

Aquatic Heteroptera as host of *Temnocephala* Blanchard (Platyhelminthes: Temnocephalidae) in Minas Gerais, Brazil

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Abstract

Adults, immatures and eggs of *Temnocephala decarloi* Moretto and *T. lanei* Pereira & Cuocolo associated with Naucoridae, Nepidae and Belostomatidae species were recorded. The presence of *Temnocephala* associated with Heteroptera species is first reported for Brazil. It is suggestive that this association is relevant for Temnocephalidae dispersion and population maintenance owing to the morphology and behaviour of these insects and the oligotrophic state of the sampled localities.

Keywords: Belostomatidae, Naucoridae, Nepidae, Temnocephalidae.

Introduction

Temnocephalidae comprises a group of freshwater Platyhelminthes with elliptic shape, digitiform appendages and posterior sucker. The Temnocephalidae are found mainly within the tropics, with reports from South and Central America as well as New Zealand, New Guinea, Madagascar, Australia and Africa (Pereira & Cuocolo, 1941; Dioni, 1967a, b, c, d; 1968; Damborenea, 1992; Brusa & Damborenea, 2000).

Reaching its greater diversity of hosts especially in Brazil, Argentina and Uruguay, *Temnocephala* species have been reported in association with invertebrate and vertebrate hosts including molluscs (Gastropoda), crustaceans (Anomura and Brachyura) and turtles (Chelidae). The association of these turbellarians with an aquatic insect was first reported by Moretto (1978) in Argentina. However, since *Temnocephala* species are generally found in different hosts, the occurrence in aquatic Heteroptera was considered sporadic and transitory. Despite its variety of hosts, many biological aspects of the interaction of *Temnocephala* species and their hosts are insufficiently studied (Pereira & Cuocolo, 1940; Damborenea, 1998).

The present work reports the association of *Temnocephala decarloi* and *Temnocephala lanei* with a group of new hosts, aquatic Heteroptera, as the result of an extensive study of the distribution of these insects in the Minas Gerais State (Nieser & Melo, 1997, 1999; Nieser *et al.*, 1997, 1999; Vianna *et al.*, 1999; Vianna & Melo, 2000).

Material and methods

Among sampled localities during 1998-2000 field excursions for the collection of aquatic and semi aquatic

Heteroptera, the temnocephalids were found in material from Santana do Riacho (Serra do Cipó, 19°15'S, 43°32'W) and Brumadinho (Retiro das Pedras, 20°04'S, 44°00'W).

Retiro das Pedras is a house condominium located at Belo Horizonte city boundaries. Within the condominium extent, part of its area maintains well preserved conditions with minimal human disturbance. The data from Retiro das Pedras contains samples taken on a 3rd order stream section draining to a small Retiro das Pedras catchment. Serra do Cipó is a wider area in central MG comprising several small freshwater systems draining to Rio São Francisco or Rio Doce basins. The localities belong to south part of Espinhaço Complex and have peculiar vegetation, which changes in structure gradually with altitude. There is a predominance of xeric habitats and most plants are sclerophyllous. Both localities are situated in high altitudinal gradients and the marked seasonal pattern influences the environmental conditions of their water bodies.

Insects with attached *Temnocephala* specimens were sampled with hand nets sweeping the edges and bottom of several small mountain streams with clean and oligotrophic water with depth ranging from 30-80cm and width varying between 1 to 5m located in the mentioned localities. Both animals were fixed in 80°GL ethanol and in order to identify the collected *Temnocephala* specimens they were stained with carmine-acetoalumen, dehydrated in a graded series of ethanol, cleared with creosote and mounted in Canada balsam.

The collected material was deposited in the taxonomic collection of the Department of Parasitology at Federal University of Minas Gerais (DPIC).

Results

In the present work, insects from three families of aquatic Heteroptera (Belostomatidae, Naucoridae and Nepidae) were found harbouring *Temnocephala* species. The observed data is provided as follows:

Temnocephalids

Temnocephala decarloi Moretto

Locality: Retiro das Pedras, Brumadinho, Minas Gerais, Brazil

Host: *Belostoma testaceopallidum* Latreille

Distribution: BRAZIL: Brumadinho, Minas Gerais. ARGENTINA: Otamendi (Delta do Paraná).

Hosts and location: The only adult individual and two juvenile forms of *T. decarloi* collected in the present study was found between the legs of the adult male *B. testaceopallidum*. This species is included within the Belostomatidae. Its size ranges from 26-34mm. It occurs among overhanging vegetation in stagnant pools of mountain streams. Despite its great swimming abilities *B. testaceopallidum* as well as other *Belostoma* species are typically sit-and-wait predators, visually orientated. *T. decarloi* shares the same location of that observed for *B. cummingsi* De Carlo. The nymphs infestation, in the examined material, was infrequent.

A total of 10 egg capsules grouped ventrally between the middle and hind legs of the insect were also recorded.

Remarks: Moretto (1978) described the species from adults, immatures and eggs found on the abdomen pile layer of a single specimen of *B. cummingsi*.

The species diagnose is based on the penis morphology which is a long sigmoid structure. The distal end is fold arched with a peculiar crest system.

It is the first report of *T. decarloi* for Brazil, considerably increasing the distributional area for the species.

Temnocephala lanei Pereira & Cuocolo

Locality: Serra do Cipó, Santana do Riacho, Minas Gerais, Brazil.

Hosts: *Limnocois maculiceps* Montandon, *L. porphyros* Nieser & Lopez-Ruf, *L. saphis* Nieser & Lopez-Ruf, *L. submontandoni* Lauck; *Ranatra montei* De Carlo.

Distribution: BRAZIL: Minas Gerais, Santana do Riacho; São Paulo, Juquiá.

Hosts and location: The specimens found in the type host, *Trichodactylus* sp., a brachyuran crustacean, were present in the body surface, articular junctions and aerial chamber (Pereira & Cuocolo, 1941).

Associated with *T. lanei* four species of *Limnocois* included within the Naucoridae were found. They comprise two common species in Minas Gerais State, *L. maculiceps*, *L. submontandoni*, and two recently described species: *L. porphyros* and *L. saphis* (Nieser & Lopez-Ruf, 2001).

L. maculiceps is one of the biggest Naucoridae species and its total size is about 8mm. It is found at edges of streams among marginal vegetation. The other species occur in the bottom of streams, between gravel and pebble of fast-flowing areas with some individuals found over rocks and small stones. The recorded species are sympatric and they appear to have a diurnal activity.

T. lanei shares the same location in all *Limnocois* species. A total of 12 adults and 29 juvenile individuals were found on ventral side of the abdomen and between the legs of the insects.

Egg capsules were found on 24.3% of 90 examined *Limnocois* and located on the propleuron and between the middle and hind legs. The mean number of deposited eggs ranged between 4.3-15.4 eggs/insect.

T. lanei were also found on *Ranatra montei* a conspicuous

species, included within the Nepidae, described from Minas Gerais where it is quite common in low order mountain streams. Its size ranges from 37-45mm. Most species of *Ranatra* spy their prey within the vegetation in a vertical position. The temnocephalids were attached ventrally on the abdomen of the insect. In both *Limnocois* ssp. and *R. montei* the nymphs infestation were infrequent in the examined material.

Remarks: It is the first report of *T. lanei* for Minas Gerais State. Pereira & Cuocolo (1941) described the species based on 8 specimens of *T. lanei* and reported the penis morphology as a short conical structure with a slight quitinous thorn crown at its distal end.

Discussion

The results provided the first record of *Temnocephala* with Heteroptera host species association for Brazil. The observed distribution patterns of the two temnocephalids varied among their host species.

In both *B. testaceopallidum* and *R. montei* the association with *Temnocephala* was once recorded, suggesting a rare event. Moretto (1978) also pointed out that the finding of *B. cummingsi* with *Temnocephala* was not frequent. In both cases the association may not be as opportunistic as previously stated. Nevertheless, the obtained data prevent any accurate analysis of the observed pattern.

On the other hand, the association of the *Limnocois* group species with *T. lanei* suggests being more consistent than the observed for the other Heteroptera. However, it's a novel occurrence considering that *Temnocephala* host species generally belongs to the same major zoological group.

The infrequent record of infested nymphs suggests that adults are selected locations for the commensals owing to the moulting process during the postembryonic development of the insect hosts and consequent lose of temnocephalids and eggs that could be present on them, as observed by Damborenea (1998) for a freshwater shrimp *Palaemonetes argentinus* Nobilli.

The present work gives little evidence for a definition of the underlying mechanisms that relates *Temnocephala* and Heteroptera hosts. Classically treated in the literature as epibiont, phoretic (Moretto, 1978), commensalist and symbiotic (Damborenea, 1992; Damborenea, 1996; Damborenea, 1998; Brusa & Damborenea, 2000), the current knowledge on the relationship between these flatworms and their heteropteran as well as other hosts is considerably deficient. The lack of taxonomic and life cycle studies on the recorded Heteroptera hosts added to the difficulty in presenting a rigorous definition of any association, confers to the Minas Gerais *Temnocephala* species and its hosts a particularly undefined situation.

However, the gathered data suggests that the recorded Heteroptera species could be possible hosts of these turbellarians, where aquatic Heteroptera would act as physical support for living temnocephalids and egg capsules as dispersion agent and for food supply. Also, due to the morphology and behaviour of these insects and the oligotrophic state of the sampled localities and recognising that parasite life stories evolve in several evolutionary paths as do those of free-

living organisms, the association is of neglected relevance for temnocephalids population maintenance and survival in the collected localities.

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