIAL LACUSTRINE GOMPHID  
(ANISOPTERA: GOMPHIDAE)**

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The behaviour of *C. latro* was studied in the Atlantic rain forest at Lake Dom Helvécia, Minas Gerais, Brazil on 15 and 16 February 1992. The daytime habitat of males consisted of offshore stands of emergent *Eleocharis interstincta* on which the males perched. They were aggressive to each other and showed site attachment. The average territory was about 9 m long. There appears to be a correlation between lacustrine habitat and territorial behaviour in the Gomphidae. The reason for this is discussed.

**INTRODUCTION**

Territorial behaviour has been described in many species of Odonata, but rarely in the Gomphidae. Aggressive behaviour without site attachment has been described in *Onychogomphus forcipatus* (L.) in Europe (KAISER, 1974), while the closely related *O. viridicostus* (Oguma) in Japan appears to be truly territorial (ARAI, 1975). Aggressive behaviour combined with a certain degree of site attachment has also been recorded in *Ictinogomphus decoratus* (Sel.) in Taiwan (LIEFTINCK, 1934), in *I. ferox* (Ramb.) in Africa (MILLER, 1964) and in *Lindenia tetraphylla* (Vander L.) in Europe (DUMONT, 1977). Thus it is worth recording observations on an apparently territorial gomphid *Cacoides latro* (Erichson) in South America in order to see whether its behaviour and habitat throw any light on territorialism in the Gomphidae in general.

## METHODS

The observations were made from a boat. This was used to disturb perched males so that they flew in the direction of other perched males and hence stimulated interactions between them.

HABITAT OF *C. LATRO*

*C. latro* was common at Lake Dom Helvécio, the largest lake of Rio Doce State Park in the state of Minas Gerais, Brazil. With an area of 6.87 km<sup>2</sup> (perimeter: 36 km) and a mean depth of 12.1 m (maximum 32.5 m) the lake is entirely surrounded by the Atlantic rain forest which either reaches the lake border or becomes separated from it by strips of marsh.

The limnology of the lake Dom Helvécio has been the subject of many investigations (see SAIJO & TUNDISI, 1987) and its odonatological fauna is very rich,



Fig. 1. The habitat of *Cacoides latro* (Erichson) at Lake Dom Helvécio, Minas Gerais, Brazil.

containing 42 species with a predominance of libellulids (A.B.M. Machado, unpublished). In the lake, the optimal habitat for the males of *C. latro* appeared to be belts of *Eleocharis interstincta* with a high density of stems, and containing groups of floating *Salvinia auriculata*. Most of our observations were made in one of these belts situated about 8 metres from the marshy shore (Fig. 1). At another point near the forested shore an exuvia of *C. latro* was found lying flat on a floating leaf of *Nymphaea* sp., among some *Eleocharis* stems.

OBSERVATIONS ON *C. LATRO*

In the afternoon of 15.2.92 we observed at least three *C. latro* perched on the

tops of *Eleocharis* stems. The insects were rather evenly spaced and showed signs of aggressive behaviour. We were able to make more detailed observations the next day.

On 16.2.92 we revisited the site between 1430 and 1724 hrs (solar time). From 1430 to 1511 we observed a sitting male attack a displaced male which had been disturbed by us. We repeated the experiment six more times and each time the displaced insect was attacked. The attack was from beneath and was thus clearly aggressive and not sexual. So far as we could see the intruder was always chased away successfully.

From 1511-1529 we observed the activities of another male. During the 18 minute period it

- (a) investigated a passing male but did not attack it,
- (b) allowed a passing male to approach it twice, but when the intruder passed a third time the perched male attacked it.
- (c) attacked passing males on three other occasions.
- (d) investigated a male *Tramea binotata* (Ramb.), but returned to its perch without attacking it.

When perched the orientation of the insect was generally with the abdomen raised and pointing towards the sun, but on three occasions the abdomen pointed westwards at right angles to the sun, and once it faced the sun. When the abdomen was raised the white spot on the second segment was conspicuous as well as the lateral flanges on the 8th segment (Fig. 2), but we never saw the insect make movements to enhance these anatomical features as a threat.

At 1542 a pair was observed in copula flying low over the lake.

The following observations were made between 1600 and 1724 from one place:

- 1600 A male was observed flying over the fringing marsh apparently hunting.
- 1622 Vigorous aggressive behaviour between two males was seen.
- 1628 A male *C. latro* was watched competing with a male *Tramea binotata* for a perching site. They exchanged the ownership of the site twice: the *Tramea* retained it.
- 1635 A male *C. latro* attacked a perched male of its own species.
- 1702 The last clash between males was observed.
- 1720 The last male left the *Eleocharis* area.
- 1724 A male *C. latro* was seen hunting over the marsh.

The patch of *Eleocharis* inhabited by the males consisted of a belt of this plant about 44 m by 6 m. In this area there were five perched males. Thus the average



Fig. 2. A male *Cacoides latro* (Erichson) in typical perching position on the top of a stem of *Eleocharis*.

territory was about 9 m long. No exuviae and no feeding behaviour were observed in the territories.

## DISCUSSION

Our results show that *C. latro* combines aggressive behaviour with site attachment. Its territorial behaviour is very similar to that of many libellulid species. The size of its territories was less than half that recorded for *I. ferox* (MILLER, 1964) and about a quarter of that recorded for *L. tetraphylla* (DUMONT, 1977), but was very similar to those of libellulid species in Britain (MOORE, 1991). The lacustrine habitat of *C. latro* in belts of emergent *Eleocharis* was shared with many libellulid species. It is an unusual habitat for members of the Gomphidae. The occurrence of this species in lentic habitats had already been reported by BELLE (1970), who found its exuviae on the sandy banks of ponds in Surinam.

The common feature which the partially or wholly territorial gomphids, *I. decoratus*, *I. ferox*, *L. tetraphylla* and *C. latro* share is their lacustrine habitat, and linked with it is their habit of perching on plants. *O. forcipatus*, which is aggressive but shows no site attachment, perches on the ground (KAISER, 1974), like many other gomphids which breed in streams and rivers.

In the Gomphidae territorial behaviour appears to be linked with a lacustrine habitat. Numerous species of other families are also territorial in lacustrine habitats and therefore one can assume that aggression with site attachment has selective advantage at lakes and ponds. In contrast to these habitats, streams and rivers in forests provide a much more variable habitat: stretches of stream only remain sunlit for part of the day, and changes in water level alter the topography of perching places in stream beds. Therefore dragonflies inhabiting forest streams probably have to move around more than those inhabiting lakes. Therefore attachment to particular sites may be less advantageous to a dragonfly which breeds in a stream. Nevertheless many dragonflies which breed in streams are territorial, and if *O. viridicostus* is truly territorial, it may well not be the only riverine gomphid to be so. Especially interesting would be a study of territoriality in the other species of the genus *Cacoides*, *C. mungo* Needham which, in marked contrast to *C. latro*, is a riverine species (BELLE, 1970).

In *I. ferox*, *L. tetraphylla* and *C. latro* there are notable lateral extensions to the 8th abdominal segments. In *L. tetraphylla* it appears that these flanges are used in a threat display (DUMONT, 1977). It is possible that they are used for this purpose in other territorial gomphids, although we obtained no evidence that this was so in *C. latro*. Abdominal flanges and swellings occur in species which are almost certainly not territorial and in some females of certain species, therefore these anatomical features are likely to have another or a different function.

MILLER (1964) noted that "the habitats at the lake edge frequented by the adults (of *I. ferox*) were often not those at which larvae emerged". Our observa-

tions suggested that the same situation may also occur in *C. latro*. This is another feature of gomphid biology which requires further study.

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