SHORT COMMUNICATION

First record of larvae of Chironomidae (Insecta, Diptera) as prey of *Temnocephala* sp. (Platyhelminthes, Temnocephalidae), an ectosymbiont on larvae of Corydalidae (Megaloptera)

Susana Trivinho-Strixino[1,3], Fabio Laurindo da Silva[2] & Francisco Valente-Neto[2]

[1]Laboratório de Ecologia de InsetosAquáticos, Departamento de Hidrobiologia, Universidade Federal de São Carlos, Caixa Postal 676, 13565–905 São Carlos-SP, Brazil.
[2]Programa de Pós-Graduacão em Ecologia e Recursos Naturais, Universidade Federal de São Carlos, CEP 13565-905, São Carlos, São Paulo, Brazil.
[3]Corresponding author. strixino@ufscar.br

ABSTRACT. First record of larvae of Chironomidae (Insecta, Diptera) as prey of *Temnocephala* sp. (Platyhelminthes, Temnocephalidae), an ectosymbiont on larvae of Corydalidae (Megaloptera). This study constitutes the first record of *Temnocephala* Blanchard, an ectosymbiont on Corydalidae, as a possible predator of chironomid larvae. Twenty-eight Corydalidae larvae (*Corydalus* and *Protochauliodes*) were examined under stereomicroscopic in search for *Temnocephala* and Chironomidae larvae, of which five megalopteran larvae had 24 *Temnocephala* sp. associated. Furthermore, eight of these *Temnocephala* worms had chironomid larvae in their gut contents, an interaction previously unknown. Gut content analyses revealed *Corynoneura* as the commonest chironomid, but larvae of *Larsia*, *Rheotanytarsus* and *Tanytarsus* were recorded as well. This study included *Corydalus* and *Protochauliodes* as hosts for *Temnocephala*, which might be important for this worm dispersion and population dynamics.

KEYWORDS. Commensalism; *Corydalus*; predation; *Protochauliodes*.

RESUMO. Primeiro registro de larvas de Chironomidae como presas de *Temnocephala* sp. (Platyhelminthes, Temnocephalidae), um ectosimbionte de larvas de Corydalidae (Maegaloptera). Este estudo constitui o primeiro registro de *Temnocephala* Blanchard (Platyhelminthes, Temnocephalidae), um ectosimbionte em larvas de Megaloptera, como um possível predador de larvas de Chironomidae. Vinte e oito larvas de Corydalidae (*Corydalus* e *Protochauliodes*) foram examinadas sobre estereomicroscópio na busca por *Temnocephala* e larvas de Chironomidae, das quais cinco larvas de Megaloptera continham 24 *Temnocephala* sp. associadas. Além disso, oito *Temnocephala* possuíam em seu conteúdo estomacal larvas de Chironomidae, uma interação desconhecida anteriormente. A análise do conteúdo estomacal revelou *Corynoneura* como o quironomídeo mais abundante, e também algumas larvas de *Larsia*, *Rheotanytarsus* e *Tanytarsus*. Este estudo inclui *Corydalus* e *Protochauliodes* como hospedeiros de *Temnocephala*, os quais podem ser importantes para a dispersão e dinâmica populacional desses vermes.

PALAVRAS-CHAVE. Comensalismo; *Corydalus*; predação; *Protochauliodes*.

Interactions between organisms, such as competition and predation, have been related as factors that regulate communities (Ricklefs 1987). However, interactions, such as commensalism, have been briefly described and still require further investigation, as indicated by Holomuzki *et al.* (2010).

In this context, *Temnocephala* species (Platyhelminthes) have been recorded associated with invertebrate and vertebrate hosts, including insects (Amato & Amato 2005; Amato *et al.* 2007; Vianna & de Melo 2002), molluscs (Damborenea 1998; Seixas *et al.* 2010), crustaceans (Damborenea 1998) and turtles (Volonterio 2010). As for temnocephalan-host associations, interactions between chironomids and their host have been recorded involving a great array of animals (Roque *et al.* 2004; Marques *et al.* 2008), mainly insects, such as megalopteran larvae (Callisto *et al.* 2006).

The interaction between temnocephalans and megalopteran larvae is poorly known. Furthermore, relationships between temnocephalan worms and chironomid larvae on megalopteran hosts have never been investigated. In this context, this study records for the first time Chironomidae larvae being preyed by *Temnocephala*, an ectosymbiont on Corydalidae.

Twenty-eight Corydalidae larvae (*Corydalus* and *Protochauliodes*) were examined under stereomicroscope in search for *Temnocephala* worms (egg, young and adult) and Chironomidae larvae associated. Five Corydalidae larvae from two second order streams, located in a preserved area of Cerrado formation municipality, and other 23 larvae (21 *Corydalus* and 2 *Protochauliodes*) from Reference Collection of the Laboratório de Ecologia de Insetos Aquáticos, Universidade Federal de São Carlos (LEIA/UFSCar) were carefully analyzed during this research.

Temnocephala specimens were stained with carmine-acetoalumen, dehydrated in ethanol, and mounted in Euparal

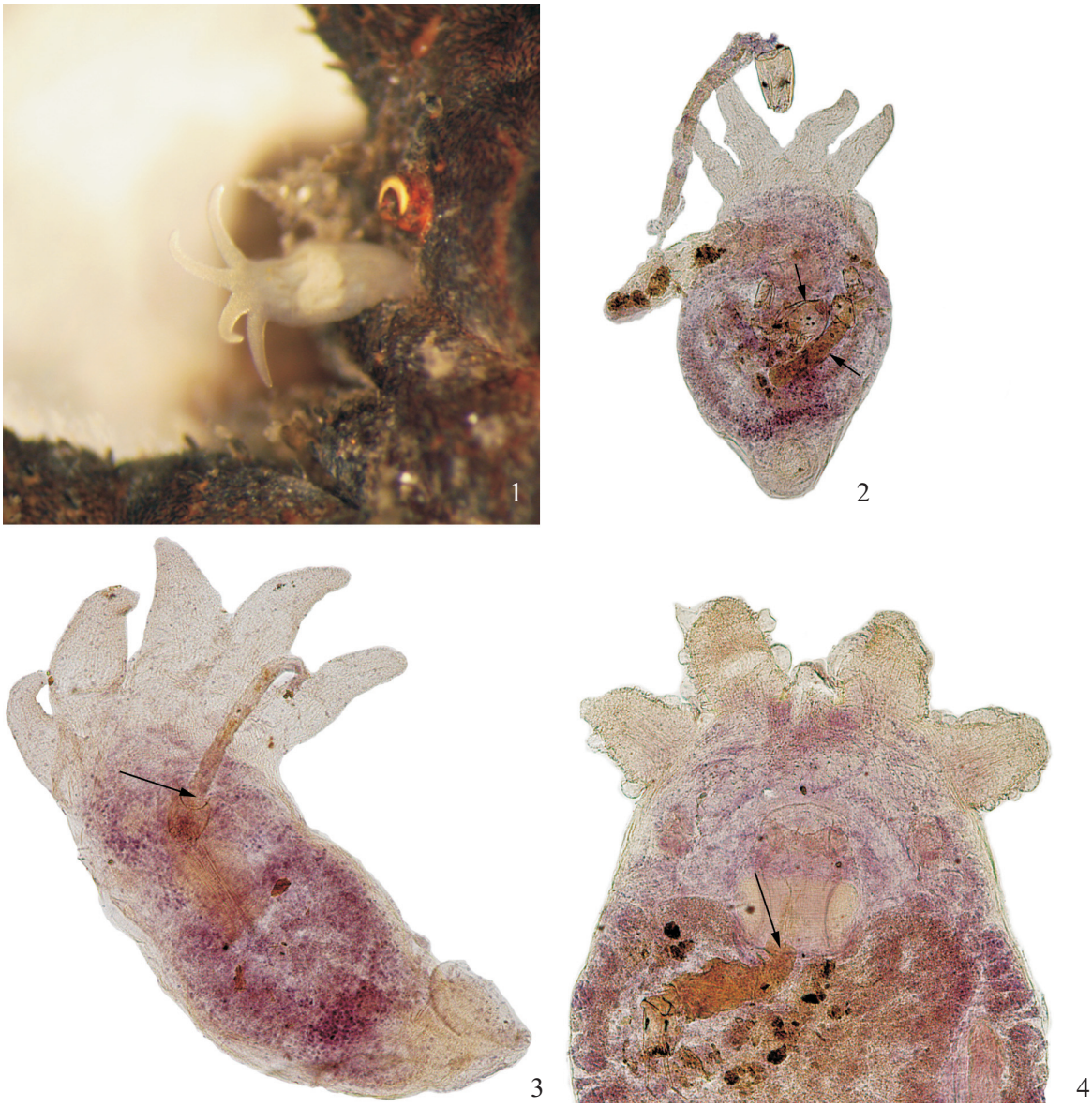
before the gut content could be analyzed. Due to the fact that the temnocephalan worms have a rather transparent cuticle, gut contents were examined under a microscope.

Twenty-four temnocephalans were found associated with five megalopteran larvae, this is the first record of such an occurrence (Fig. 1). It could be argued that megalopteran larvae are one of the most suitable insect host groups, together with Plecoptera, Ephemeroptera and Odonata, because they are large with free-living and cryptic benthic species with intermediate mobility (de la Rosa 1992; Tokeshi 1999; Roque *et al.* 2004).

Moreover, eight temnocephalans had chironomid larvae in their gut contents (Figs. 2–4), interaction previously unknown. Gut content analyses revealed that the most abundant chironomid taxon was *Corynoneura*, but larvae of *Larsia*, *Rheotanytarsus* and *Tanytarsus*, were recorded as well. Likewise, *Corynoneura* was the most abundant and frequent chironomid larvae on megalopteran larvae body, as found by Callisto *et al.* (2006), i.e., *Corynoneura* is the most available larvae for *Temnocephala*. It is noteworthy that we found two megalopteran larvae harbored both *Corynoneura* larvae and temnocephalan worms.

On the other hand, we found *Rheotanytarsus* in low abundance and frequency associated with megalopteran larvae. This result differs from de la Rosa (1992) study for Costa Rican streams, which found *Rheotanytarsus* living on Corydalidae larvae at rather high rates. *Larsia* was also found in low abundance and frequency. Not a single *Tanytarsus* larva was found on this host. The interactions between *Larsia* and *Tanytarsus* with insect hosts are not well known yet.

Some authors suggested that the association between chironomid larvae and megalopteran hosts might benefit the



Figs. 1–4. *Temnocephala* sp. 1. *Temnocephala* sp. associated to a *Corydalus* larva. 2–4. Chironomid larvae in the gut content of *Temnocephala* sp.

chironomids by improving feeding opportunity, increasing mobility, providing protection from disturbances, and decreasing predation risks (de la Rosa 1992; Tokeshi 1995; Roque *et al.* 2004). However, the present study provides evidence that the chironomid larvae might be predated by *Temnocephala*, both associated with megalopteran larvae body. In other words, *Temnocephala* and chironomid larvae have the same association with megalopteran larvae and *Temnocephala* could takes advantage of it by preying on chironomids.

In summary, this study included *Corydalus* and *Protochauliodes* as new hosts for *Temnocephala*, which may be important for its dispersion and population dynamics. Moreover, we suggest a new predator prey relationship between *Temnocephala* and chironomid larvae, both associated with Megaloptera hosts. Thus, the argument currently reported of decreasing predation risk of chironomid larvae when they are associated with insect host might be better studied for understanding the real benefits of this association for chironomids.

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