

First report of the aquatic genus *Climacia* McLachlan, 1869 in French Guiana [Neuroptera, Sisyridae]

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Larvae of a spongillafly were collected in French Guiana's freshwater for the first time, to our knowledge. Identified as the genus *Climacia*, they allow to extend the known distributional area of this genus to the French overseas territory of the Guiana Shield.

Première citation du genre aquatique *Climacia* McLachlan, 1869 en Guyane française [Neuroptera, Sisyridae]

Mots-clés : Neuroptère, *Climacia*, larve, Guyane Française, région néotropicale.

Des larves de Neuroptères aquatiques ont été collectées, pour la première fois à notre connaissance, en Guyane française. Identifiées comme appartenant au genre *Climacia*, elles permettent d'étendre à ce DOM du Plateau des Guyanes l'aire de distribution connue de ce taxon.

1. Introduction

The Guiana Shield is an old Precambrian geological formation more than 1600 km long, located in the north-eastern part of South America that includes Guyana, Suriname, French Guiana, and part of Brazil, Venezuela and Colombia. French Guiana (2°- 6° Northern latitude) stretches over almost 84,000 km². It is a hot spot of biodiversity with 80% of its territory covered by tropical rain forest and is considered one of the last 15 remaining clusters worldwide only partially affected by human activity (GARGOMINY 2003, HAMMOND 2005).

Aquatic Neuroptera and Megaloptera are holometabolous insects of the superorder Neuropterida. They form a small worldwide fauna composed of 328 species of Megaloptera and 73 species of aquatic Neuroptera (COVER & RESH 2008) with recent classification (e.g., PENNY et al. 1997) considering Neuroptera a separate order from Megaloptera. Unlike Megaloptera, which include some of the largest and most spectacular species, aquatic Neuroptera are characterized by minute individuals and have received only modest attention. The Megaloptera fauna of French Guiana has recently been estimated at 6 species (CLAVIER et al. 2010), but no record of

aquatic Neuroptera exists prior to this report. The aim of the present paper is therefore to report, for the first time, the presence of the genus *Climacia* in this French overseas territory.

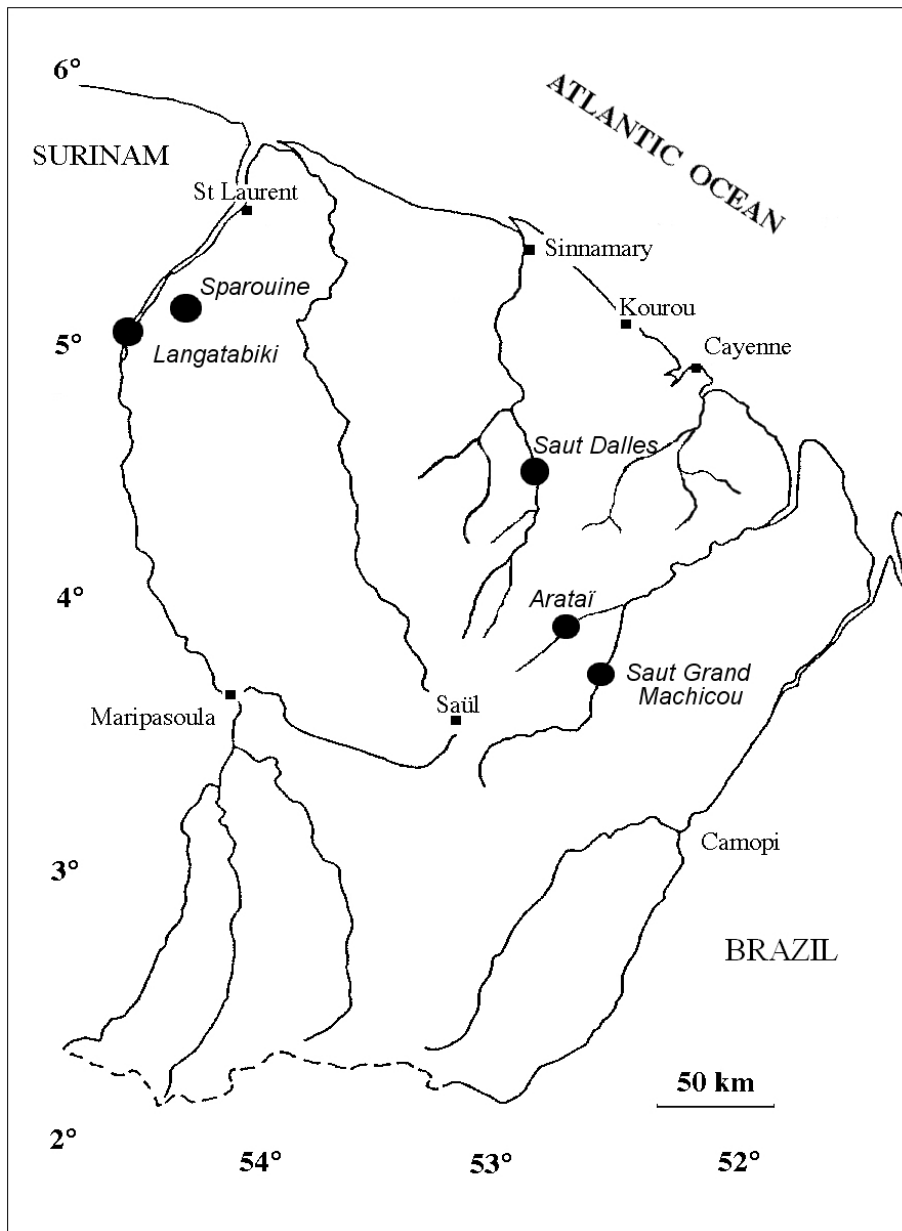


Figure 1. Location of the study sites (black circles).

Figure 1. Emplacement des stations d'échantillonnage (cercles noirs).

2. Material and Methods

In order to evaluate the benthic macro fauna of the French Guiana district, the HYDRECO Laboratory conducted a large hydrobiological study covering the entire territory at the beginning of the dry season (IX-2010). According to ROSENBERG & RESH (1993), “benthic” implies “bottom-living” and the prefix “macro” indicates that these organisms can be caught using nets with a mesh width range of 200-500 µm. Sampling was conducted by sweeping a net (mesh width: 200 µm) along the edges of the streams. For a period of one minute, the substratum was disturbed at a depth of several centimetres to dislodge any macroinvertebrates attached or buried in the organic and/or inorganic matter.

3. Results

Study material

Seven larvae of the genus *Climacia* were collected in (Fig. 1):

Maroni watershed:

- the Sparouine river (05°05'40''N / 54°12'12''W), 02-XI-2010, two larvae;
- the Maroni river at Langatabiki (05°00'20''N / 54°26'12''W), 04-XI-2010, one larva;

Sinnamary watershed:

- the Sinnamary stream at Saut Dalles (04°33'13''N / 52°53'59''W), 25-XI-2010, two larvae.

Approuague watershed:

- the Arataï River (04°01'36''N / 52°41'35''W), 16-II-2010, one larva;
- the Approuague river at Saut Grand Machicou (03°54'14''N / 52°34'52''W), 25-X-2010, one larva.

va.

This material is deposited in the collections of the HYDRECO Laboratory (French Guiana).

Generic identification of larvae

The Sysiridae family is easy to recognize on the basis of the mouthparts modified into elongated and unsegmented piercing stylets (Fig. 2) and as such are not easily confused with other aquatic larvae. Identification to the genus was made according to EVANS & NEUNZIG (1996) and FLINT et al. (2008), leading to the following key:

- Pair of dorsal setae present on abdominal segment 8; ventral pair of medial setae on abdominal segment 8 raised on tubercles and only slightly closer together than those on segment 9; small acute spines present at bases of thoracic setae (not present in *Climacia californica*).....*Climacia* McLachlan, 1869
- Pair of dorsal setae absent on abdominal segment 8; pair of ventral medial setae on abdominal segment 8 sessile and distinctly closer together than those on segment 9; small acute spines at bases of thoracic setae absent.....*Sisyra* Burmeister, 1839

Having been developed for the study of North American fauna, this key must be used with care in Guiana. In particular, the space between the ventral setae of segment 9 can be twice that between setae of segment 8. At least two distinct species (possibly three) are present in our material.

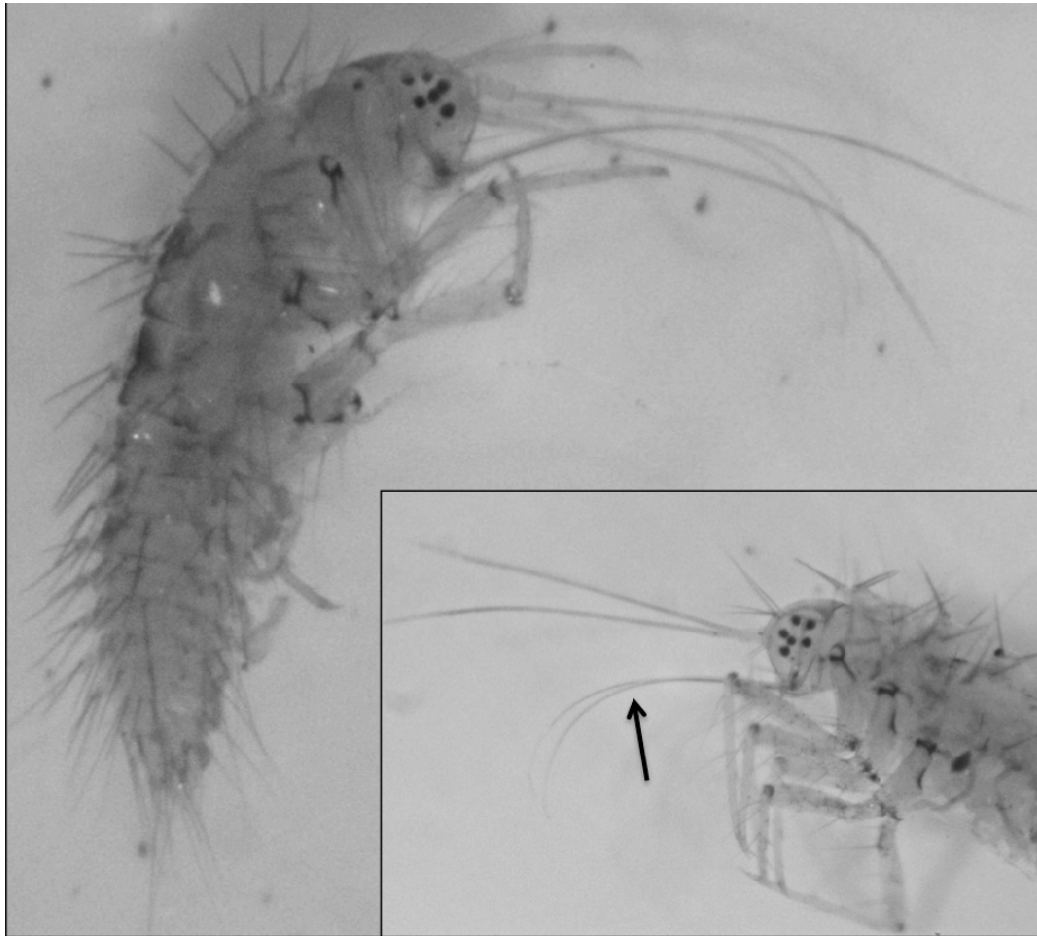


Figure 2. Lateral views of a Guianese larva of *Climacia*. Arrow shows the modified mouthparts into elongated and unsegmented piercing stylets.

Figure 2. Vues latérales d'une larve guyanaise de *Climacia*. La flèche indique les pièces buccales modifiées en longs stylets perforants.

4. Discussion

Little data is available on aquatic Neuroptera as this insect order is primarily a terrestrial group. Neuron (nerve) and pteron (wing) is a reference to the dense, nerve-like venation present in the wings of the adults. Only two of the 17 families of Neuroptera have aquatic larvae (Nevrorthidae and Sysiridae) and one family has some water-dependant species (Osmylidae). Although Sisyrids are the most common aquatic Neuroptera with 61 recorded species, compared to 12 species of Nevrorthidae (COVER & RESH 2008), these records are few and scattered

(BROWN 1974), particularly due to their life cycle. Larvae are parasites of freshwater sponges (= spongillaflies) with mouthparts (mandibles and maxillae) modified into a 'sucking tube' for piercing and sucking out cytoplasm from the sponge's cells¹. Therefore, the presence of Sisyridae also confirms the occurrence of Spongillidae in French Guiana, which has never been sighted prior to this report.

In French Guiana, although presently recorded in three watersheds (Maroni, Sinnamary, and Approuague), Sisyridae appear to be rare in samples. Despite extensive sampling conducted in the entire territory and more than 60,000 aquatic invertebrates identified, only 7 larvae of this family were collected on the whole. Populations are limited by the abundance of their sponge hosts, which are themselves limited by their substrate preference. Hence, specimens were only collected under shallow rocks, in running water with a high level of dissolved oxygen (> 90%), and a moderate to important flow, which is a habitat to freshwater sponges. This kind of habitat requirement explains the lack of data for this systematic group on this French overseas territory, where freshwater is dominated by soft substrate and fine sediments.

The known genera of spongillaflies include *Climacia*, *Sisyra*, *Sisyrina*, *Sisyrella* and *Sisyborina*. In the New World, only *Sisyra* and *Climacia* are encountered but they are particularly diversified, principally in the Neotropics. *Sisyra*, which occurs worldwide, counts 9 Neotropical species. *Climacia* is primarily a Neotropical genus, although some species are present in temperate regions [e.g. *Climacia areolaris* (Hagen, 1861)]. 21 species are distributed from USA to Argentina (FLINT 2006). The known distributional area of *Climacia* can now be extended to also include French Guiana.

Considering the Orenoque River to the western limit of the Guiana Shield, six species of *Climacia* and one of *Sisyra* have been recorded in this territory (OSWALD 2007). *Climacia bimaculata* Banks, 1913 and *Sisyra amazonica* Penny, 1981 may be present in French Guiana. But larval instars are difficult to identify to species level. Without an adult association, it is only possible to correctly identify these specimens to genus at this time. As such, it would be interesting to conduct light traps near the capture sites so as to collect adult specimens and confirm the species identification.

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¹ CHANDLER (1956) gives a detailed larval-pupal life history.

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