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A description of the late-instar larva of *Nossidium pilosellum* (MARSHAM, 1802) (*Coleoptera*: *Ptiliidae*)

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ABSTRACT. A detailed description of the late-instar larva of *Nossidium pilosellum* (MARSHAM) is given, the illustrations of structural features provided. The differences in morphological structures between the larvae of *N. pilosellum* and *N. americanum* MOTSCHULSKY are mentioned.

Key words: Entomology, morphology, larva, *Coleoptera, Ptiliidae*, *Nossidium pilosellum*.

INTRODUCTION

Featherwing beetles are the smallest known beetles including over 400 known species with estimates of the probable total greatly exceeding this number (DYBAS 1976). Family *Ptiliidae* HEER belongs to the "leptinid association" distinguished by BÖVING and CRAIGHEAD (1931) on the basis of larval characters. The "Leptinid association" includes larvae bearing primitive characters such as: mandible with asperate or tuberculate molar part, maxilla with fringed galea, urogomphi present two- or one- jointed and anal membrane furnished with anal hooks. Larvae of *Ptiliidae* have been previously described or mentioned by PERRIS (1853, 1862 - *Ptinella aptera* GUÈRIN, *Acrotrichis intermedia* (GILLMEISTER)), MATTHEWS (1872 - *Actinopteryx* MATTHEWS), BÖVING and CRAIGHEAD (1931- *Nossidium* ERICHSON) and HINTON (1941 - *Acrotrichis fascicularis* HERBST) who mentioned also larvae of *Ptinella limbata* (HEER) as previously described, but did

not give a bibliography. Next PAULIAN (1941) gave descriptions of *Acrotrichis grandicollis* MANNERHEIM, *Mycophagus* FORSTER, *Cylindrosella* HUBBARD and a redescription of *Ptinella aptera.* In 1976 DYBAS described larvae representing eight genera known from the United States (*Nossidium*, *Pteryx* MATTHEWS, *Actidium* MATTHEWS, *Nanosella* MOTSCHULSKY, *Throscoptilium* BARBER, *Actinopteryx*, *Acrotrichis* MOTSCHULSKY, *Nephanes* THOMSON) with disscussion of the previous mistakes and misinterpretations. The latter paper is the basis of this study and differences between larvae of *N. pilosellum* and *N. americanum* MOTSCHULSKY are given in conclusions.

On the the basis of adult morphology, *Nossidium* is regarded as the most generalized genus in the family (DYBAS 1976). *N. pilosellum* is widespread, but of rare occurrence, in the South, West and Central Europe. It is the only member of the genus in Poland where it is known from five regions in the central and southern part of the country (BURAKOWSKI, MROCZKOWSKI and STEFAŃSKA 1978).

In view of the current studies on larvae of *Ptiliidae* underway in the United States (W.E.HALL, M. SORENSSON per. com.), I have not proposed a system of naming larval chaetotaxy. The terminology follows ASHE and WATROUS (1984) which seems to be logical and consistent, and after CROWSON (1981). It was also used and discussed in my previous study on the larvae of *Agathidiini* (KILIAN 1998).

BIOLOGY

Information about *Nossidium pilosellum* and in particular its biology is very limited. Adults of this European species have been collected from four species of *Polyporaceae* and once from the agaric *Russula integra* (NEWTON 1984 after BENICK 1952, and REHFOUS 1955). On the contrary, larvae and adults of *N. americanum* have not been found on any specific host (NEWTON 1984). There is no evidence if *N. pilosellum*, and other species of the *Nossidium* group are "specialist mycophages" or "generalist mycophages" (NEWTON 1984). Numerous imagines were collected in the Bieszczady Mountains (May, July, August 1968-1970) by BURAKOWSKI from a dead *Acer pseudoplatanus* L. infested by a fungus *Polyporus squamosus* (HUDS.) ex Fr. (*Polyporacae*). Numerous specimens were found in moist humus in cavities or at the bottom of the stump near the fruiting body of the fungus. The beetles were absent in dry polyporus and in dry rotten wood of the hollow stump. *N. pilosellum* seems to be strongly associated with *Polyporus squamosus*. WELCH (1970) also gives data on imagines found on this bracket fungus in England.

The number of larval instars of *Ptiliidae* is unknown (DYBAS 1991); TAYLOR (1975) gives three instars for *Ptinella*. Development from egg to imago lasts 32-45 days in 3 species of *Ptinella* (TAYLOR 1975). The pupal stage has been described only for *A. fascicularis* (HINTON 1941). Rearing of *N. pilosellum* by BURAKOWSKI from egg to larva lasted 24 days but the number of stages has not been observed.

MATERIALS AND METHODS

All the specimens studied were loaned from the collection of the Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw. Larvae were reared by Dr. BURAKOWSKI from imagines collected near Warsaw (Warszawa-Marysinek, 1 VII 1979) from a fallen trunk of *Ulmus campestris* L. em. HUDS., in soft and moist fruiting bodies of *Polyporus squamosus*. First larvae and 1 pupa were observed on 24 VII 1979 on the underside of the polyporus. Some of them were hidden in the tubes of the fungus. One larva was reared to the pupal stage in a glass tube. Numerous imagines were observed in July and August and eclosion was finished on 27 IX 1979 when no further adults were observed. Fourteen larvae and two pupae were obtained. Larvae are diverse in size but the number of instars is unclear. I measured and observed bigger of them, which seem to the last instar. Their length ranges between 1.39 and 1.98 mm. They do not differ in chaetotaxy. These specimens may represent one or two different larval instars.

Preparations: 6 specimens were examined. The larvae were stored and boiled in 70% ethanol, cleared in 10% KOH, passed through chloralphenol and mounted in Swan's medium. The larvae were studied at magnification up to 840x using phase contrast "Jeneval" miroscope and some details up to 1000x under oil immersion using "Nikon" microscope with phase contrast. All the illustrations were drawn using drawing attachement.

Measurements: body length (apex of head without labrum to base of urogomphi), width of head (at widest point), length of head (without labrum).

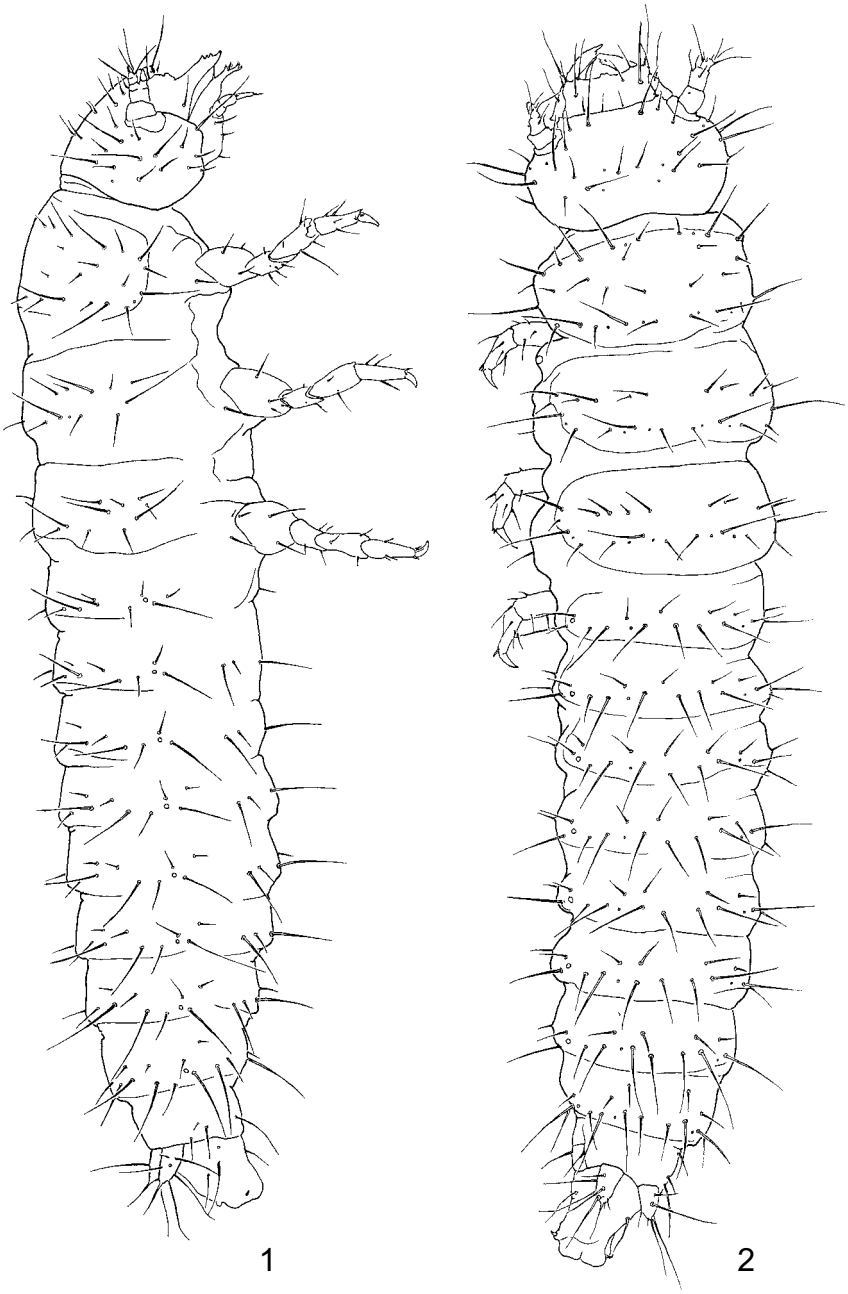
Nossidium pilosellum (MARSHAM, 1802)

DESCRIPTION OF LARVA

Body (figs 1-2): Tergal and sternal sclerities not defined; setae simple; length: 1.39-1.98 mm; elongate, subparallel, colour white, head with mouthparts yellowish-brown; all setae simple (slender and pointed at apex); integument without microsculpture (at magnification up to 1000x very sparse teeth on sclerities); spiracles annular.

Head (figs 3-5): directed downward, yellowish, more sclerotized than the rest of body, epicranial suture and stem absent; ocelli absent; head width: 0.31-0.49 mm; head length: 0.175-0.2 mm; chaetotaxy: 3 pairs of campaniform sensillae, 4 pairs of minute setae posteriorly, 9 pairs of anterior setae and 2 pairs of lateral ones, 8 pairs of ventral setae, 1 pair of ventrolateral campaniform sensilla, microsculpture very delicate (fig. 6).

Antenna (figs 12-13): 3-segmented, the first segment with 4 campaniform sensillae around apex, the 2nd segment: with 2 dorsal and 1 ventral setae, large, bulbous sensory appendage (sa) longer than the second segment, 2 accessory sensory appendages (IIs1, IIs 2) or solenidia (ASHE and WATROUS, 1984); the 3rd

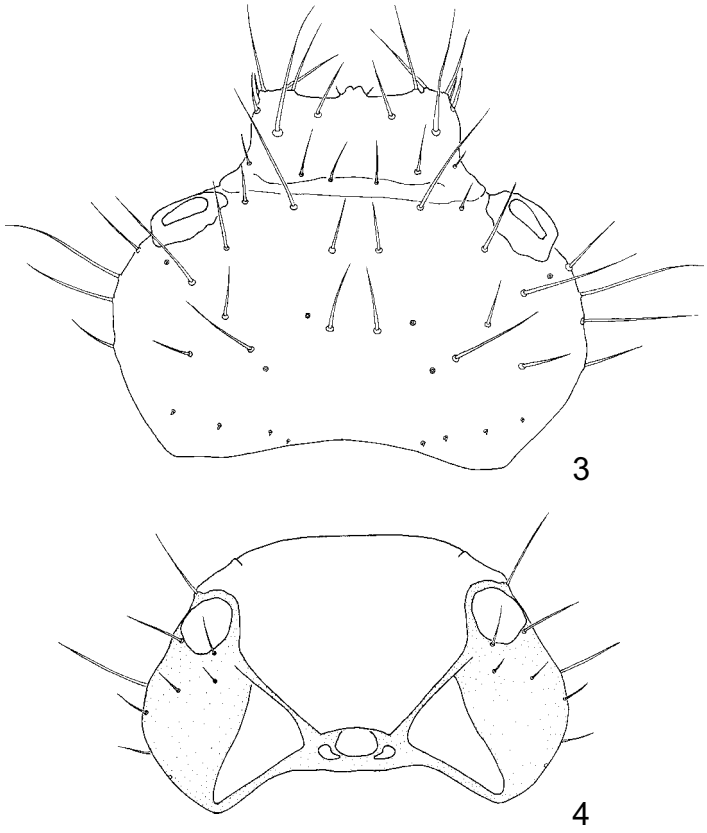


1-2. *Nossidium pilosellum*, mature larva: 1 – lateral view; 2 – dorsal view

with 3 long setae, 1 small subapical seta (or solenidium - see ASHE and WATROUS 1984) and 5 apical processes: 3 of them long, accicuate, 2 of them smaller, bluntly ended (solenidia).

Labrum (figs 10-11): Transverse, about twice as broad as long; separated by a very fine suture (difficult to define); anterior margin with 5 pairs of setae and 1 pair of small spines near a bilobed projection in the midlle of a margin , 10 setae on dorsal side, ventral side: 3-4 campaniform sensilla subapically and a pair of sensilla above; groups of spinules and microtrichiae.

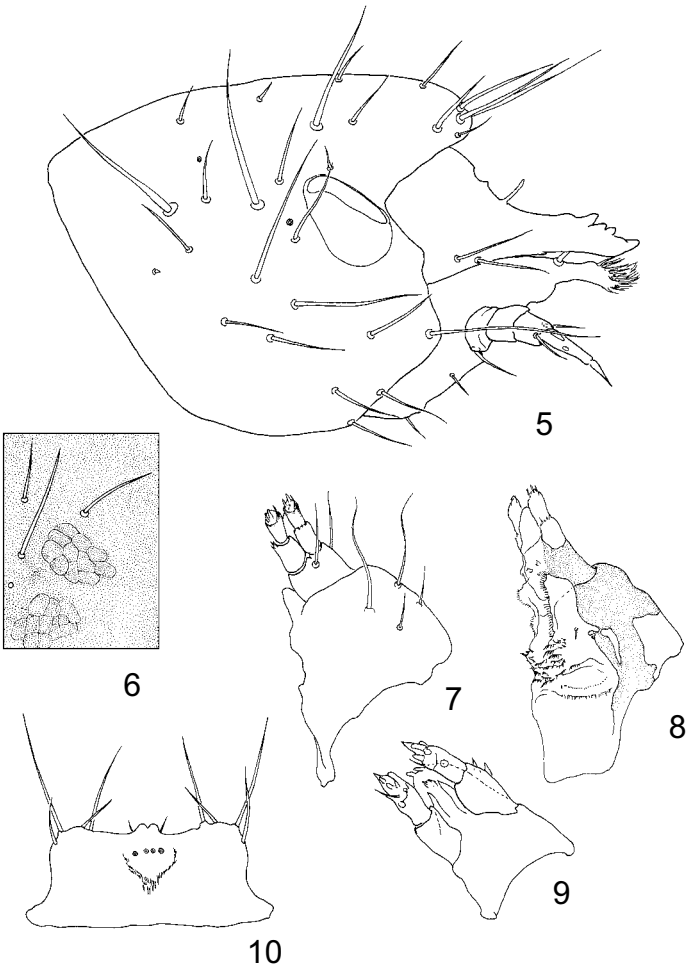
Mandibles (figs 21-22): Symmetrical, apical part with 4 teeth, prostheca articulated, long, pointed, 3 premolar teeth and small brush of spinules above; mola more sclerotized than the remainder of mandible, ventral molar area with 8 transverse rows of close, rasp-like denticles and irregular bigger teeth ventro-



3-4. *Nossidium pilosellum*, head: 3 – dorsal view; 4 – ventral view

laterally; dorsal side with 11 rows of teeth : 5 of them are of different size (minute and bigger rounded tubercles), 6 of them with minute teeth, length of rows also variable; lateral area with rows of microtrichiae; 2 setae ventro-laterally.

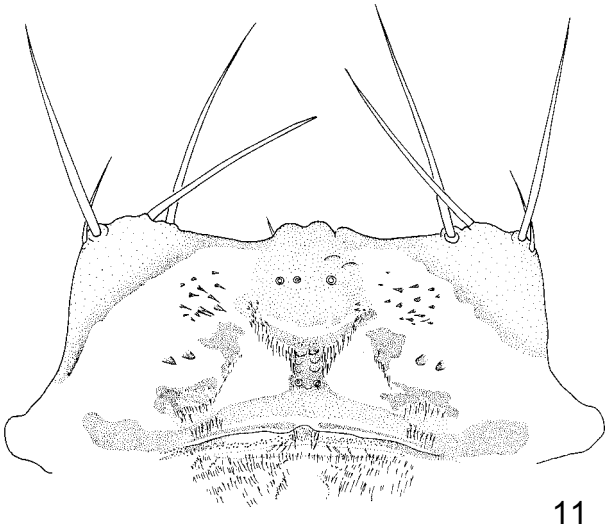
Maxillaae (figs 14-20): Stipes with 5 setae and 1 campaniform sensillum, mala divided: Galea bearing a fringe of hair-like processes, lacinia with 10-11 apical and subapical, stout, blunt spines and about 5 laminae, apex of lacinia bilobed; 1 big, subapical seta; maxillary palp four-segmented; segment 1 with 2 campaniform sensilla and a few cuticule teeth; the second segment with 2 setae, 1

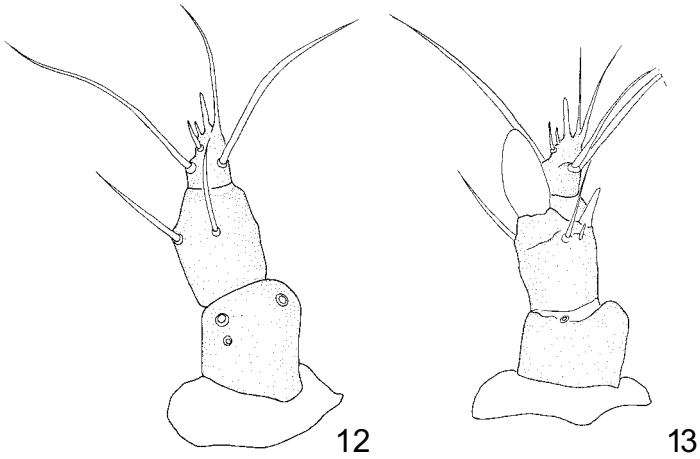


5-10. *Nossidium pilosellum*: 5 – head, lateral view; 6 – head, mirosculpture of dorsal side; 7 – labium, dorsal side; 8, 9 – labium, ventral side; 10 – labrum, ventral side

campaniform sensillum and cuticule teeth; the third segment with digitiform sensillum (CROWSON 1981) and 3 pores. The third segment is furnished with an additional article called a terminal tuft by DYBAS (1976) which by PAULIAN (1941)was regarded as the fourth segment, with several sensillae on it.

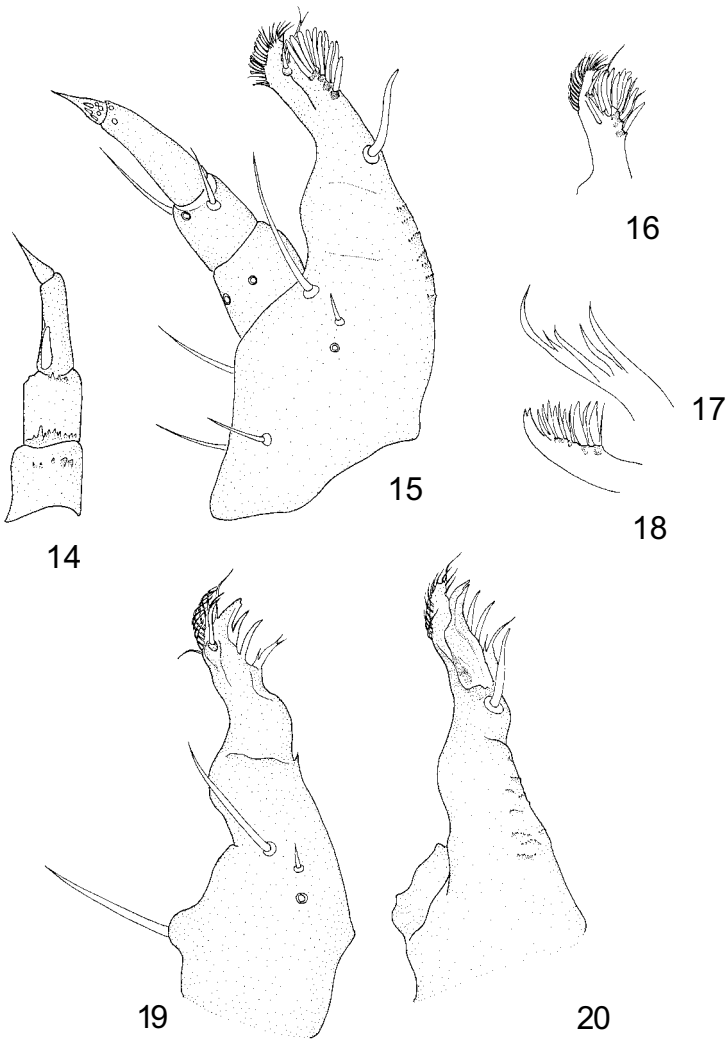
Labium (figs 7-9): Palpi 2- segmented with a group of various sensilla on the apical segment; prementum with a pair of setae, mentum and submentum with 2 pairs of setae.





11-13. *Nossidium pilosellum*, 11 – labrum, ventral side; 12 – right antenna, dorsal view; 13 – right antenna, ventral view

Leg (fig. 28): 5-segmented, chaetoataxy similar in all legs, setae marked with broken circle present or absent, no rule connected with the number (fore, mid or hind) (I cannot work this bit out!) of leg, generally similar to the leg of *N. americanum*, but the lack of detailed description of the legs of ptiliid larvae of other genera makes comparison impossible, tibia with accicuate process near two short, stout apical setae.



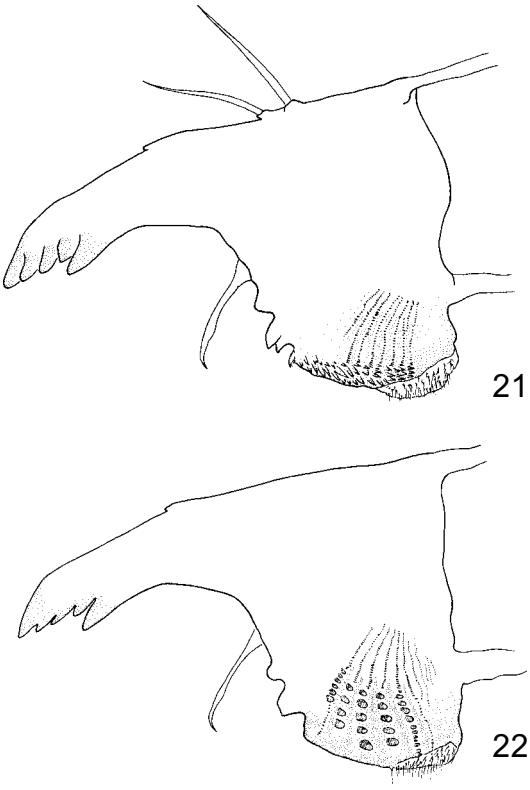
14-20. *Nossidium pilosellum*, 14 – maxillary palp, ventral side; 15 – left maxilla, dorsal side; 16-20 – maxilla, details of apex of stipes and galea

Pronotum (fig. 23): Transverse; setae: 10 anterior, 4 lateral, 10 in the middle, 10 posterior; 4 pairs of campaniform sensillae.

Mesonotum (fig. 24): Transverse; setae: 10 anterior and 4 minute setae above, 4 lateral, 8 posterior; 3 pairs of campaniform sensillae.

Metanotum (fig. 25): Transverse; setae: 4 anterior, 6 minute setae above, 6 lateral, 8 posterior; 3 pairs of campaniform sensillae.

Abdominal segments (figs 26-27): Transverse, segments I-VIII with the same pattern of setae and spiracles present (smaller than mesothoracic ones). Chaetotaxy: 8 posterior and 4 lateral setae, 1 pair of campaniform sensilla, 6 setae in the middle of segment and 3 pairs of minute setae above; segments IX with urogomphi and 3 pairs of lateral setae; sternites of abdominal segments I-VIII with 5 pairs of setae posteriorly and 2 pairs smaller above; segment X cylindrical with 2 pairs of setae dorso-laterally and 1 pair on ventrally, 1 pair of campaniform sensilla; membraneous anal vesicle with two, moderately sclerotized, curved, short hooks.



21-22. *Nossidium pilosellum*, right mandible: 21 – dorsal side; 22 – ventral side

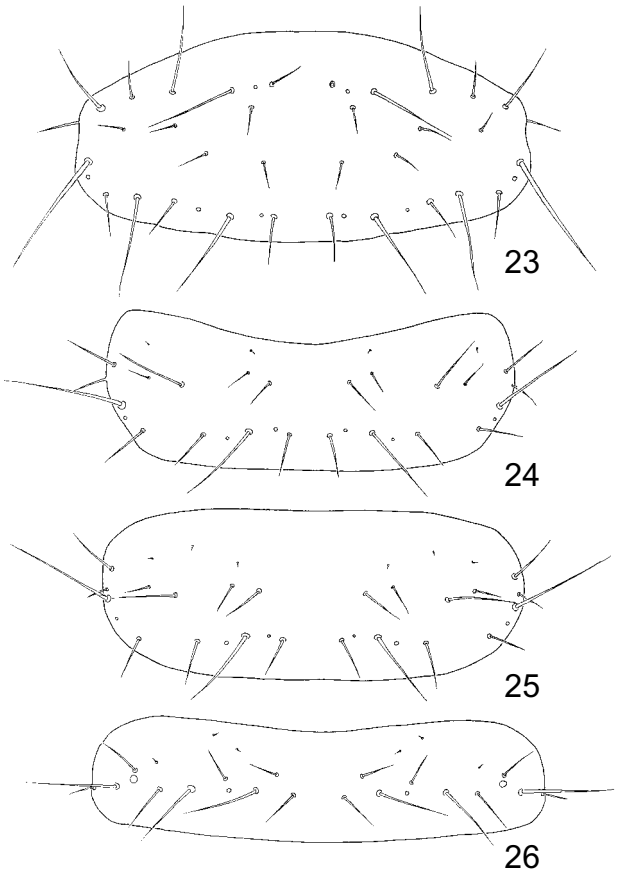
Urogomphi (fig. 29): Articulated, 1-segmented with 4 long and 2 shorter (varying, longer or shorter) setae, 1 campaniform sensillum and 1 apical seta.

CONCLUSIONS

Description of the larva of *N. pilosellum* is given and comparrisons with the Nearctic species *N. americanum* (DYBAS 1976) are made. The larvae of these two species appear to be quite similar, but differences noted include:

Nossidium pilosellum

1) 1 additional large seta on dorsal side of head, near antennae.
2) 4 pairs of minute posterior setae on dorsal side of head.



23-26. *Nossidium pilosellum*, 23 – pronotum; 24 – mesonotum; 25 – metanotum; 26 – abdominal segment I

3) 2 additional pairs of campaniform sensilla on head, similar to *Nossidium* (species indet.) described by DYBAS (1976).

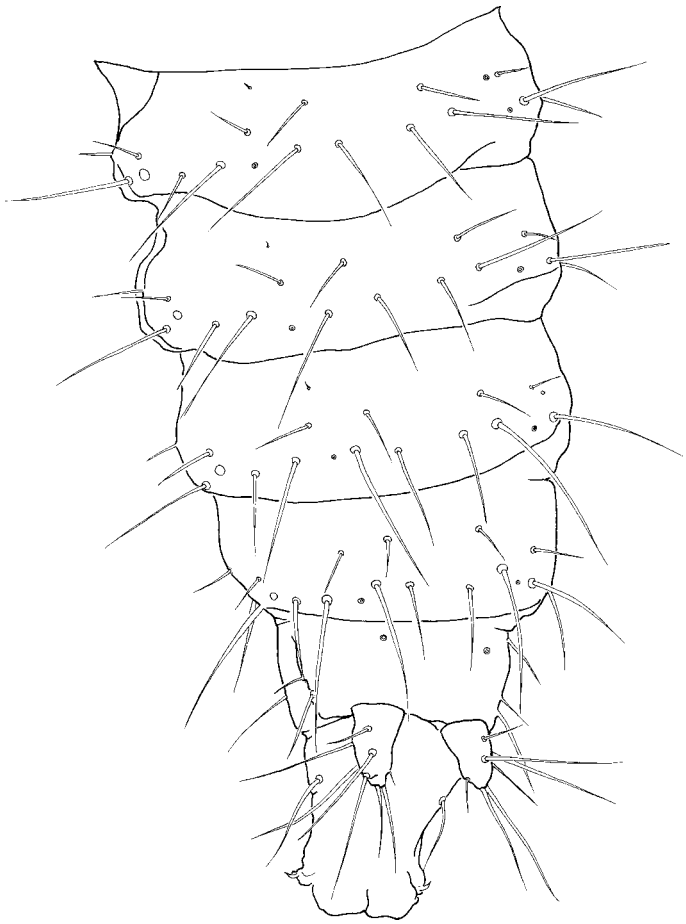
4) lateral and vetral setae of head difficult to compare.

5) lack of small setae on dorsal side of labrum, below bilobed projection.

6) 3 pairs of small setae on the margin of labrum and head (in *N. americanum* these setae are on head).

7) additional lateral seta on margin of labrum.

8) antenna: 2nd segment with 1 additional small sensory appendage, 3rd antennomere with 3 acciculate processes (1 in *N. americanum*), 2 bluntly ended solenidiae (the same in *N. americanum*) and 1 subapical seta in the place of process of *N. americanum*.



27. *Nossidium pilosellum*, abdomen, dorsal view

9) maxillae, mandibles, urogomphi very similar to *N. americanum*.

10) 3 pairs of small setae on dorsal side of tergum of thorax and abdomen; 2 pairs of campaniform sensilla on thorax;1 pair of additional campaniform sensilla on abdominal segment 1, which are difficult to see.

11) legs are not compared, figures in DYBAS' paper (1976) show only one side of leg, and different legs for various genera; generally leg similar to *N. americanum*, 1 additional or overlooked seta or spine at the apex of tibia.

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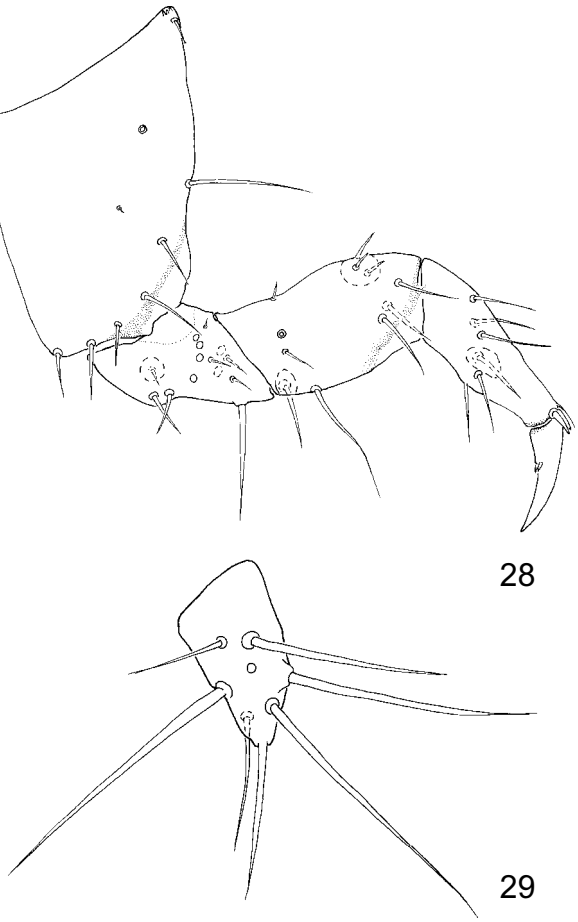

28-29. *Nossidium pilosellum*, 28 – third leg, ventral view; 29 – right urogomphus, dorsal view

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