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## Ecology and phoretic habits of *Anthrenochernes stellae* (Pseudoscorpionida, Chernetidae)

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### Summary

The biology and phoretic habits of the chernetid pseudo-scorpion *Anthrenochernes stellae* Lohmander, which had previously been found on only five occasions (in Denmark, Sweden, and Poland), is discussed in the light of new finds from Sweden. It seems to live among loose decaying wood in old hollow, deciduous trees (beech, lime and oak), and is commonly associated with insect or bird nests. The phoretic behaviour of the species is also discussed, and the spermatheca and pedipalpal chela are illustrated.

### Introduction

*Anthrenochernes stellae* was described by Lohmander (1939b) on the basis of material from Gothenburg

(collected 25 November 1938) and from the vicinity of Copenhagen (one specimen, collected 30 May 1886). Since then it has only been reported twice, from Zealand, Denmark (Andersen, 1988) and from Poland (Rafalski, 1967). In Gothenburg, Lohmander found this species in a rather old, hollow lime (originally published as being an elm) growing on a south-facing, sunny slope. The tree cavity had become exposed when the tree was broken by a storm. The species was found together with *Dinocheirus panzeri* (C. L. Koch) among loose decaying wood mixed with debris from a bees' nest and dead honey bees at the bottom of the cavity (Lohmander, 1939a, b). The find in Copenhagen in 1886 was from a hollow oak, in company with *Larca lata* (Hansen), *Pselaphochernes scorpioides* (Hermann), *Allochernes wideri* (C. L. Koch) and *Dinocheirus panzeri* (Lohmander, 1939a, b). Andersen (1988) found *A. stellae* in a large, broken, hollow branch from an old oak in a manor park. Within the hollow branch there were dead wasps and remnants of their nest, as well as some debris that might have been remnants of a bird's nest.

Rafalski (1967) found the species among decaying wood (species of trees not specified) in two areas in south-eastern Poland.

We report here on new records of *A. stellae* from seven different localities in southern Sweden. The

phoretic behaviour of this species is also discussed, and the spermatheca and pedipalpal chela are illustrated.

### Material

The following are new records from Sweden:

Blekinge province, Gö, 26 April 1990. Sifting of decaying wood in a cavity with old birds' nests (probably jackdaw *Corvus monedula* L.) in a wind-fallen hollow beech trunk, close to seashore, 1♀, leg. R. Baranowski, together with *Dinocheirus panzeri*.

Blekinge, Tromtö, 26 May 1990. Sifting of decaying wood in a cavity with the ant *Lasius fuliginosus* (Latreille) in a hollow, thick and large, live beech tree in old beech forest, 1♀, leg. R. Baranowski.

Blekinge, Tromtö, 6 August 1990. Sifting of black decaying wood in a high stem cavity originating at a branch attachment in a hollow, thick live beech tree in old beech forest, 8♀, leg. R. Baranowski. No birds' nests seen, but the beetle fauna suggests that one or more were probably present. Found together with *Dinocheirus panzeri*, *Chernes cimicoides* (Fabricius) and 11 species (10 beetles and the ant *Lasius brunneus* (Latreille)) on the Swedish red list of invertebrates (Ehnström, Gärdenfors & Lindelöv, 1993).

Småland province, Bjurkärr, 16 September 1989. Sifting of decaying wood in a hollow, live beech tree in old beech forest, 1♀, leg. P. Rolfson.

Småland, Sunnavik, 21 km SW Växjö, mid-June 1989. Indoors, phoretic on *Ctenophora pectinicornis* (L.) (Tipulidae), 40♀, leg. B. Hyllén-Cavallius.

Södermanland province, Jättna, 13 July–2 September 1991. Open lime/oak grove, near lake, in a yellow-trap placed inside an old, hollow lime with bees' honeycombs, 1♀, leg. B. Viklund, L.-O. Wikars and J. Sandström.

Södermanland, Oxelösund, Ämtnäs, 13 July–2 September 1991. Open oak/lime grove, near coast, in yellow-trap placed on old lime, 1♀, leg. Bert Viklund, L.-O. Wikars and J. Sandström. Many rare beetles in the area.

Södermanland, Tystberga, Måstena, Koholmen, 4 June–20 July 1991. Rich, shaded oak forest with lime, near coast, in a yellow-trap placed in small cavity in a partly rotten, live oak, 1♀, leg. B. Viklund, L.-O. Wikars and J. Sandström.

### Diagnostic characters

Lohmander (1939a, b) felt compelled to infer a relationship between his new species and the genus *Lamprochernes*, on account of the shape of the body hairs. But, because of the discrepancies in many other characters, he erected a new genus. He discussed at some length the similarities between *A. stellae* and *Pselaphochernes scorpioides*, including the structure of the male genitalia (Lohmander intended to publish an investigation of the genitalia of all the Scandinavian chernetids, which he never realised). As all our specimens are females we have not been able to verify this, but the structure of the spermatheca of the female (Fig. 1) does not seem to differ significantly from that of *P. scorpioides*.

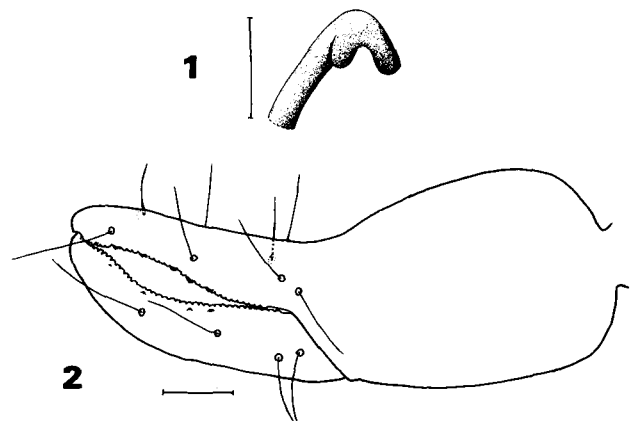
Lohmander (1939b) briefly mentioned that in *A. stellae* the inner margins of the fingers are curved, i.e. not aligned when closed. This character (Fig. 2) alone is diagnostic as far as the Scandinavian chernetids are concerned. Also see Gärdenfors & Wilander (1992) for a short description and habitus drawing.

### Discussion

The first material we came across was sent by Dr Björn Hyllén-Cavallius from the province of Småland. His wife had called his attention to a tipulid which, heavily loaded with small creatures, flew clumsily around at an indoors window. After being preserved in Swedish punch (a liqueur) and sent to us, we counted 40 females (and then some had already escaped!) of *A. stellae* grasping the legs of the burdened tipulid. The tipulid was a female *Ctenophora pectinicornis*, a species which develops in rotten wood in hollow trees and logs. The pseudoscorpions had probably boarded the newly hatched tipulid whilst it was waiting for its wings to become functional. In two New World chernetids phoretic behaviour is triggered by eclosion of the phoretic host from the pupal case (Zeh & Zeh, 1992a, b). It seems probable that in the present case the females of *A. stellae* had been waiting for the host to emerge, otherwise it would be difficult to account for the large number of individuals on a single tipulid. It has been suggested that phoresy in pseudoscorpions is the result of chance events during predatory behaviour (e.g. Vachon, 1940; Muchmore, 1971), but the likelihood of more than 40 such chance events occurring simultaneously seems very small. We therefore suggest that phoresy in *A. stellae* is a specialised, adaptive behaviour (cf. Zeh & Zeh, 1992b).

The phoretic habit was also suggested by the findings of *A. stellae* in yellow-traps in limes and an oak, although we do not know for certain how these pseudoscorpions arrived, as the traps were placed in tree-cavities or on a tree.

Zeh & Zeh (1992b) demonstrated a female bias in phoretic pseudoscorpions. Our observations, particularly of the 40 females attached to a tipulid, fit this pattern well.



Figs. 1–2: *Anthrenochernes stellae*. 1 Spermatheca; 2 Female, left chela, retrolateral view. Scale lines = 0.1 mm.

One can speculate on the functional significance of the peculiar curved shape of the pedipalpal fingers of *A. stellae* (Fig. 2). This character occurs in males as well as females (Lohmander, 1939b), which rules out a sexually selected trait (cf. Zeh, 1987). It would be reasonable to interpret this as a morphological adaptation to its phoretic habits.

The specimens from two localities in the province of Blekinge were collected among decaying wood in three different, old, hollow beech trees. In one case birds' nests were present, in the second the ant *Lasius fuliginosus* and in the third *L. brunneus* (and probably an old birds' nest). A bees' nest was present in one of the limes where *A. stellae* was collected in yellow-traps.

Summarising, *A. stellae* seems to live among loose decaying wood in old hollow, deciduous trees (so far beech, lime and oak), commonly (always?) associated with insects' or birds' nests. It seems to be a highly phoretic species.

The new finds indicate that the species has, to some extent, been overlooked. However, it has only been found (except for those on the flying tipulid) in, or in association with, old hollow trees, which implies that the species is vulnerable to felling of such trees. The presence of another rare pseudoscorpion (*Larca lata*) in the Copenhagen oak shows the quality of this habitat. The Blekinge and Småland localities belong to the most species-rich beech forests in Sweden regarding their invertebrate fauna. Eleven species of insects on the Swedish red data list were found in a single beech tree. In Södermanland at least two of the localities had a diverse fauna of rare beetles. Therefore, we would expect that *A. stellae* really is a rare species and, furthermore, that where it is found the habitat quality is very high and supports many other rare organisms. The localities where *A. stellae* occurs deserve to be preserved and protected from tree felling.

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#### Addendum

The following two new Swedish records of *A. stellae* were received after this paper had gone to press:

Östergötland province, Bjärka-Säby, Bjärka äng, 21 September 1993. Sifting of decaying wood, containing large amounts of droppings presumably from small rodent, in a thick hollow oak in a grazed meadow with thick hollow oaks and aspens, 1♀, leg. T. Ranius.

Västergötland province, Gråbo, 21 June 1982. Attached to the leg of a sarcophagid fly, in coll. Gothenburg Museum of Natural History, 1♀, leg. M. Helegård.