A Monograph of the *Nothridae* and *Camisiidae* of Poland (*Acari*: *Oribatida*: *Crotonioidea*)

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ABSTRACT. The oribatid families *Nothridae* and *Camisiidae* are represented in Poland by three genera (*Nothrus*, *Camisia* and *Heminothrus*) and twenty species. Morphological descriptions of all species are presented taking into account variability of certain taxonomically important structures. Analysis of the obtained results permitted explanation of the status of those species which have been problematic from the point of view of systematics, i.e. *Camisia horrida* (HERMANN, 1804), *Heminothrus capillatus* (BERLESE, 1914). *Camisia invenusta* (MICHAEL, 1888) and *C. lapponica* (TRÄGÅRDH, 1910) sensu COLLOFF 1993 are new to the Polish fauna. The following new synonymies are proposed: *Camisia borealis* (THORELL, 1872) = *C. horrida* (HERMANN, 1804), *Heminothrus septentrionalis* (SELLNICK, 1944) = *Platynothrus maior* WILLMANN, 1956 = *H. capillatus* (BERLESE, 1914), *H. abchasicus* TARBA, 1990 = *H. peltifer* (C.L. KOCH, 1839). Species identification keys are provided. Setation of all legs was studied in detail. The *Nothridae* and *Camisiidae* in Poland are most abundant in marshy and alder forests while they are least numerous on the meadows. Mountain forests and dwarf pine zone are the richest in species. The values of the constancy of occurrence and dominance determined for particular habitats permitted an analysis of the fidelity of species. Most nothrid and camisiid species are found in the whole country; exceptions are *Camisia invenusta*, *C. lapponica*, *C. solhoeyi*, *C. tatrica*, *Heminothrus capillatus* and *H. humicolus* whose occurrence is limited to mountainous regions of S. Poland.

Key words: monograph, morphology, ecology, Poland, *Nothridae*, *Camisiidae*, *Acari*, *Oribatida*.

CONTENTS

INTRODUCTION

The *Nothridae* BERLESE, 1896 and *Camisiidae* OUDEMANS, 1900 are two of the seven families of moss mites (*Oribatida*) forming a relatively well distinguished unit. This group was singled out by GRANDJEAN (1969), as one of the main six taxonomic units of the order, under the name *Nothroidea* sensu GRANDJEAN 1954 = *Desmonomata*[1] WOOLLEY, 1973 (syn. *Holosomata* sensu BALOGH & MAHUNKA, 1983).

Apart from the two families just named, the superfamily *Crotonioidea* THORELL, 1876 (= *Nothroidea* BERLESE, 1896) comprises: *Crotoniidae* (WALLWORK, 1963), *Trhypochthoniidae*[2] WILLMANN, 1931 and *Malaconothridae* BERLESE, 1916. *Nanhermanniidae* SELLNICK, 1928 and *Hermanniidae* SELLNICK, 1928 are usually classified in separate superfamilies (*Nanhermannioidea* SELLNICK, 1928 and *Hermannioidea* SELLNICK, 1928, respectively).

Desmonomata comprise over 400 species of 32 genera. Except the Antarctic they inhabit all continents. A number of species of this group are characterized by very wide, even cosmopolitan type of distribution. They are found mostly in litter and the surface layer of soil, although some species live on trees, or lichen-covered rocks. Few species are typically aquatic, found in springs and on plants submerged in freshwater. Like the majority of moss mites, *Desmonomata* are mainly saprophagous. Because of their considerable abundance, reaching several thousand individuals per m^2, their role in breaking up and partial processing of organic matter is essential. Cases of phytophagy (algae, lichens) and parasitism on freshwater fish (the latter is quite rare for moss mites) were also observed (FAIN & LAMBRECHTS 1987). Certain species are intermediate hosts of cestoids of the *Anoplocephalata* group which are parasites of sheep, goat and cattle.

Desmonomata are a very old group. Their representatives were found in the sedimentary rocks from the Jurassic and Cretaceous (KRIVOLUCKIJ & DRUK 1986). They exemplify a number of interesting evolutionary adaptations showing progressive characters (e.g. neotrichy of legs) and some regressive ones (reduction of trichobothria, type of chaetotaxy of pedipalps) with respect to other moss mites (TRAVÉ & OLSZANOWSKI 1991).

The *Nothridae* and *Camisiidae*[3] are the most abundant in our climatic zone - a group of the so-called lower moss mites. Their abundance, relatively large size and wide distribution made them the subject of interest of many authors (SELLNICK & FORSSLUND 1955, KARPPINEN 1955, COLLOFF 1993). Despite the considerable interest they enjoyed, certain, even commonly found species, cause taxonomic problems

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[1] To standarize the nomenclature WOOLLEY (1973) changed the name used by GRANDJEAN (which is also the name of the superfamily) to *Desmonomata*.

[2] According to KNÜLLE (1957) the species of *Trhypochthoniellus* should be distinguished as a separate family - *Trhypochthonielliidae*.

[3] Since the species of the two families show a number of similarities in their morphology, habitat demands and biology, until recently they have been classified in one family (SELLNICK 1929, WOOLLEY 1973). In this paper, in the part devoted to ecology, they are treated as one unit.

(TRAVÉ & OLSZANOWSKI 1988) because of high morphological variation following from the thelytokous parthenogenesis, common in both families (PALMER & NORTON 1990). The available descriptions and figures of the species are in many cases innacurate and, moreover, certain innaccuracies and errors have been repeated for many years and can be found in currently used comprehensive works and keys devoted to moss mites. These taxonomic errors are reflected in papers on biology or ecology which makes it difficult to compare the obtained results. These problems have prompted me to study species of the *Nothridae* and *Camisiidae* which have been so far found in Poland, on the basis of rich, representative material of soil samples from a large variety of habitats.

MATERIALS AND METHODS

This paper is based on the material collected partly by the author and partly taken from the collection of the Department of Animal Morphology, A. Mickiewicz University, Poznań, and from Dr. J. BŁOSZYK's collection (Department of Animal Taxonomy and Ecology, A. Mickiewicz University, Poznań). The material included 1212 qualitative samples from the area of the whole Poland (Fig. 106) and 2130 quantitative samples collected in two chosen reservations from the Great Poland region; the total number of samples is 3342.

The qualitative samples were collected by many persons mainly in the years 1968-1992 (in different seasons) in three types of habitats: open habitats, forests (and shrubs) and merocenoses[4]. Most of them were samples of sifted litter and soil. The information included in the description of the samples is not always comprehensive as far as the phytosociological characteristics of localities is concerned. Therefore, the applied division of habitats into types cannot be based on the specific vegetation community as the basic syntaxon used in classification of phytocenoses. For the same reason I have introduced a division of forest habitats employing the principles of typology based on the concept of biotopic types of forests (MROCZKIEWICZ et al. 1964). The division I assumed is as follows:

Lowland regions:
- coniferous forests (dry, fresh, moist, bog),
- mixed forests (fresh, moist, upland),
- deciduous forests (fresh, moist, upland),
- marshy forests and alder forests.

Mountainous regions:
- coniferous forests (alpine),
- coniferous and deciduous forests (mountain, mixed mountain).

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[4] Regarding a specific character of merocenoses being elements of different types of habitats, I treated them as a separate entity.

The basic data on the number of collected samples and specimens of the studied oribatid species found in different habitats are given in Table 1. Despite the differences in the sample size, they could be used to draw conclusions concerning ecological questions because of their large number representing the majority of habitats. In 876 effective samples (72.3%) I found 14427 adults and 5797 juvenile stages, making 20224 specimens altogether. In ecological considerations only adults have been taken into account. On an average, the number of sexually mature forms in one sample was 11.2.

The material was analysed considering the following indices:

- constancy of occurence - C (percentage of samples in which the species occurs),
- dominance - D (ratio of the number of individuals of a given species to the number of all the individuals of the systematic group under study, in percent).

As 100% I assumed the total number of qualitative samples and specimens collected in one habitat, respectively.

The degree to which the species are bound to the habitat is known as "fidelity". On the basis of detailed analysis of constancy of occurrence and dominance, I adopted 5 classes of fidelity that were distinguished by Peus (PETRUSEWICZ 1938, RAJSKI 1961, KASPRZAK & NIEDBAŁA 1981). In the modified form, the classes are as follows:

Characteristic species:

- exclusive species - occur only in a given habitat,
- selective species - those which attain the highest value of C and/or D indices within a given habitat, though they can also occur, even regularly, in other habitats.

Accompanying species:

- indifferent species - without any clear predisposition towards any particular habitat,
- attending species - in a given habitat they can have a high C and/or D indices, but they are selective species in another habitat.

Accidental species: species encountered in a given habitat only by accident.

The samples for quantitative studies[5] were collected from April 1981 to March 1983, twice a month from April to July and from September to November; once a month in August and from December to March. Altogether these samples contained 4515 adult specimens and 5224 juveniles of *Nothridae* and *Camisiidae*, making a total of 9739 specimens from 1430 effective samples (67.1%).

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[5] Detailed results of these studies will be the subject of a separate paper.

The results presented in this paper are based on analysis of 29963 specimens representing 20 species of the *Nothridae* and *Camisiidae*, including 18942 adults and 11021 juveniles.

The mites were extracted in a Tullgren apparatus and preserved in 75% ethanol. Prior to determination the specimens were kept in lactic acid. The size of the body

Table 1. Number of samples of *Nothridae* and *Camisiidae* found in different habitats.

Habitats	Number of samples	Number of effective samples	%	Number of adult speci-mens	Averave per a sample	Number of juvenile speci-mens	Total number of speci-mens	Number of species
1. Xerothermic grasses	48	22	48.5	424	8.8	102	526	9
2. Grasses on decalcified basement soil	36	29	80.1	402	11.2	107	509	13
3. Grasses on limestone-rich basement soil	47	34	72.3	228	4.6	138	366	12
4. Meadows	44	23	52.3	148	3.4	102	250	7
5. Peat-bogs	60	47	78.3	1009	16.8	374	1383	12
6. Other unforested habitats	15	8	53.3	44	2.9	20	64	2
7. Lowland coniferous forests	124	104	83.9	1807	14.6	909	2716	13
8. Mixed coniferous and deciduous forests (lowland and upland)	144	122	84.7	2593	18.0	1037	3630	12
9. Deciduous forests (lowland and upland)	228	184	80.7	2975	13.0	1018	3993	13
10. Marshy forests and alder forests	61	50	82.0	1238	20.3	370	1608	10
11. Alpine coniferous forests	32	27	84.4	456	14.3	346	802	10
12. Mountain coniferous and deciduous forests	74	63	85.1	1154	15.6	526	1680	15
13. Dwarf pine zone	29	28	96.6	393	13.6	195	588	14
14. Brushwoods	29	26	89.7	530	18.3	207	737	11
15. Parks	37	29	78.4	596	16.1	140	736	10
16. Ant-hills	9	5	55.6	65	7.2	17	82	3
17. Mole nests	26	11	42.3	9	0.3	35	44	4
18. Other mammal nests	7	5	71.4	26	3.7	12	38	7
19. Bird nests	19	15	78.9	45	2.4	46	91	6
20. Mouldered trunks	79	26	32.9	206	2.6	60	266	8
21. Hollows in tree trunks	40	11	27.5	17	0.4	8	25	6
22. Other merocenoses	24	7	29.2	62	2.6	28	90	5
TOTAL	**1212**	**876**	**72.3**	**14427**	**x = 11.2**	**5797**	**20224**	**x = 8.6**

was measured under a microscope with a calibrated eyepiece. In the case of less numerous species all individuals were measured, whereas in the case of numerous species the measurements were taken from 30 to 360 specimens.

LIST OF LOCALITIES

Distribution of all the localities studied in Poland is shown on Map 1. The list of localities where representatives of the *Nothridae* and *Camisiidae* were found, together with the specification of the species, is given below. The sample identifications are given in square brackets. A detailed description of all samples and localities is included in a separate paper (BŁOSZYK & OLSZANOWSKI, in prep.). The abbreviation "juv." denotes juvenile stages, "res." - reserve, "env." - environs.

Province of Białystok: Bielki (0546/11: *H. peltifer*, juv.); Korycin (0981/19: *H. thori*).

Province of Bielsko-Biała: Porąbka (0076/1: *H. peltifer*, juv.); env. of Gorzeń Górny (0143/3: *H. peltifer*, juv.); env. of Sucha Beskidzka (0173/4: *N. silvestris*); Magurka Mt. (0205/5: *N. silvestris*, *C. biurus*, *H. peltifer*, juv.); Grodziec (0206/6: *C. segnis*); env. of Targoszów (0252/8: *H. peltifer*, juv.); res. "Madohora" near Żywiec (0254/9: *C. biurus*, juv.); Jaworzyna Mt. (0263/11: juv.); Wielka Góra Mt. (0283/13: *N. silvestris*, *H. peltifer*, juv.); env. of Wadowice (0294/14: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Jałowiec Mt. (0314/16: *N. silvestris*); env. of Świnna Poręba (0319/15: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); env. of Czernichów (0326/17: *N. palustris*, *H. peltifer*, juv.); Babia Góra Mt. (0466/19: *N. borussicus*, *C. biurus*, *H. longisetosus*, juv.), (0472/11: *H. peltifer*), (0473/12: *H. peltifer*), (0475/14: *C. biurus*, *C. horrida*, *C. solhoeyi*, *H. peltifer*, juv.), (0484/15: *H. peltifer*), (0517/18: *H. peltifer*, juv.), (0640/20: *H. capillatus*, *H. peltifer*, juv.), (JB-143: *N. borussicus*), (JB-1160: *H. peltifer*, juv.), (ZO-201: *N. borussicus*, juv.), (ZO-203: *C. segnis*, *H. peltifer*, juv.), (ZO-207: *H. capillatus*), (ZO-208: *N. borussicus*, *H. longisetosus*, juv.), (ZO-209: *H. capillatus*, *H. peltifer*, juv.), (ZO-210: *H. capillatus*, *H. peltifer*, juv.).

Province of Bydgoszcz: env. of Mogilno (0565/5: *N. anauniensis*); env. of Żnin (JB-115: *N. silvestris*, *H. peltifer*, juv.); Bory Tucholskie (JB-614, 616, 617, 618: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); Kruszyn (ZO-123: *H. peltifer*); Przymuszewo (ZO-127: *N. silvestris*, *H. peltifer*); res. "Wolność" (ZO-128: *N. silvestris*, juv.); Męcikał near Chojnice (ZO-138: *N. silvestris*, *C. biurus*, *C. segnis*, juv.), (ZO-140: *H. peltifer*, juv.); Więcbork (ZO-141: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Biskupin (ZO-147: *N. anauniensis*, *H. thori*, juv.).

Province of Chełm: Wola Wereszczyńska near Włodawa (0334/1: *H. peltifer*, *H. thori*); res. "Stawska Góra" (0523/1: juv.); res. "Durne Bagno" (0658/3: *C. horrida*); env. of Wojsławice (0821/11: *N. borussicus*, *N. palustris*, *N. silvestris*, juv.); res. "Bachus" (1099/12: *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (1161/13: *N. silvestris*, *H. peltifer*, juv.); env. of Sosnowica (JB-212: *C. spinifer*, *H. peltifer*, juv.).

Province of Ciechanów: Szyszki (0984/9: *H. peltifer. H. thori*, juv.).

Province of Częstochowa: Parzymiechy near Kłobuck (0228/3: *N. anauniensis*, *N. palustris*, *C. horrida*, *H. peltifer*, *H. targionii*, juv.); env. of Pajęczno (0313/4: *N. palustris*, *H. peltifer*); env. of Myszków (0469/5: juv.); Złoty Potok (0676/9: juv.); Olsztyn near Częstochowa (0743/10: *N. anauniensis*, *N. borussicus*, *H. targionii*, juv.); res. "Zielona Góra" (0917/15: *C. biverrucata*, juv.), (0919/16: *N. silvestris*, *H. targionii*, juv.), (1000/18: *N. palustris*, *H. targionii*, juv.); res. "Parkowe" (JB-206: *N. silvestris*, *H. peltifer*, juv.), (JB-207: juv.).

Province of Elbląg: res. "Dęby w Krukach Pasłęckich" (0011/1: *N. silvestris*, juv.); Kwidzyń (0016/3: *N. palustris*, *N. silvestris*, *H. targionii*, juv.); res. "Kadyński Las" (0237/4: *N. silvestris*, juv.); res. "Biała Góra" (0513/6: *C. biurus*, *C. spinifer*, juv.); Rogajny near Pasłęk (0607/5: *H. peltifer*, juv.), (0622/8: *N. anauniensis*, *N. palustris*, *C. segnis*, *H. peltifer*. *H. targionii*, juv.); Gostyczyń near Susz (0623/9: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Nowa Wioska near Kwidzyń (0883/10: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); env. of Orneta (0892/11: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Frombork (1048/13: *N. anauniensis*, *N. palustris*, *H. peltifer*, juv.); Mierzeja Wiślana (JB-172: *N. palustris*), (JB-198: *C. segnis*).

Province of Gdańsk: Sulęczyno near Kartuzy (0461/8: *N. palustris*, *N. pratensis*, *H. peltifer*, *H. thori*); res. "Twardy Dół" (0703/14: *H. peltifer*, juv.); Oliwa (0817/21: *H. peltifer*); env. of Chałupy (JB-138: *N. borussicus*, *H. peltifer*, juv.), (JB-140: *H. peltifer*); Gdańsk-Stogi (ZO-194: *H. peltifer*, juv.); Wiele near Kościerzyna (ZO-228: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.).

Province of Gorzów Wlkp.: res. "Kolno Międzychodzkie" (0118/5: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Chycina near Międzyrzecz (0559/16: *N. palustris*, *N. silvestris*, *C. segnis*, *C. spinifer*, *H. peltifer*, *H. thori*, juv.), (ZO-274: *N. pratensis*, juv.); Międzychód (0971/15: *C. horrida*, juv.); env. of Myślibórz (JB-797: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); env. of Ściechów (RAF-208: *N. silvestris*, *H. peltifer*, juv.).

Province of Jelenia Góra: Chojnik (0533/11: *N. silvestris*, *H. peltifer*, juv.); env. of Opolno-Zdrój (0407/5: *N. borussicus*, *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); env. of Radomierzyce (0375/4: *N. palustris*, *H. peltifer*, juv.), (0418/8: *N. palustris*, *H. peltifer*, juv.); env. of Szklarska Poręba (0833/24: *N. silvestris*, *C. biurus*, *H. peltifer*, juv.); Góry Izerskie Mts. (0827/19: *N. silvestris*, *C. biurus*, *H. humicolus*, *H. peltifer*, juv.), (0828/20: *N. silvestris*, *C. biurus*, juv.), (0831/22: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. longisetosus*, juv.), (0843/32: *N. silvestris*, *C. biurus*, *H. peltifer*, juv.); Karkonosze Mts. (0036/1: *C. biurus*, *H. longisetosus*), (0038/3: *C. horrida*, juv.), (0467/10: *C. solhoeyi*, *H. capillatus*, juv.), (0823/17: *C. biurus*, *C. solhoeyi*, juv.), (0826/18: *C. solhoeyi*, *H. capillatus*, *H. humicolus*, juv.), (0829/21: *C. biurus*, *C. invenusta*, *C. spinifer*, juv.), (0832/23: *N. silvestris*, juv.), (0834/25: *C. horrida*), (0835/26: *C. solhoeyi*, *H. humicolus*, *H. peltifer*, juv.), (0836/27: *H. peltifer*, juv.), (0838/28: *C. solhoeyi*, *H. peltifer*, juv.), (0839/29: *C. horrida*, *C. invenusta*, juv.), (0840/30: *C. biurus*, juv.), (JB-756: *N. anauniensis*,

N. palustris, *H. peltifer*, *H. targionii*, juv.), (ZO-056: juv.), (ZO-057: *C. solhoeyi*, *H. peltifer*, juv.), (ZO-058: *H. peltifer*, juv.), (ZO-059: *H. peltifer*, *H. thori*, juv.), (ZO-116: *H. peltifer*, juv.), (ZO-117: *C. solhoeyi*, juv.), (ZO-118: *C. biurus*, *C. spinifer*), (ZO-119: *C. spinifer*, juv.), (ZO-151: *C. solhoeyi*, *H. capillatus*, juv.), (ZO-152: *C. solhoeyi*, *H. peltifer*, juv.), (ZO-153: *H. peltifer*, juv.), (ZO-211: *H. humicolus*, *H. peltifer*, juv.), (ZO-212: *N. silvestris*, *C. biurus*, *H. peltifer*, juv.), (ZO-213: *C. segnis*), (ZO-214: *H. humicolus*, juv.); Kliczków near Bolesławiec (JB-159: *N. palustris*, *H. targionii*, juv.); res. "Torfowisko pod Węglińcem" (0409/6: *N. silvestris*, juv.); Świeradów-Zdrój (0410/7: *N. palustris*, *H. targionii*, juv.), (0430/9: *N. silvestris*, *C. biurus*, juv.); Wleń (0536/12: *N. palustris*, *H. peltifer*, juv.), (0540/13: *N. palustris*, *H. peltifer*, *H. targionii*, juv.), (0561/14: *C. horrida*, juv.), (0641/16: *N. anauniensis*, *N. palustris*, *H. targionii*, juv.); Wojcieszów (JB-101, 102: *N. palustris*, juv.).

Province of Kalisz: Taczanów near Pleszew (0339/8: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); env. of Krotoszyn (0687/18: *N. silvestris*); Antonin (JB-095: *N. silvestris*, *C. spinifer*, juv.), (JB-854: *H. peltifer*, juv.), (ZO-176: *N. palustris*, *H. peltifer*, juv.); Brzeziny (ZO-015: *C. biurus*), (ZO-074: *N. silvestris*, *C. biurus*, *C. spinifer*), (ZO-075: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Chełmce near Kalisz (ZO-026: *H. thori*, juv.), (ZO-107: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); Czarny Las (JB-090: *H. peltifer*, juv.), (JB-092: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.); Dębnica (ZO-085: *N. silvestris*, *C. spinifer*, juv.), (JB-097: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Doruchów (ZO-088: *C. spinifer*, juv.); env. of Chynowa (ZO-084: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (ZO-113: *C. spinifer*, juv.); env. of Mikstat (ZO-114: *C. biurus*, juv.), (ZO-115: *C. biurus*, *C. spinifer*, juv.); env. of Wielowieś (ZO-121: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (ZO-122: *N. silvestris*, *C. spinifer*, juv.), (ZO-184: *N. silvestris*, *H. peltifer*, juv.), (ZO-185, 186: *N. silvestris*, *N. peltifer*, *C. biurus*, *C. spinifer*, juv.), (ZO-187: *H. peltifer*, juv.); Gołuchów (ZO-110, 111: *H. peltifer*, juv.), (ZO-149: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (ZO-150: *N. silvestris*, *H. peltifer*, juv.), (ZO-252: *H. peltifer*, juv.), (ZO-265: *N. palustris*, *C. spinifer*, *H. peltifer*, juv.), (ZO-099: *N. silvestris*, *C. biurus*, *C. segnis*, *C. spinifer*, juv.); Kalisz-Lis (ZO-002: *H. peltifer*), (ZO-003: *H. peltifer*), (ZO-004: *H. peltifer*, *H. thori*, juv.), (ZO-012: *H. peltifer*, *H. thori*, juv.); Kalisz-Piwonice (ZO-062: *H. peltifer*, juv.), (ZO-063: juv.); Kalisz-Szałe (ZO-010: *H. peltifer*, juv.); Ludwików near Antonin (JB-089: *N. silvestris*, juv.), (JB-091: *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (JB-093: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (JB-094: *N. silvestris*, *C. horrida*), (JB-096: *N. silvestris*, *H. peltifer*, juv.), (ZO-091: *C. biurus*), (ZO-142: *N. silvestris*, *C. biurus*, *C. spinifer*, juv.), (ZO-172: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (ZO-173, 174: *C. biurus*, *H. peltifer*, juv.), (ZO-175: *N. silvestris*, *C. biurus*, *H. peltifer*, juv.), (ZO-177: *N. silvestris*, *C. spinifer*, juv.); Odolanów-Górka (ZO-041: *H. thori*, juv.), (ZO-233: *H. peltifer*, juv.), (ZO-234: *C. biurus*, *H. peltifer*, juv.); res. "Niwa" (ZO-081, 082: *N. silvestris*, *H. peltifer*, juv.), (ZO-

083: *N. silvestris*, *H. peltifer*, juv.), (ZO-112: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); res. "Olbina" (ZO-021: *C. biurus*); Siemianice near Kępno (JB-154: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); env. of Wieruszów (JB-226: *C. segnis*), (JB-242: juv.), (JB-245: *N. palustris*), (JB-249: juv.), (JB-255: juv.); Golina near Jarocin (JB-442: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Szałe near Kalisz (ZO-179: juv.); Tromba near Ostrów Wlkp. (ZO-009: juv.); Wzgórza Ostrzeszowskie Hills (ZO-093: *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (ZO-095: *N. silvestris*, *C. segnis*, juv.), (ZO-096: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ZO-097: *C. spinifer*, *H. peltifer*, juv.), (ZO-101: *N. palustris*, *H. peltifer*), (ZO-102: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (ZO-103: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (ZO-104: *H. peltifer*, juv.), (ZO-105, 106: *H. peltifer*, juv.); Żydów near Kalisz (ZO-064: *H. peltifer*), (ZO-065: *C. biurus*, *C. horrida*, *C. spinifer*, juv.).

Province of Katowice: res. "Lipowiec" (0045/1: *H. peltifer*, juv.), (0077/2: *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (0123/3: juv.); Smoleń near Olkusz (0293/6: *H. targionii*, juv.), (1050/10: *N. anauniensis*, *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.); res. "Góra Chełm" (0373/11: *N. silvestris*, *H. targionii*, juv.); env. of Rodaka (1103/11: *H. targionii*).

Province of Kielce: Stopnica (0178/: *H. peltifer*); Przyjma (0204/4: *H. peltifer*, juv.); Klonów near Miechów (0479/11: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); res. "Dąbie" (0529/16: *N. anauniensis*, *N. borussicus*, *H. targionii*, juv.); Pasmo Jeleniowskie Hills (0596/7: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Bogucice near Pińczów (0636/31: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, *H. targionii*, juv.); Skorocice near Busko-Zdrój (0650/32: *N. anauniensis*, *N. palustris*, *H. peltifer*); Chęciny (ZO-245: *N. anauniensis*, juv.), (ZO-246: juv.); Góry Świętokrzyskie Mts. (0800/36: juv.), (0888/37: *H. peltifer*), (0927/43: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (JB-359: *N. silvestris*, juv.), (ZO-148: *N. silvestris*, *H. peltifer*, juv.), (ZO-244: *N. silvestris*, juv.), (ZO-247: *H. peltifer*, *H. thori*, juv.), (ZO-248: *N. silvestris*, *H. peltifer*, *H. thori*, juv.); Łagów (ZO-249: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Końskie (ZO-250: *N. silvestris*, *C. spinifer*, juv.).res. "Grabowiec near Pińczów" (JB-135: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); res. "Zamczysko" (0910/38: *N. silvestris*), (0914/39: *H. peltifer*); Krzyżanowice (0916/40: *N. anauniensis*). Province of Konin: Lubstów (0324/3: juv.); Bieniszew near Konin (0436/4: *H. peltifer*, juv.); Zagórów near Słupca (0600/1: *H. peltifer*); Stare Miasto near Konin (0926/7: *C. biurus*, *C. horrida*, juv.); res. "Mielno" (ZO-268: *N. borussicus*, *N. palustris*, *C. biurus*, *H. peltifer*, *H. targionii*, juv.).

Province of Koszalin: Podborsk near Białogard (0699/5: *N. pratensis*, *C. biurus*, juv.), (0753/10: *N. pratensis*, juv.); env. of Cieszyno (0752/9: *N. palustris*, *H. thori*); Chłopy near Mielno (ZO-076: *N. borussicus*, *N. palustris*, *C. biurus*, *H. peltifer*, juv.), (ZO-079: *C. spinifer*, *H. peltifer*, juv.).

Province of Kraków: Beskid Makowski (0175/5: *N. silvestris*), (0282/8: *N. silvestris*); Chrosna near Kraków (0684/31: *N. anauniensis*, juv.); Dubie near

Kraków (0686/32: *N. anauniensis*); Zalas near Krzeszowice (0734/33: *N. palustris*); Czerna near Krzeszowice (0671/29: *N. palustris*); Czesław near Raciechowice (0498/12: *N. palustris*, *H. peltifer*, juv.); Dolina Kluczwody near Kraków (0248/7: *N. anauniensis*, *N. palustris*, *N. silvestris*, juv.), (0309/8: *N. palustris*, *H. targionii*, juv.), (0310/9: *C. segnis*, *H. targionii*); Dolina Kobylańska near Kraków (0032/2: *N. anauniensis*), (0549/17: *H. targionii*); env. of Kraków (JB-314: *C. spinifer*); env. of Myślenice (0273/9: N *palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (0278/5: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.), (0613/21: *N. anauniensis*, *N. palustris*, *H. peltifer*, juv.), (1017/49: *N. palustris*, *N. silvestris*, *H. capillatus*, *H. peltifer*, juv.); env. of Zabierzów (0420/9: *N. palustris*, *N. silvestris*, *C. horrida*, *C. spinifer*, *H. peltifer*, juv.), (0421/10: *N. palustris*, *N. silvestris*, *C. segnis*, *H. peltifer*, *H. targionii*, juv.), (0813/40: *N. anauniensis*, *H. targionii*, juv.); Krzeszów near Kraków (0501/13: *N. palustris*, N, *silvestris*, juv.); Ojcowski National Park (0018/1: *N. anauniensis*, *N. borussicus*, *N. silvestris*, *C. spinifer*, *H. targionii*, juv.), (0548/16: *N. anauniensis*, *H. targionii*, juv.), (1003/41: *H. peltifer*, juv.), (1004/42: *N. anauniensis*, *N. borussicus*, *C. horrida*, *C. spinifer*, *H. peltifer*, *H. targionii*, juv.), (1005/43: *N. anauniensis*, *N. silvestris*), (1006/44: *N. silvestris*), (1007/45: *N. anauniensis*, *N. borussicus*, *H. targionii*, juv.), (1008/46: *N. palustris*, juv.), (1010/48: *N. anauniensis*, *N. palustris*, *C. spinifer*, *H. targionii*, juv.), (JB-329: *H. targionii*, juv.), (JB-330: *N. silvestris*, juv.); Poręba-Żegoty near Kraków (0302/7: *N. palustris*, juv.); res. "Dolina Mnikowska" (0034/3: *N. anauniensis*, *N. borussicus*, *C. spinifer*), (JB-155: *N. palustris*, *H. targionii*, juv.); res. "Zamczysko nad Rabą" (0168/6: *H. peltifer*); res. "Skałki Przegorzalskie" (1254/58: juv.); Tyniec near Kraków (0808/39: *N. anauniensis*, *H. targionii*, juv.), (ZO-240: *C. horrida*, juv.).

Province of Krosno: Bieszczady Mts. (0010/3: *C. invenusta*), (0081/9: *N. palustris*, *H. peltifer*, juv.), (0167/12: *H. peltifer*, juv.), (0351/22: *N. silvestris*, *H. peltifer*, juv.), (0424/26: *N. palustris*, *C. segnis*, *H. peltifer*, *H. targionii*), (0427/27: *H. peltifer*, juv.), (0714/37: *N. palustris*, *H. peltifer*, juv.), (0730/42: juv.), (0940/42: juv.), (0945/46: *N. anauniensis*, *H. peltifer*, *H. targionii*, juv.), (JB-149: *N. palustris*, *N. silvestris*, *C. solhoeyi*, *H. peltifer*, *H. targionii*, juv.), (JB-782: *H. peltifer*, juv.); env of Dukla (JB-710: *N. palustris*, H *targionii*, juv.), (JB-712: *H. peltifer*, *H. targionii*, juv.), (0033/6: *N. borussicus*, *N. palustris*, *H. capillatus*, *H. peltifer*, juv.), (127/11: *N. palustris*, *N. silvestris*, *H. capillatus*, *H. peltifer*), (JB-205: *N. palustris*, *H. peltifer*, juv.); env. of Jasło (JB-728: *N. palustris*, *H. peltifer*, juv.), (JB-852: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); env. of Jaśliska (JB-204: *C. spinifer*, juv.), (JB-211: *N. palustris*, *C. biurus*, *H. peltifer*, juv.), (JB-729: *H. peltifer*); env. of Karszyn (0171/13: *N. anauniensis*, *H. peltifer*, juv.); env. of Lesko (0301/20: *N. silvestris*, *H. peltifer*, juv.); env. of Sanok (0412/24: *N. anauniensis*, *H. targionii*, juv.), (0413/25: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Kąty near Nowy Żmigród (0709/36: *N. palustris*, *H. peltifer*, juv.); Ustrzyki Górne (0052/7: juv.); res. "Piotruś" (0053/8: *N. silvestris*, *H. peltifer*); Żydowskie (0716/37: *N. silvestris*, *H. peltifer*, juv.).

Province of Legnica: Jurcz near Legnica (0155/1: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.); Kochlice near Legnica (0289/2: *N. palustris*, *H. peltifer*, *H. targionii*, juv.); env. of Lubiatów (0405/3: *N. silvestris*, *H. peltifer*, juv.); Buczyna near Głogów (0408/4: *H. peltifer*); res. "Ostrzyca Proboszczowicka" (0890/6: *N. palustris*, *H. peltifer*, *H. targionii*, juv.), (0891/7: juv.).

Province of Leszno: res. "Dębno" (0187/1: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (0877/14: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Gogolewo near Krobia (0343/2: *N. anauniensis*, *N. borussicus*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Racot (0482/4: *N. anauniensis*, *H. targionii*, juv.); Kopaszewo near Kościan (0493/5: *N. palustris*, *H. targionii*, *H. thori*, juv.), (0555/7: *N. anauniensis*, *N. borussicus*, *N. palustris*, *H. targionii*, juv.); Osieczna (0617/9: juv.); Turew (0665/11: *H. targionii*, juv.); env. of Krobia (0985/16: juv.); Włoszakowice (JB-163: *N. anauniensis*, *N. palustris*).

Province of Lublin: Kazimierz nad Wisłą (0051/1: *N. anauniensis*, *N. silvestis*, *C. biverrucata*, *C. segnis*, *H. targionii*, juv.), (0306/5: *N. anauniensis*, *C. biverrucata*, juv.); Nałęczów (0311/6: *N. borussicus*, juv.), (ZO-197: *N. palustris*, *H. targionii*, juv.); env. of Kraśnik (1165/10: *N. silvestris*, juv.); Chodel (ZO-137: *C. biurus*, juv.); Puławy (ZO-198: *N. anauniensis*, *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.).

Province of Nowy Sącz: Beskid Niski (1108/157: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (1110/159: *N. silvestris*, juv.), (1113/161: *N. silvestris*, *H. peltifer*, juv.); Beskid Wyspowy Mts. (0280/40: juv.); Białowodska Góra (JB-209: *H. targionii*); Czorsztyn (JB-112: *H. targionii*), (JB-116: *H. targionii*, juv.); env. of Nowy Targ (JB-100: *C. biurus*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.), (JB-101: *N. silvestris*, *C. biurus*, juv.); env. of Uście Gorlickie (JB-335: *N. palustris*, *N. silvestris*, juv.); env. of Wysowa (JB-224: *N. silvestris*, *H. peltifer*), (JB-327: *N. palustris*, juv.); Gorce Mts. (0741/86: *H. peltifer*), (0931/101: *H. peltifer*, juv.), (0933/103: *H. peltifer*, juv.), (0936/106: *H. peltifer*, juv.), (JB-103: *N. silvestris*, juv.), (JB-106: *C. solhoeyi*, *H. humicolus*, H *peltifer*, juv.), (JB-113: *N. borussicus*, *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (JB-117: *C. spinifer*, *H. peltifer*, *H. targionii*, juv.), (JB-118: *H. peltifer*, juv.), (JB-122: *N. silvestris*, *H. peltifer*, juv.), (JB-123: juv.), (JB-124: N *silvestris*, *C. biurus*, juv.), (JB-125: *H. peltifer*, juv.); Góra Chełm Mt. (JB-074: *C. segnis*); Huta near Krynica (JB-207: *N. silvestris*); Klimkówka near Gorlice (JB-337: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); Krajno near Nowy Sącz (0934/104: *H. peltifer*, juv.); Kremnica near Nowy Targ (0392/61: *C. horrida*, *C. invenusta*, juv.); Lubań near Nowy Targ (0937/107: *C. solhoeyi*, *H. peltifer*, juv.); Miejska Góra near Szymbark (JB-156: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); Niedzica (0128/24: juv.), (JB-109: *H. targionii*, juv.); Pieniny Mts. (0003/1: *H. peltifer*, juv.), (0004/2: *C. biurus*, *C. biverrucata*, *C. segnis*, juv.), (0005/3: *N. palustris*, *H. targionii*, juv.), (0126/23: *N. silvestris*, juv.), (0379/47: *N. silvestris*), (0391/60: *N. palustris*, juv.), (0403/72: *C. horrida*, *H. humicolus*, juv.), (0663/76: juv.), (0666/78: *H. peltifer*, juv.), (1055/116: *N. silvestris*, juv.); Pasmo Radziejowej (0382/51: *H. peltifer*, juv.), (0388/57:

H. peltifer, juv.), (0389/58: *N. silvestris*, *H. peltifer*), (0414/74: *H. peltifer*, juv.); res. "Bór na Czerwonym" (JB-099: *N. pratensis*, juv.); Tatra Mts. (0598/75: *C. biurus*, juv.), (0979/108: *N. borussicus*, *C. solhoeyi*, *H. longisetosus*, *H. peltifer*, juv.), (1029/110: *N. palustris*, *H. peltifer*, juv.), (1069/129: *C. biurus*, *C. horrida*, *C. solhoeyi*, juv.), (1071/131: *C. horrida*), (1072/132: *H. humicolus*), (1076/136: *C. biurus*, *H. humicolus*, juv.), (1077/137: *C. biurus*, *H. humicolus*, juv.), (1079/139: *C. biurus*, *C. solhoeyi*, *H. humicolus*, *H. peltifer*, juv.), (1080/140: *H. humicolus*), (1084/144: *N. borussicus*, *C. solhoeyi*, *H. humicolus*, juv.), (1087/147: *H. peltifer*), (1088/148: *H. humicolus*), (1089/149: *N. borussicus*, *C. biurus*, *C. solhoeyi*, *H. humicolus*, juv.), (1090/150: *C. horrida*, *H. peltifer*, juv.), (1248/203: juv.), (ZO-044: *H. peltifer*, juv.), (ZO-045: *H. peltifer*, juv.), (ZO-046: *C. biurus*, *H. peltifer*, juv.), (ZO-047: *C. biverrucata*, juv.), (ZO-048: *H. peltifer*, juv.), (ZO-051: *H. peltifer*, juv.), (ZO-052: juv.), (ZO-053: *H. peltifer*, juv.), (ZO-129: *N. borussicus*, juv.), (ZO-132: *C. solhoeyi*, juv.), (ZO-154: *H. peltifer*, juv.), (ZO-155: *C. biurus*, *H. peltifer*, juv.), (ZO-156: *N. silvestris*, *H. peltifer*, juv.), (ZO-157, 158, 159, 160, 161: *N. silvestris*, *C. biurus*, *C. biverrucata*, *C. solhoeyi*, *H. peltifer*, *H. targionii*, juv.), (ZO-162: *N. borussicus*, *C. biurus*, *H. humicolus*, juv.), (ZO-163: *N. borussicus*, *H. peltifer*, juv.), (ZO-164: *N. borussicus*, *C. biurus*, *H. peltifer*, juv.), (ZO-165: *N. borussicus*, *C. solhoeyi*, juv.), (ZO-166: *N. borussicus*, *C. solhoeyi*, juv.), (ZO-167: *H. peltifer*, juv.), (ZO-168: *C. tatrica*, juv.), (ZO-169: *N. borussicus*, *C. solhoeyi*, *H. humicolus*, *H. peltifer*, juv.), . (ZO-170: *C. spinifer*, *H. peltifer*, juv.), (ZO-171: *H. peltifer*, juv.), (ZO-235: *N. borussicus*, C. lapponica, juv.), (ZO-236: *H. peltifer*), (ZO-237: *N. borussicus*, *C. solhoeyi*, *H. humicolus*, juv.), (ZO-238: *H. peltifer*, juv.), (ZO-239: *C. invenusta*, juv.), (ZO-269: *N. borussicus*, *C. solhoeyi*, *H. peltifer*, juv.).

Province of Olsztyn: Ostróda (0009/1: *N. palustris*, *H. peltifer*, juv); res. "Niedźwiedzie Wielkie" (0090/2: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); Rudzienice Suskie (0091/3: *N. palustris*, juv.), (0450/13: *N. anauniensis*, *N. borussicus*, *N. silvestris*, *H. peltifer*, juv.), (1037/26: *H. peltifer*, juv.); res. "Dębowo" (0093/4: *N. silvestris*, *H. peltifer*, juv.), (0463/18: *N. pratensis*, N.*silvestris*, *H. peltifer*, juv.); res. "Bukowy" (0096/5: *N. palustris*, *N. silvestris*, juv.); Barczewo (0098/6: *N. silvestris*, *C. biurus*, *C. horrida*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.); env. of Iława (0303/8: *N. anauniensis*, *N. palustris*, *N. silvestris*, juv.), (0611/21: *N. silvestris*, *H. peltifer*); res. "Królewska Sosna" (0304/9: *N. palustris*, *N. silvestris*, juv.); res. "Zakręt" (0318/10: *N. anauniensis*, *N. palustris*, *N. silvestris*, *C. biurus*, *C. spinifer*, *H. targionii*, juv.); env. of Morąg (0347/12: *N. borussicus*, *N. silvestris*, juv.); enw. of Mrągowo (0452/14: *N. pratensis*, juv.), (0455/15: *N. pratensis*, *C. spinifer*, *H. peltifer*, juv.); env. of Piławka near Ostróda (0460/16: *N. palustris*, *N. pratensis*, *N. silvestris*, *C. biurus*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.); res. "Zielony Machacz" (0462/17: *N. pratensis*, *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); res. "Kulka" (0528/19: *N. silvestris*, *H. peltifer*, *H. targionii*, juv.); env. of Wiatrowiec near Bartoszyce (0620/22: *N. borussicus*, *N. palustris*, *H. targionii*, juv.); Lidzbark Warmiński (0644/23:

N. palustris, *H. peltifer*, *H. targionii*, juv.); Gierłoż near Kętrzyn (0645/24: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.).

Province of Opole: Lubsza near Brzeg (0130/2: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); env. of Śląsk Opolski (0136/3: *N. palustris*, *H. peltifer*, juv.); Opole (0170/4: *N. silvestris*, juv.); Rogów Opolski (0256/7: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Kurznie (0260/6: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, *H. targionii*, juv.); Smolarnia near Krapkowice (0338/8: *N. silvestris*, *H. peltifer*, juv.); res. "Płużnica" (0345/9: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); res. "Lubsza" (0356/10: *N. silvestris*); env. of Namysłów (0451/11: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.); Karłowice (0879/15: *N. anauniensis*, *H. targionii*, juv.); Popielów near Brzeg (0990/19: juv.); Prudnik (0995/21: juv.); Kalinów near Kamień Śląski (JB-1109: *N. palustris*, *N. silvestris*, *H. peltifer*).

Province of Ostrołęka: Rycice near Przasnysz (0012/1: *N. anauniensis*), (0097/2: juv.); Różan (0492/4: *N. silvestris*, *C. biurus*, *C. spinifer*, juv.); env. of Maków Mazowiecki (0781/5: *N. palustris*. *H. peltifer*, juv.); Popowo near Serock (1027/6: *C. biurus*).

Province of Piła: env. of Radolin (0426/3: *N. silvestris*, *C. segnis*); Tuczno near Wałcz (JB-151: juv.).

Province of Piotrków Tryb.: res. "Meszcze" (0221/1: *N. silvestris*, *H. peltifer*, juv.), (0868/7: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); res. "Spała" (0270/2: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Tomaszów Mazowiecki (0305/3: juv.); Szpinałów near Kamieńsko (0446/5: *N. palustris*, juv.); res. "Konewka" (1015/8: *N. silvestris*, juv.); Grabica (1038/9: *N. palustris*, juv.); env. of Sulejów (ZO-136: *N. silvestris*, juv.).

Province of Płock: Oporów near Kutno (0103/2: *N. anauniensis*, *N. borussicus*, *N. palutris*, *C. spinifer*, juv.); Lisica near Kutno (0160/2: *N. silvestris*); Młogoszyn (0329/4: *H. peltifer*, *H. thori*, juv.); Łąck (0337/5: *H. peltifer*, juv.); Błonie near Łęczyca (0417/7: *H. peltifer*); env. of Wyszogród (1028/10: *H. peltifer*, juv.).

Province of Poznań: Biedrusko (ZO-263: *H. peltifer*, juv.), (ZO-264: *H. targionii*, juv.); Puszcza Zielonka near Poznań (ZO-272: *C. biurus*, *C. horrida*, *C. spinifer*, juv.), (ZO-273: *N. silvestris*, *H. peltifer*, juv.), (ZO-275: *N. palustris*, *H. peltifer*, *H. thori*, juv.); Czerniejewo (ZO-199: *N. silvestris*, *C. spinifer*, *H. peltifer*), (ZO-231: *N. silvestris*, *H. peltifer*, juv.), (ZO-253: juv.), (ZO-254: *N. palustris*, *H. peltifer*, juv.), (ZO-144: *N. anauniensis*); Chełmno near Pniewy (C-I P: *N. anauniensis*, *H. peltifer*, *H. targionii*), (C-II P: *H. thori*, juv.); env. of Kobylnica (JB-790: *N. silvestris*, *H. peltifer*); env. of Gniezno (JB-150: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.); Kiekrz near Poznań (ZO-098: juv.); Kobylepole near Poznań (JB-134: *H. peltifer*, *H. targionii*, juv.); Morasko near Poznań (ZO-086: *H. peltifer*, juv.), (ZO-087: *N. silvestris*, *H. peltifer*, juv.); Poznań (0503/31: *N. silvestris*), (ZO-276: juv.), (RAF-201: *N. anauniensis*), (ZO-034: *H. peltifer*, juv.), (ZO-035: *C. biurus*, *C. spinifer*), (ZO-038: *H. peltifer*), (ZO-054: *N. pratensis*, juv.), (ZO-055: *H. peltifer*, *H. thori*, juv.), (ZO-066: *N. palustris*, juv.), (ZO-067: *H. peltifer*, *H. targionii*, juv.), (ZO-070: *H. peltifer*), (ZO-071: *H. peltifer*,

juv.), (JB-153: juv.), (JB-264: *H. peltifer*), (JB-269: *H. peltifer*), (JB-293: *H. peltifer*), (JB-338: juv.), (JB-339: juv.), (JB-341: *H. peltifer*), (JB-342: *H. peltifer*, juv.), (JB-343: *N. anauniensis*, *H. targionii*, juv.), (JB-345: *N. palustris*, *H. peltifer*, *H. targionii*, juv.), (JB-346: juv.), (JB-776: *N. anauniensis*), (JB-777: *N. anauniensis*, *H. targionii*), (JB-784: *C. segnis*); Promno (JB-126: *H. peltifer*), (JB-127: *H. peltifer*), (JB-130: *H. peltifer*), (JB-132: *N. silvestris*, *C. spinifer*, juv.); res. "Wiązy w Nowym Lesie" (ZO-146: *N. palustris*, *H. targionii*); (ZO-200: *N. palustris*, juv.); res. "Bielawy" (ZO-145: *N. silvestris*, *C. spinifer*, *H. peltifer*, *H. targionii*, juv.); res. "Jakubowo" (J-III P: *H. peltifer*, juv.), (J-III P: *H. peltifer*, juv.); Skoki (JB-1134: *C. spinifer*, *H. peltifer*, juv.), (JB-1135: *H. targionii*, juv.).

Province of Przemyśl: Boratyń near Jarosław (0234/1: juv.); Narol near Lubaczów (1125/5: *N. anauniensis*, *H. targionii*, juv.), (1136/11: *H. targionii*); env. of Zalesie (1128/6: *N. silvestris*, *H. peltifer*, juv.); Dąbrówka Starzeńska near Dynów (JB-144: *N. anauniensis* juv.); env. of Bircza (JB-145: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.).

Province of Radom: env. of Łoje (JB-727: *H. targionii*).

Province of Rzeszów: Przyłęk near Mielec (0039/1: *N. palustris*, *N. silvestris*, *C. spinifer*); env. of Grzegorzówka (0119/2: *N. silvestris*); Czudec (0122/3: *H. peltifer*); Czajkowa near Mielec (0229/4: *N. silvestris*); res. "Buczyna na Cyrance" (0745/6: *H. peltifer*, juv.), (1133/8: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); res. "Las Klasztorny" (1126/7: *N. silvestris*. *H. peltifer*, juv.), (1137/9: *N. silvestris*, *H. peltifer*, juv.).

Province of Siedlce: Sterdyń near Sokołów Podlaski (0008/1: *H. targionii*); env. of Sokołów Podlaski (0161/3: *N. borussicus*, *N. palustris*); res. "Rudka Sanatoryjna" (0162/4: *N. palustris*, *N. silvestris*, *C. spinifer*, juv.); Żeliszew near Kotuń (0163/5: *C. segnis*); Env. of Węgrów (0164/2: *N. silvestris*, *H. peltifer*); Jagodne near Żelechów (0369/7: *N. palustris*, *N. silvestris*, *C. segnis*, *H. peltifer*); res. "Przekop" (0443/1: *N. palustris*, *H. peltifer*, *H. targionii*); Hołubla near Siedlce (0545/10: *N. silvestris*, *C. biurus*, *C. spinifer*, juv.); Siedlce (0723/12: juv.); env. of Wyszków (0782/13: *N. palustris*, juv.); Repka near Sokołów Podlaski (1175/14: *N. silvestris*, juv.).

Province of Sieradz: res. "Węże" (0112/2: *N. anauniensis*); res. "Nowa Wieś" (0120/1: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); res. "Jamno" (0678/5: *N. palustris*, *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); Jasionna near Masłowice (0884/6: *C. segnis*); Nowa Wieś near Sieradz (0901/8: *N. anauniensis*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); Dalechów near Wieluń (ZO-089: *N. silvestris*, juv.); Łask (ZO-251: *C. biurus*).

Province of Skierniewice: Rogów near Koluszki (0361/4: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.).

Province of Słupsk: Słowiński National Park: (0017/1: *N. silvestris*); Nakla near Bytów (0530/8: *N. pratensis*, *C. biurus*, juv.); Gostowo near Kościerzyna (0531/9: *N. palustris*, *H. thori*, juv.); env. of Izbica (0763/10: *N. pratensis*, *H. peltifer*, juv.); res. "Bagna Izbickie" (1255/14: juv.); env. of Gać (ZO-092:

N. pratensis, *C. biurus*); Jarosławiec (ZO-241: juv.), (ZO-242, 243: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.).

Province of Suwałki: res. "Perkun" (0288/9: *N. anauniensis*, *N. palustris*, *N. silvestris*, *H. peltifer*, *H. thori*, juv.); Jałowo near Lipsk (ZO-188: *H. peltifer*, *H. thori*, juv.); Trzyrzeczki near Dąbrowa Białostocka (ZO-189: *H. peltifer*, juv.); Sztabin (ZO-190: *C. biurus*, *H. peltifer*, *H. thori*, juv.); Gawrych-Ruda (ZO-191: *H. peltifer*), (ZO-192: juv.); Bryzgiel (ZO-193: *H. peltifer*, juv.).

Province of Szczecin: Wolin Island (0094/14: *H. peltifer*, juv.); Kołowo near Gryfino (0316/22: *N. pratensis*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); env. of Pyrzyce (JB-794, RAF-204: *N. anauniensis*, *H. peltifer*, *H. targionii*, juv.); env. of Widuchowo (JB-795: juv.), (JB-796: juv.); Pogorzelica (ZO-181: juv.), (ZO-182: *C. segnis*, juv.), (ZO-183: *C. segnis*).

Province of Tarnobrzeg: Łaniów near Sandomierz (0909/2: *N. silvestris*, *C. spinifer*, *H. peltifer*, *H. targionii*, juv.); Nart near Nisko (0915/5: *H. targionii*, juv.); Kurozwęki near Staszów (0921/7: *H. targionii*); env. of Janów Lubelski (JB-142: *N. pratensis*, *N. silvestris*, *H. peltifer*, juv.), (JB-781: *N. palustris*, *H. peltifer*, juv.).

Province of Tarnów: Ciężkowice (0485/12: *N. palustris*, *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); env. of Pilzno (JB-167: *N. palustris*, juv.), (JB-208: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (JB-333, 334: *N. anauniensis*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (JB-713: *N. palustris*, juv.); env. of Brzesko (JB-349: *H. peltifer*).

Province of Toruń: res. "Szumny Zdrój" (0100/1: *H. peltifer*, *H. targionii*); res. "Okonek" (0457/7: *H. peltifer*); res. "Kociołek" (0459/8: *N. pratensis*, juv.); Toruń (ZO-143: *N. anauniensis*, *H. peltifer*, *H. targionii*, juv.).

Province of Wałbrzych: env. of Trzebieszowice (JB-443: *H. peltifer*, *H. targionii*, juv.); Góry Bialskie Mts. (0616/13: *N. silvestris*, juv.), (0802/14: *N. palustris*, *H. peltifer*, juv.); Góry Stołowe Mts. (0454/10: *N. pratensis*, *N. silvestris*, *C. biurus*, *H. longisetosus*, *H. peltifer*, juv.), (0456/11: *N. silvestris*, juv.), (JB-187: *N. borussicus*, *H. peltifer*, juv.), (JB-191: *C. biurus*), (0867/34: *H. peltifer*); Masyw Śnieżnika Mts. (JB-182: *N. silvestris*, juv.), (JB-183: *N. silvestris*, *H. peltifer*, juv.), (JB-184: *N. silvestris*, juv.), (JB-185: *H. peltifer*), (JB-186: *C. biurus*, *H. peltifer*, juv.), (ZO-216: juv.), (ZO-217: *H. peltifer*), (ZO-218: *C. biurus*, *C. solhoeyi*, *C. spinifer*, *H. peltifer*, juv.), (ZO-219: *C. solhoeyi*, *H. peltifer*, juv.), (ZO-220: *N. borussicus*, *N. palustris*, *H. peltifer*, juv.), (ZO-221: *H. peltifer*), (ZO-223: *N. silvestris*, juv.), (ZO-224: *H. peltifer*, juv.), (ZO-225: *N. silvestris*, juv.), (ZO-226: *N. silvestris*, *H. peltifer*), (JB-190: *N. borussicus*, *H. peltifer*), (JB-192: *N. silvestris*, juv.).

Province of Warszawa: Warszawa (JB-849: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.).

Province of Włocławek: Wieniec-Zdrój near Włocławek (0612/3: *C. biverrucata*); Skępe near Lipno (1271/6: juv.); Niski Grąd (1274/9: *H. peltifer*); Włocławek (1275/10: juv.); Ciechocinek (JB-201, 202: juv.).

Province of Wrocław: Ślęża Mt. (0084/7: *N. silvesrtis*), (0109/9: *N. silvestris*, *C. solhoeyi*, *C. spinifer*, *H. peltifer*, juv.), (0133/11: *N. silvestris*, *C. horrida*,

C. invenusta, *C. segnis*, *C. spinifer*, juv.), (ZO-134: *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, juv.); Gniechowice near Wrocław (0138/13: *N. borussicus*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.); Jordanów Śląski (JB-440: *N. anauniensis*, *N. borussicus*, *N. palustris*, *H. targionii*, juv.); Raków near Wrocław (ZO-133: *N. palustris*, *N. silvestris*, *C. biurus*, *C. spinifer*, *H. peltifer*, *H. targionii*, juv.).

Province of Zamość: Adamów (ROZ-191: *N. anauniensis*, *H. peltifer*, juv.); Bagno Tałandy (ROZ-134, 144: *N. pratensis*, *N. silvestris*, *C. biurus*, juv.); Bełżec (ROZ-152: *N. silvestris*, *H. peltifer*, juv.), (ROZ-153: *N. silvestris*, juv.), (ROZ-155: *H. peltifer*), (ROZ-158: *N. silvestris*), (ROZ-159: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. thori*, juv.); env. of Huta Lubycka (ROZ-183: *N. silvestris*), (ROZ-184: *C. spinifer*, juv.); env. of Józefów (ROZ-115, 119, 121: *N. anauniensis*, *C. biverrucata*, *H. targionii*, juv.), (ROZ-130: *N. anauniensis*), (ROZ-143: *N. silvestris*, *C. biurus*, juv.); env. of Kawęczyn (ROZ-028: *N. silvestris*, *C. spinifer*, *H. peltifer*), (ROZ-029: *C. biurus*), (ROZ-030: *N. silvestris*, *C. horrida*); env. of Płazów (ROZ-114: *H. peltifer*, juv.); env. of Szczebrzeszyn (JB-352: *C. spinifer*, *H. longisetosus*, juv.), (JB-364: *H. peltifer*, juv.), (ROZ-131, 136: *N. borussicus*, *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (ROZ-138: *N. silvestris*, *H. peltifer*, juv.), (ROZ-146: *N. anauniensis*), (ROZ-148, 149, 150: *N. borussicus*, *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-268: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); env. of Tarnawa (ROZ-215, 216: *N. palustris*, *N. silvestris*, juv.), (ROZ-218: *N. silvestris*, juv.), (ROZ-219: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-222: *N. silvestris*, juv.), (ROZ-224: *N. silvestris*, *H. peltifer*), (ROZ-225: *H. peltifer*), (ROZ-226: *N. silvestris*, *H. peltifer*), (ROZ-227: *N. palustris*, *N. silvestris*, juv.); env. of Tomaszów Lubelski (1127/17: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.), (1134/18: *N. silvestris*, juv.), (ROZ-122: *N. borussicus*, juv.), (ROZ-189: *N. anauniensis*, juv.); env. of Zwierzyniec (0580/4: *N. anauniensis*, *N. borussicus*, *N. silvestris*, *H. targionii*, juv.); Gilów (ROZ-231: *N. silvestris*, juv.), (ROZ-232: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-233: *N. palustris*), (ROZ-235: *N. silvestris*); Hrebenne (ROZ-069: *N. palustris*, *N. pratensis*, *N. silvestris*, *H. peltifer*), (ROZ-123: *H. targionii*), (ROZ-163: *N. anauniensis*, *H. targionii*, juv.); Huta Lubecka (ROZ-046: *H. peltifer*, juv.), (ROZ-051: *N. borussicus*, *C. biurus*); KĄty II (ROZ-040: *H. peltifer*, juv.), (ROZ-041: *N. borussicus*, *N. palustris*, *C. biurus*, *H. peltifer*, *H. targionii*, *H. thori*, juv.), (ROZ-045: *N. palustris*, *H. longisetosus*, *H. peltifer*, *H. targionii*, juv.), (ROZ-052, 057: *N. borussicus*, *C. biurus*, *H. peltifer*, *H. targionii*), (ROZ-062: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-110: *H. peltifer*, juv.), (ROZ-112: *C. spinifer*, juv.); Klucze near Biłgoraj (1138/9: *N. pratensis*, *N. silvestris*, juv.); Majdan Kasztelański (ROZ-042: *N. palustris*, *N. silvestris*, *C. segnis*, *H. peltifer*, *H. thori*, juv.); Narol (ROZ-185, 186: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.); Nowiny near Tomaszów Lubelski (0257/1: *N. anauniensis*); Potoki near Lubycza Królewska (ROZ-160: *N. palustris*, juv.), (ROZ-161: *N. palustris*, *N. silvestris*, juv.); Roztoczański National Park (0519/3: *N. silvestris*, *H. peltifer*, juv.), (0581/5: *N. anauniensis*, *N. palustris*, *H. peltifer*, juv.), (0582/6: *N. palustris*, *N. silvestris*,

H. peltifer, *H. thori*, juv.), (0584/8: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (0585/9: *N. palustris*, *H. peltifer*, juv.), (0586/10: *N. palustris*, *N. silvestris*, *H. peltifer*, *H. targionii*, juv.), (0587/11: *N. silvestris*, juv.), (0720/14: *N. anauniensis*, *N. palustris*, juv.), (0736/13: *N. anauniensis*, *N. palustris*, *H. peltifer*, *H. targionii*, juv.), (JB-353: *C. spinifer*, juv.), (JB-354: juv.), (JB-355: *H. peltifer*), (JB-356: *H. longisetosus*, juv.), (JB-357: *C. spinifer*), (JB-358: *H. peltifer*), (JB-361: *N. silvestris*, juv.), (JB-365: *H. peltifer*, juv.), (JB-366: *N. silvestris*, *H. longisetosus*, juv.), (ROZ-002: *N. palustris*), (ROZ-004, 009: *N. anauniensis*, *N. palustris*, *H. peltifer*), (ROZ-006, 010: *N. silvestris*, *C. spinifer*, *H. longisetosus*), (ROZ-016: *N. anauniensis*, *C. spinifer*, *H. longisetosus*, *H. peltifer*), (ROZ-018: *H. peltifer*), (ROZ-023: *H. peltifer*), (ROZ-024: *C. biurus*), (ROZ-027: *N. silvestris*, *H. peltifer*, juv.), (ROZ-035: *N. silvestris C. spinifer*, *H. peltifer*, juv.), (ROZ-036: *N. silvestris*, *H. peltifer*), (ROZ-038: *N. pratensis*, *H. peltifer*), (ROZ-039: *N. palustris*, *N. silvestris*, *H. peltifer*), (ROZ-043: *H. peltifer*, *H. thori*, juv.), (ROZ-044: *C. spinifer*, *H. peltifer*, juv.), (ROZ-048: *N. pratensis*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-053: *N. pratensis*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-056: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-059: *N. silvestris*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-084, 094: *H. peltifer*, juv.), (ROZ-085: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-087: *H. peltifer*), (ROZ-089, 093: *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-091: *N. palustris*, *H. peltifer*, juv.), (ROZ-098: *H. peltifer*, juv.), (ROZ-099: juv.), (ROZ-104: *H. peltifer*, juv.), (ROZ-105: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (ROZ-118: *N. anauniensis*, juv.), (ROZ-124, 125: *N. silvestris*, *H. peltifer*, *H. thori*, juv.), (ROZ-126: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-127: *H. peltifer*, *H. thori*, juv.), (ROZ-129: *H. targionii*), (ROZ-135: *N. anauniensis*, *N. palustris*, *H. targionii*, juv.), (ROZ-137: *N. anauniensis*, *N. silvestris*, *C. biverrucata*, juv.), (ROZ-139: *N. silvestris*, juv.), (ROZ-140: *N. palustris*, juv.), (ROZ-141, 147: *N. anauniensis*, *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-142: *N. palustris*, juv.), (ROZ-145, 151: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-192, 193, 194, 195: *N. palustris*, *H. peltifer*, juv.), (ROZ-199: *H. peltifer*, juv.), (ROZ-200: *H. longisetosus*), (ROZ-201, 202, 203, 204: *N. palustris*, *N. silvestris*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-207, 208, 209, 210: *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (ROZ-239, 240, 241, 244, 246: *N. palustris*, *N. silvestris*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-242, 248: *N. silvestris*, *H. peltifer*, juv.), (ROZ-243, 245, 249, 251: *N. silvestris*, *H. peltifer*, juv.), (ROZ-260: *N. silvestris*, *H. peltifer*), (ROZ-261: *N. palustris*, *N. silvestris*, juv.), (ROZ-262: *H. peltifer*), (ROZ-266: *H. targionii*), (ROZ-271, 272, 274: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*, juv.), (ROZ-275: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-276, 277, 278, 279, 287, 288: *N. palustris*, *N. silvestris*, *H. longisetosus*, *H. peltifer*, juv.), (ROZ-281, 282, 286, 289: *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.); res. "Czartowe Pole" (0415/2: *H. longisetosus*, *H. peltifer*, juv.); Siedliska (ROZ 108, 111: *N. silvestris*, *C. spinifer*, juv.), (ROZ-109: *H. peltifer*,

juv.), (ROZ-049: *H. peltifer*), (ROZ-050] , (*N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-070: *N. palustris*, *N. silvestris*, *C. spinifer*, *H. peltifer*), (ROZ-073: *N. silvestris*, juv.), (ROZ-166: *N. palustris*, juv.), (ROZ-167: *H. peltifer*, juv.), (ROZ-170: *N. silvestris*, *H. peltifer*, juv.), (ROZ-172: *N. silvestris*, *H. peltifer*, juv.), (ROZ-174: *N. silvestris*, juv.), (ROZ-176, 179, 181: *N. silvestris*, juv.), (ROZ-178, 180: *N. silvestris*, juv.); Sochy (ROZ-254: *N. silvestris*, *H. peltifer*, juv.), (ROZ-255: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.), (ROZ-256: *H. peltifer*); Strzyżów near Horodło (ZO-257: *N. anauniensis*, *H. peltifer*, juv.); Sułów (ROZ-212: *N. anauniensis*, juv.), (ROZ-213: *H. peltifer*, juv.); Ulów (ROZ-075: *C. biurus*, *C. spinifer*, *H. peltifer*, juv.), (ROZ-113: *N. silvestris*, *C. spinifer*, *H. longisetosus*, *H. peltifer*, juv.); Wysokie near Teratyń (1163/20: *N. palustris*, *N. silvestris*, *H. peltifer*, juv.); Zielone near Krasnobród (ROZ-190: *N. silvestris*, *H. peltifer*, juv.).

Province of Zielona Góra: Wolsztyn (JB-168: *N. anauniensis*, *N. palustris*, *H. targionii*, juv.); Przełazy (JB-444: *N. anauniensis*, *H. peltifer*), (JB-445: *N. palustris*, *H. peltifer*, *H. targionii*, juv.) .

CHARACTERISTICS OF THE *NOTHRIDAE* AND *CAMISIIDAE*

For moss mites, the size of adult nothriids and camisiids is medium or large, it varies from 0.5 to 1.3 mm. Their body colour varies from white through different shades of brown to almost black. The body surface is smooth, minutely porose or with a distinct microsculpture, usually in the form of rounded cavities (Figs 1, 4 J, K; Phot. 3, 11) or protuberances (Fig. 32 H). The body is covered with bi- or trilayered cuticle. The species of the genus *Nothrus* are devoid of the external epicuticle and thus more susceptible to dessication. In many species the body is covered with a special secretion (cerotegument) (Figs 39 C, I, 71 C) from the even glands (*gla*) localized in the posterior part of hysterosoma; the secretion forms a protecting layer preventing from the excessive loss of water (GRANDJEAN 1936). In such cases, the body is usually coated with fine particles of the soil or other material depending on the habitat. Sometimes the posterior part of the mite can preserve fragments of tritonymphal exuvium (Fig. 32 F).

The body, usually flattened dorsoventrally, is divided by a sejugal furrow in two separate tagmata: proterosoma and hysterosoma, covered on the dorsal side with two separate shields - prodorsum and notogaster, respectively.

Prodorsum is roughly triangular and takes from 1/4 to 1/3 body length. Its anterior part is an elongated rostrum whose apex may be rounded, indentated or slightly protruding. At the sides of the rostrum, usually on small apophyses, there is a pair of short rostral setae[6] (*ro*) which are either smooth or slightly rugged distally and usually slightly bent towards each other. The second pair of setae, always inserted on smaller or larger apophyses, are lamellar setae (*le*) (sometimes their apices can protrude from the rostrum). In their apical part they are almost always

[6] Setae nomenclature after GRANDJEAN (TRAVÉ and VACHON 1975).

endowed with longer or shorter branches (Figs 31 C, 75 B) and usually covered with cerotegument (Figs 4 C, 44 C). In the mid part of prodorsum there is the third pair of proterosomal setae i.e. the interlamellar setae (*in*). They may take different shapes and sizes, in certain species they reach for beyond the rostral margin (Figs 42, 44 D), in others they are small and barely distinguishable, devoid of apophyses (Figs 42, 44 D). Exobothridial setae (*ex*) are very small, smooth, located near the external side of bothridia and may disappear in some species. Bothridium is cup-shaped, protruding from the surface of prodorsum. Its opening is directed towards the margin or slightly to the front of the body. The sensillus originating from the bothridium takes various shapes from long rod-like or whip-like in the *Nothridae* (Figs 4 A, 20 A) to clavate shortened in *Camisia* (Fig. 31 A). The surface of prodorsum is smooth or covered with characteristic cavities (Figs 1, 4 J), in the members of *Camisiidae* usually endowed with a pair of longitudinal ridges stretching from the base of the lamellar apophyses to the trichobothria.

Notogaster is usually oval, though in certain species of the genus *Camisia* its sides are almost parallel. The central part is distinctly convex or flat and sometimes even slightly concave (Figs 2, 27, 28, 79). Frequently, the central part is distinguished from the lateral ones either by different microsculpture (*Nothridae*; Fig. 1) or by longitudinal ridges running along the shield (*Camisiidae*). In some species the dorsal surface of the notogaster is almost smooth and devoid of sculpture. Of the 16 pairs of notogastral setae, *f1* may disappear completely (*Camisia*) or remain in the form of alveolus (*Heminothrus*) (GRANDJEAN 1933, SENICZAK et al. 1990). The notogastral setae are of various shapes: from smooth through branched to lanceolate or leaf-like flattened (Figs 95 E-H, 50 E-L, 53 E-J; Phots. 3, 9, 11, 13). The orientation of the setae on the notogastral shield in particular species is shown in Figs 3, 29-30 and 80-81. Sometimes the notogastral setae originate on the apophyses which are particularly long in *Camisia spinifer* (Figs 68, 71 A-C). Of the five pairs of lyrifissures (*ia*, *im*, *ih*, *ip*, *ips*) the first three are usually visible only in the lateral aspect.

Gnathosoma. (Figs 5, 33, 34, 83; Phot. 2) Subcapitulum is stenarthic, with a porous cuticle. The central lobes of rutellum are very large and completely cover the adoral region. The mental setae (*h*) are usually thick, longer or shorter than the genal ones (*a*). The *m* setae are either missing (*Camisia*) or present in the number of 1 or 2 pairs. From among the oral setae (*or*) *or1* are usually slightly different in shape from the other two pairs. Pedipalps are five-segmented (Figs 5 A, 33 B). Chelicerae (Figs 5 B, 33 A, 83 A) have two typical setae (*cha*).

Ventral region (Figs 3, 30, 81; Phot. 1) is surrounded by the edge of the notogastral shield spreading to the bottom part of the body. The anterior and posterior parts of epimeral region are distinctly separated by bands of weakly sclerified cuticle. The species of *Nothrus* are characterized by evident coxosternal neotrichy. The genital shields are rounded, with the setae arranged along the internal margin of the shields (in *Nothrus* the last seta takes the posterolateral position). The number of genital setae (*g*) varies from 9 to 25 pairs, in the *Nothridae*

there is no genital neotrichy. Between the genital and anal regions there is a narrow preanal shield in transverse position. The anal shields are narrow and elongated, and their length is close to that of the genital ones. The anal setae (*an*) occur in the number of 2 (*Nothrus*, *Heminothrus*) or 3 (*Camisia*) pairs. The aggenital and adanal shields, lying laterally to the genital and anal ones, are joined. Two pairs of aggenital setae (*ag*) grow at the medial margin of the shield, in *Nothrus* they do not occur. All species have three pairs of adanal setae (*ad*). The anterior parts of the anal and adanal shields are endowed with lyrifissures (*ian* and *iad*).

Legs are composed of five movable segments: trochanter, femur, genu, tibia and tarsus. The tarsus is terminated by one, two or three claws (Figs 6, 7, 35, 36, 84).

SOME REMARKS ON LEG SETATION

The available literature information on phaneres on legs in the *Nothridae* and *Camisiidae* is scarce and scattered. Most comprehensive data can be found in papers of GRANDJEAN (1936, 1940a, 1940b, 1941, 1942, 1946, 1964a, 1964b). Of particular interest are his works on postlarval setae of *Platynothrus peltifer* (1971, 1973, 1974). Earlier reports (e.g. MICHAEL 1888, TRÄGÅRDH 1904, 1910, HAMMER 1952, TUXEN 1952, SELLNICK & FORSSLUND 1955) by other authors (including figures) are usually innacurate and bring little information on the number and location of setae and other organs. Recently, the problems related to leg phanerotaxy in different groups of moss mites and its significance for taxonomy and phylogeny of this group have been taken up by a growing number of authors, however, the information on the *Nothridae* and *Camisiidae* is still insufficient. Phanerotaxy in selected species is discussed in more detail in the following papers: ANDRÉ (1980), HAMMEN (1981), FUJIKAWA (1982), TRAVÉ & OLSZANOWSKI (1988, 1991), SENICZAK & KLIMEK (1990) and COLLOFF (1993).

The arrangement of the basic (or so called "larval[7]") setae, most characteristic of the *Crotonioidea* is the following:

trochanters - lack of setae
femora I and II: *d*, *bv*''
femora III and IV: *d*, *ev*'
genua I and II: *d*, (*l*)
genua III and IV: *d*, *l*'
tibiae I and II: *d*, (*l*), *v*'
tibiae III and IV: *d*, *l*', *v*'
tarsi I: (*pl*), (*ft*), (*tc*), (*p*), (*u*), (*a*), *s*, (*pv*) = 16 (together with famulus)
tarsi II, III, IV: (*ft*), (*tc*), (*p*), (*u*), (*a*), *s*, (*pv*) = 13

[7] In the case of legs IV, the correspondents of larval setae are considered, formed either in the protonymphal stage on tarsi (*ft*'', (*p*), (*u*), and (*pv*)) or in the deutonymphal stage on tarsi or else in the deutonymphal stage on tarsi (*ft*', (*tc*), (*a*) and *s*) and other segments.

The solenidial formulae are constant within particular genera:

Nothrus:	[1-2-3] [1-1-1] [1-1-0] [1-1-0]
Camisia	[1-1-1] [1-1-1] [1-1-0] [0-1-0]
HoloNothrus	[1-2-3] [1-1-2] [1-1-0] [1-1-0]

Leg setation[8] of the species of *Nothridae* and *Camisiidae* occurring in Poland is described below (see also Table 2). However, in view of a large variety of leg chaetotaxy in the *Crotonioidea* and insufficient data on the ontogenesis of phaneres, the problem requires further studies.

Genus *Nothrus*

(Figs 6, 7, 12, 17, 22, 26)

Trochanteres. On legs I and II in all species I found single setae *v'*; the largest variation of the number of setae on trochanters III was revelated in *N. pratensis* (from 2 to 4); in certain species on trochanters IV, seta *v''* showed a tendency to disappear.

Femora. Most frequently the number of setae on legs I was 8, the observed variation concerned only the ventral setae; the number of setae on legs II varied from 8 to 9; there was a constant number (5) and arrangement of setae on femora III, while femora IV revealed the absence of the setae *v''* (*N. silvestris*) and, moreover, the absence of one of the lateral setae (*N. palustris*, *N. pratensis*).

Genua. In all species, a constant number of 5 setae was observed.

Tibiae. The number of setae was 6 (tibiae I) or 5 (tibiae II - IV).

Tarsi. On tarsi I and II, I observed 27 and 25 setae, respectively, except for *N. pratensis* in which on tarsi II one of the ventral setae disappeared; in *N. pratensis* and *N. palustris* tarsi III of most specimens revealed the presence of one and two additional lateral setae, respecively; tarsi IV of all species with 22 setae. A typical feature of this genus is the lack of setae *it* on all tarsi.

Genus *Camisia*

(Figs 35, 36, 41, 45 C, 51 D, 56, 57, 67 B, 73 B, 77, 78)

Trochanteres. Trochanteres I, II and IV are characterized by the presence of single seta *v'*, except for *C. invenusta* and *C. tatrica* in which there is a pair of ventral setae on leg IV; on trochanteres III there are from 3 to 5 setae (depending on the number of lateral setae in particular species).

Femora. Setation of this segment shows great variety; the number of setae on particular legs varies between 7 - 13 on leg I, 8 - 13 on leg II, 3 - 9 on leg III and

[8] In the case of femora and tarsi the description is based only on the number of setae because of difficulties in their identification.

Table 2. Leg setation (trochanter to tarsus) in the studied species of *Nothridae* and *Camisiidae* (tarsus I together with famulus).

SPECIES	LEG I					LEG II				
N. anauniensis	1	6-8	5	6	27	1	8-9	5	5	25
N. borussicus	1	8-9	5	6	27	1	9	5	5	25
N. palustris	1	8	5	6	27	1	9	5	5	25
N. pratensis	1	8	5	6	27	1	8	5	5	24
N. silvestris	1	8-9	5	6	27	1	9	5	5	25
C. biurus	1	13	5	5-6	29	1	13	5	6	26
C. biverrucata	1	11	5	6	32	1	11	5	6	29
C. horrida	1	10	5	6	28-29	1	9	5	6	25
C. invenusta	1	7	5	6	18-21	1	8	5	6	16
C. lapponica	1	11	5	6	27-28	1	10	5	6	24-26
C. segnis	1	8	5	6	23	1	8	5	6	20
C. solhoeyi	1	12	5	6	29-30	1	12	5	6	26
C. spinifer	1	10	5	6	25-26	1	11	5	6	23
C. tatrica	1	7	5	6	19	1	8	5	6	16
H. capillatus	1	9	5	5-6	31	1	9	5	5	26-27
H. humicolus	1	10	5	5	27	1	10	5	5	24
H. longisetosus	1	10	5	5	26	1	10	5	5	22
H. peltifer	1	9	5	5	26	1	9	5	5	23
H. targionii	1	12	5	4	31	1	11	5	5	23
H. thori	1	11	5	5	31	1	11	5	5	23-24
	LEG III					LEG IV				
N. anauniensis	3	5	5	5	22	2	6	5	5	22
N. borussicus	3	5	5	5	22	2	6	5	5	22
N. palustris	3	5	5	5	24	1-2	4	5	5	22
N. pratensis	2-4	5	5	5	22-23	1	4	5	5	22
N. silvestris	2-3	5	5	5	22	1-2	5	5	5	22
C. biurus	5	9	5	5	25	1	7	5	5	25
C. biverrucata	5	5	5	5	25-27	1	3	5	5	25-26
C. horrida	3	6	4	5	23-24	1	3	4	4-5	22
C. invenusta	3	4	3	4	15	2	2	3	4	15
C. lapponica	4	4	4	4	19-20	1	2	3	4	20
C. segnis	5	5	4-5	4	17	1	2	4-5	4	17
C. solhoeyi	5	4-5	4	4	18-20	1	2	5	4	19
C. spinifer	5	8	4	4	21	1	6	3	5	22
C. tatrica	3	3	3	4	15	2	2	3	4	15
H. capillatus	5	8	4	4	26	1	5-6	4	4	25-26
H. humicolus	4	4	5	4	23	1	4	5	4	23
H. longisetosus	4	6	5	5	23	1	4-5	5	5	23
H. peltifer	2-4	5	4	4	23	1	4-5	4	4	23
H. targionii	5	8	5	5	27	1	8	5	5	26
H. thori	5	8	5	5	26	1	10	5	5	25

2 - 7 on leg IV; the richest setation occurs in *C. biurus* while the poorest (particularly on legs I and II) in *C. invenusta*, *C. segnis* and *C. tatrica*.

Genua. On legs I and II a constant number of 5 setae was observed (in *C. biurus* frequently additional seta *v'* appeared); on legs III and IV 3 - 5 setae were present (*l''* and *v''* disappeared in some species).

Tibiae. On legs I and II a constant number of 6 setae was observed; on legs III and IV one or both (in the majority of studied species) paraxial lateral setae (*l''*) were missing.

Tarsi. The total number of setae on tarsi varied depending on the species and was: on leg I: 19 - 32, II: 16 - 29, III: 15 - 27, and IV: 15 - 26. Among the studied species the largest number of setae was observed in *C. biverrucata* while the most reduced setation on tarsi and close in the number of setae and their arrangement was found in *C. invenusta* and *C. tatrica*.

Genus *Heminothrus*

(Figs 84, 88, 89, 92 C, D, 101)

Trochanteres. All trochanteres on legs I, II and IV with a single ventral seta (*v'*); leg III with 4 or 5 setae except in *H. peltifer* in which the number of setae varied from 2 to 4 (cf. TRAVÉ & OLSZANOWSKI 1989).

Femora. Legs I and II bear the same number of 9, 10 or 11 setae depending on the species, only in *H. targionii* legs I have an additional twelveth seta. On legs III there are from 4 (*H. humicolus*) to 8 setae; on legs IV - from 4 to 10 setae.

Genua. Genua I and II have 5 setae in all species; in *H. capillatus* and *H. peltifer* on legs III and IV there are no paraxial lateral setae (*l''*).

Tibiae. In all species tibiae of legs I and II show a full vertition of 5 setae except for *H. targionii* in which *l'* on legs I is missing; in some specimens of *H. capillatus* an additional seta *v''* was observed; on legs III and IV a constant number of 4 (*l''* missing) or 5 setae was observed depending on the species.

Tarsi. Differences in chaetotaxy between particular species follow from a different number of postlarval lateral and ventral setae and from the possible absence of the pair of iteral setae (*it*) on tarsi I. Apart from *H. targionii* these setae were missing in *H. humicolus* and *H. longisetosus*. The richest chaetotaxy was found in *H. capillatus*, *H. targionii* and *H. thori*. A striking feature are the differences in location of solenidion ω*3* which is placed either distally near solenidion ω*2* (*H. capillatus*), next to solenidion ω*1* (*H. humicolus*), or in a close vicinity of famulus (other species). When placed in the latter position it is distinctly shortened.

KEYS TO ADULTS OF FAMILIES, GENERA AND SPECIES OF THE *NOTHRIDAE* AND *CAMISIIDAE*[9]

1. No aggenital setae; tip of rostrum indented ..... *Nothridae* BERLESE
2. Two pairs of aggenital setae; rostrum not indented ..... *Camisiidae* OUDEMANS

[9] A modified and supplemented version of the keys prepared by SITNIKOVA (1975) and BALOGH & MAHUNKA (1983).

Nothridae Berlese, 1896

Nothrus C.L. Koch, 1835

1. Tarsi with one or two claws 2
-. Tarsi with three claws 3
2. Lamellar setae pointed and almost smooth, shorter than distance between them; central notogastral setae pointed and smooth ..... *Nothrus pratensis* Sellnick
-. Lamellar setae rod-like, distinctly barbed, their length equal to distance between them; central notogastral setae rod-like, distinctly barbed ..... *Nothrus silvestris* Nicolet
3. Setae *h1* a few times longer than other notogastral ones; distance between setae *c1-c2* significantly greater than that between *c2-c3* ..... *Nothrus palustris* C.L. Koch
-. Setae *h1* slightly longer than the other notogastral ones, distance *c1-c2* smaller than *c2-c3* 4
4. Posterior notogastral setae significantly broadened and leaf-like flattened, short; setae *p1* of length equal to that of setae on central part of notogaster; lateral margins of hysterosoma with wavy indentations ..... *Nothrus anauniensis* Canestrini et Fanzago
-. Posterior notogastral setae slightly broadened distally, longer than other notogastral ones; setae *p1* significantly longer than setae on central part of notogaster; lateral margins of hysterosoma without indentations ..... *Nothrus borussicus* Sellnick

Camisiidae Oudemans, 1900

1. Three pairs of anal setae; posterior margin of notogaster delimiting anogenital region bent at the right angle; sensilli short and rod-shaped ..... *Camisia* von Heyden
-. Two pairs of anal setae; posterior margin of notogaster delimiting anogenital region bent at acute angle; sensilli long, rod-shaped or slightly broadened distally ..... *Heminothrus* Berlese

Camisia von Heyden, 1826

1. Tarsi with 1 claw 2
-. Tarsi with 3 claws 3
2. Lamellar setae longer than distance between them; distal part of sensillus smooth; notogastral setae narrow and lanceolate; 9-11 pairs of genital setae ..... *Camisia solhoeyi* Colloff

-. Lamellar setae of length equal to the distance between them; distal part of sensillus with numerous spines; notogastral setae broad-lanceolate or leaf-shaped; 13-15 pairs of genital setae ..... *Camisia lapponica* (TRÄGÅRDH)
3. Interlamellar setae significantly shorter than distance between their bases, not on apophyses 4
-. Interlamellar setae longer than distance between their bases, set on apophyses 6
4. Lamellar apophyses long, reaching tip of rostrum; notogastral setae with lateral needle-shaped spikes, usually in sheath 5
-. Lamellar apophyses short, not reaching tip of rostrum; notogastral setae smooth, without spikes and sheaths ..... *Camisia tatrica* OLSZANOWSKI
5. Posterior part of notogaster with two large cylindrical extensions carrying setae *p1*, distal width of extensions equal to the distance between them, their bases separated by deep semicircular hollow ..... *Camisia biverrucata* (C.L. KOCH)
-. Extensions carrying setae *p1* in posterior part of notogaster significantly narrower than distance between them, hollow between extensions shallow, slightly concave ..... *Camisia horrida* (HERMANN)
6. Marginal notogastral setae very long (their length equal to width of hysterosoma) set on apophyses whose length is several times greater than their width ..... *Camisia spinifer* (C.L. KOCH)
-. Notogastral setae a few times shorter than width of hysterosoma; length of notogastral apophyses approximately equal to their width 7
7. Lamellar apophyses short, not reaching tip of rostrum; posterior part of body convex ..... *Camisia invenusta* (MICHAEL)
-. Lamellar apophyses long, extending beyond tip of rostrum; posterior part of body concave 8
8. Hysterosoma elongated, twice as long as wide, posteriorly with pair of broad extensions carrying setae *h2* ..... *Camisia biurus* (C.L. KOCH)
-. Length of hysterosoma equal to one and half of its width, its posterior part without extensions ..... *Camisia segnis* (HERMANN)

Heminothrus BERLESE, 1913

1. Setae *h2* and *p1* inserted on distinct apophyses (their length exceeding their width) 2
-. Apophyses of setae *h2* and *p1* small (their length smaller than their width) 3
2. Tips of marginal notogastral setae reach distinctly beyond bases of next pair of setae, notogastral setae smooth; 9-10 pairs of genital setae; epimera IV separated medially ..... *Heminothrus longisetosus* WILLMANN
-. Tips of marginal notogastral setae barely reach bases of next pair of setae, notogastral setae barbed; 21-23 pairs of genital setae; epimera IV fused medially ..... *Heminothrus targionii* (BERLESE)

3. Notogaster with distinct longitudinal chitinous ridges 4
-. Notogaster without longitudinal ridges 5
4. Tips of notogastral setae do not reach bases of next pair of setae, setae *d1* and *e1* originate between longitudinal ridges ..... *Heminothrus humicolus* (FORSSLUND)
-. Tips of notogastral setae reach beyond bases of next pair of setae, setae *d1* and *e1* originate outside longitudinal ridges ..... *Heminothrus peltifer* (C.L. KOCH)
5. Sensilli shorter than interlamellar setae; distance between setae *c1-c1* shorter than between *d1-d1*; 19-21 pairs of genital setae ..... *Heminothrus capillatus* (BERLESE)
-. Sensilli equal in length to interlamellar setae; distance between setae *c1-c1* greater than between *d1-d1*; 12-14 pairs of genital setae ..... *Heminothrus thori* (BERLESE)

SYSTEMATIC REVIEW

Nothridae BERLESE, 1896

Cleft-like hollow in posterior part of proterosoma; sensilli setose or rod-like, longer than proterosomal setae; exobothridial setae present; lateral margins of hysterosoma slightly broadened posteriorly; surface of notogaster covered with cavities whose shape and size in central and lateral parts differ; 16 pairs of notogastral setae usually broadened distally (shape of setae is frequently obscured by layer of cerotegument); setae *f1* present in all stages; pairs of epimera I and II joined medially; neotrichy present on epimera; 9 pairs of genital setae (no genital neotrichy); no aggenital setae; 2 pairs of anal setae; 3 pairs of adanal setae; tarsi with 1, 2 or 3 claws.

Nothrus C.L. KOCH, 1835

Type species: *Nothrus palustris* C.L. KOCH, 1839
(See diagnosis of the family).

Nothrus anauniensis CANESTRINI et FANZAGO, 1876

Nothrus anauniensis CANESTRINI et FANZAGO, 1876: 99.
Camisia biciliatus: OUDEMANS 1902; non C.L. KOCH, 1841.
Nothrus biciliatus: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983.

Type: unknown.

Body length: 700-810 µm; body width: 350-410 µm.
Colour: light brown to brown.

Body slim, in certain specimens covered partially with layer of cerotegument with soil particles (particularly in hollow parts and on ventral side), setae also covered with cerotegument sheaths obscuring their actual shape (most of them slightly branched distally).

Prodorsum (Figs 3 A, 4 A-D, J)

Prodorsum elongated, surface covered with regular cavities particularly distinct in mid part; setae *ro* and *le* broad and slightly sharpened, the latter based on small apophyses and delicately barbed distally; setae *in* broad, leaf-shaped, distinctly shaped; sensilli setose, slightly broadened distally to almost 2/3 length, covered with spikes well visible in dorsal view.

Notogaster (Figs 3 A, B, 4 E-I, K; Phot. 3)

Notogaster slightly broadened posteriorly, lateral margins with wavy hollows; central field narrow, slightly broadened at level of setae *e1* and *f1*, covered with cavities of approximately circular or elongate shape, cavity edges straight or wavy, distances between cavities slightly greater than in other species, beyond limits of central field cavities less distinct, changing into system of hills and hollows; setae in central field (*c1*, *d1*, *e1* and *f1*) set near edge of field in two longitudinal rows almost parallel to each other; distance *c1-c2* significantly shorter than *c2-c3*; notogastral setae rod-like or leaf-like (in posterior part of notogaster); setae *h2* and *p1* slightly longer than others, considerably branched under sheath layer.

Gnathosoma (Fig. 5)

Subcapitulum covered with delicate reticular pattern; setae *h* short and thick apically; 3 pairs of genal setae, *a* twice longer than *m1*, *m2* twice shorter than *m1*; distance *a-m1* considerably greater than *m1-m2*; pedipalp setation: 0-1-1-3-9[1]; both cheliceral setae smooth.

Ventral region (Fig. 3 B)

Epimera III and IV separated medially; epimeral setation: (6-7)-(5-6)-(4-6)-(4-6).

Legs (Figs 6, 7)

Tarsi tridactylous, both lateral claws significantly smaller than central claw. Leg setation (including famulus) and solenidial formulae:

I:	1-(6-8)-5-6-27	[1-2-3]
II:	1-(8-9)-5-5-25	[1-1-1]
III:	3-5-5-5-22	[1-1-0]
IV:	2-6-5-5-22	[1-1-0]

MATERIAL

304 specimens from 88 samples (14 habitats).

REMARKS

Despite the postulates of HAMMEN (1952) and GRANDJEAN (1965) who suggested that the name: *N. anauniensis* CANESTRINI et FANZAGO, 1841 (*N. biciliatus* C.L. KOCH, 1841 cannot be verified) should be used, the majority of authors have been using the name *N. biciliatus*, on the basis of the monograph by SELLNICK & FORSSLUND (1955) and the keys for determination of moss mites published later (SITNIKOVA 1975, BALOGH & MAHUNKA 1983).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 107)

The species can be found in the whole area of Poland, although it is more frequent in the lowlands than in the mountainous regions. The highest locality where it was found is at 1250 m a.s.l., in the Karkonosze Mts. (Śnieżne Kotły). *N. anauniensis* is a characteristic - selective species of grasses and mosses on limestone-rich basement soil, and of the forest habitats - of parks (together with *H. targionii*). In Poland the highest values of occurrence and dominance were also noted in the shrubs, marshy forests, alder forests and other types of deciduous forests.

C = 7.3; D = 2.1.

PREVIOUS RECORDS FROM POLAND

FRENZEL 1936, RAJSKI 1961, 1967, RAFALSKI 1966, NIEDBAŁA 1967, 1977, NIEDBAŁA & ROHLOFF 1972, BOROWIAK & NIEDBAŁA 1980, 1982.

GENERAL DISTRIBUTION

Holarctic, Oriental and Australian Regions.

Nothrus borussicus SELLNICK, 1928

Nothrus borussicus SELLNICK, 1928: 19.
Nothrus borussicus: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983 .
Nothrus biciliatus sensu TRÄGARDH, 1904: HAMMER 1946, non C.L. KOCH, 1841.
Nothrus silvestris sensu JØRGENSEN, 1934: HAMMER 1946, non NICOLET, 1855.

Type: destroyed.

Body length: 890-1000 μm; body width: 440-600 μm.

Colour: brown.

Body slim, considerably broadened posteriorly; setae (except rostral) covered with cerotegument sheath.

Prodorsum (Figs 8, 10 A-D, J)

Prodorsum elongated, surface covered with regular oval cavities; setae *ro* thin and smooth; setae *le* longer and wider, covered with sheath and set on small apophyses; setae *in* broadened and branched distally; sensillus setose, sharpened, covered with sparse squamate spikes.

Notogaster (Figs 8, 9, 10 E-I, K)

Notogastral shield considerably broadened at level of setae *e2*, strongly arched in central part, covered with round or oval cavities sometimes fused, in less sclerified specimens lighter bands joining neighbouring cavities can be seen, outside central field cavities smaller and less distinct; central field wide; pairs of setae *c1*, *d1*, *d2*, *e1* and *f1* in rows almost parallel to each other, far from borders of central field; distance *c1-c2* significantly smaller than *c2-c3*; seta *c2* shorter than *c1*; notogastral setae rod-shaped (in central field) to broadened distally (in posterior part of notogaster); setae *h2* and *p1*, of almost the same length, longer than other notogastral setae, significantly branched distally and covered in sheath; setae *p2* and *p3* much shorter than *p1*.

Gnathosoma (Figs 11, 12 A)

Subcapitulum covered with very delicate reticulate pattern; setae *h* short and thick apically; setae *m1* and *m2* three times shorter than *a*; distance *a-m1* only slightly longer than *m1-m2*; pedipalp setation: 0-1-1-3-9[1]; both cheliceral setae smooth.

Ventral region (Fig. 9)

Epimera III and IV separated medially by narrow crevice; epimeral setation: 7-5-(6-7)-6.

Legs (Fig. 12 B)

Tarsi tridactylous (both lateral claws smaller than central claw). Leg setation (including famulus) and solenidial formulae:

I:	1-(8-9)-5-6-27	[1-2-3]
II:	1-9-5-5-25	[1-1-1]
III:	3-5-5-5-22	[1-1-0]
IV:	2-6-5-5-22	[1-1-0]

MATERIAL

232 specimens from 51 samples (13 habitats).

REMARKS

The reticulae between the cavities on notogaster, mentioned by SELLNICK & FORSSLUND (1955), which have been used as a key character in recent papers

(SITNIKOVA 1975, BALOGH & MAHUNKA 1983) are visible only in weakly sclerified specimens and thus constitute no reliable diagnostic feature. Moreover, this feature is not exclusive for *N. borussicus*, and can be observed also in other species of *Nothridae* and *Camisiidae*. Perhaps its existence is related to the way of notogastral cavities formation.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 108)

This species can be found in whole Poland, both in the lowlands and in the mountainous regions where it is even more abundant. I found it, among other sites, also at the Kozia Przełęcz Pass in the Tatra Mts. (2137 m a.s.l.), which in Poland is the highest locality of occurrence of all the *Nothridae* and *Camisiidae*. For this species the highest values of the constancy of occurrence and dominance have been noted in grasses on decalcified basement soil, in dwarf pine zone, alpine forests and also in the nests of mammals except the mole. In the lowland areas *N. borussicus* occurs mostly in shrubs and parks, however, it can be also found in various types of mixed and deciduous forests and xerothermic grasses.

C = 4.2; D = 1.6.

PREVIOUS RECORDS FROM POLAND

WILLMANN 1956.

GENERAL DISTRIBUTION

Holarctic Region.

Nothrus palustris C.L. KOCH, 1839

Nothrus palustris C.L. KOCH, 1839: Vol. 29 (13).
Nothrus palustris: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983.
Angelia palustris (C.L. KOCH, 1839).

Type: unknown.

Body length: 990-1200 µm; body width: 500-760 µm.

Colour: light brown to brown.

Body thick, considerably broader posteriorly. Setae covered with a more or less noticeable cerotegument sheath.

Prodorsum (Figs 13, 15 A-D, I)

Prodorsum shortened, wide; surface covered with oval cavities; setae *ro* short, slightly curved, smooth; setae *le* longer, slightly rough apically, set on short apophyses; setae *in* slightly broader and branched distally; bothridia with relatively small openings; sensillus smooth, setose, rounded distally, in certain specimens covered with delicate sparse scales.

Notogaster (Figs 13, 14, 15 E-H, J)

Notogaster usually separated from prodorsum by less sclerified region, wide, egg-shaped, its posterior margin straight or slightly concave; central field arched, broad, distinctly narrowed anteriorly (at about setae *c1*) and posteriorly, beyond setae *f1* covered with round or polygonal cavities, sometimes joined in two or three; in less sclerified specimens lighter band joining neighbouring cavities can be seen; outside central field cavities smaller, more irregular, near extreme margins they change into knotted humps; distances between pairs of setae *c1* and *d1* significantly shorter than distances between *d2* and *e1*; setae *c2* short, set close to *c3* (distance *c1-c2* four times longer than *c2-c3*); shape of notogastral setae much varied: in central field and on margins of notogaster rod-like, slightly broadened distally and sharpened, *h1* and *p1* longer and broader, slightly branched distally, *h2* a few times longer (to 600 μm) than others, setose, with very delicate spikes, setae *h3*, *p1* and *p2* short and thin.

Gnathosoma (Fig. 16)

Subcapitulum covered with very delicate reticulate pattern; setae *h* relatively short and narrow; genal setae much differentiated (*a* twice longer than *m1*, *m2* shorter than *m1*); distance *a-m1* over twice longer that *m1-m2*; pedipalp setation: 0-1-1-3-9[1]; both cheliceral setae delicately barbed.

Ventral region (Fig. 14)

Epimera III and IV clearly separated medially; epimeral setation: (3-4)-3-(4-6)-(4-5).

Legs (Fig. 17)

Tarsi tridactylous (both extreme claws smaller than central one). Leg setation (including famulus) and solenidial formulae:

I:	1-8-5-6-27	[1-2-3]
II:	1-9-5-5-25	[1-1-1]
III:	3-5-5-5-24	[1-1-0]
IV:	(1-2)-4-5-5-22	[1-1-0]

MATERIAL

1552 specimens from 191 samples (16 habitats).

REMARKS

In 1974 AOKI & OHNISHI distinguished a subspecies *N. palustris asiaticus* and gave the following features that distinguished it from the description and figure given by SELLNICK & FORSSLUND (1955): the length of sensilli greater than the distance between their bases and broader "spatulate" notogastral setae (especially on posterior margin). In my opinion, based on the studies on the morphology of *N. palustris*, the decision of the above authors is poorly justified. In the specimens

collected in Poland the length of sensilli fits within the range specified for the subspecies *asiaticus* and, moreover, the shape of notogastral setae, whose width is highly variable, is also similar (see Figs 15 E-H). The figure given by SELLNICK & FORSSLUND is too small and imprecise to be treated as a reference standard for distinguishing a new taxon.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 109)

N. palustris is distributed in the area of whole Poland; in the mountainous regions as high as 1250 m a.s.l. (Karkonosze Mts. - Śnieżne Kotły). It is a very frequent and very abundant species. I assumed it to be a characteristic - selective species for marshy forests, alder forests and parks, although high values of the constancy of occurrence and dominance were also obtained for this species in other humid forest habitats such as coniferous forests, mixed forests and brushwoods. C = 15.8; D = 10.8.

PREVIOUS RECORDS FROM POLAND

DYRDOWSKA 1931, FRENZEL 1936, KIEŁCZEWSKI 1957, RAJSKI 1961, 1967, NIEDBAŁA 1977, SENICZAK 1978, BŁOSZYK & OLSZANOWSKI 1985, SELL 1990, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION

Holarctic Region.

Nothrus pratensis SELLNICK, 1928

Nothrus pratensis SELLNICK: 19.
Nothrus pratensis: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983.

Type: destroyed.

Body length: 760-900 µm; body width: 430-520 µm.

Colour: light brown to brown. Body stocky, thickened posteriorly. Setae (except rostral and lamellar) covered with thin cerotegument sheath.

Prodorsum (Figs 18, 20 A-D, J)

Surface covered with cavities; setae *ro* and *le* of the same length, without sheaths, setae *le* set on short apophyses and delicately barbed; setae *in* slightly longer and broader, barbed; sensilli setose, frequently curved posteriorly, sharpened, with sparse scale-like spikes.

Notogaster (Figs 18, 19, 20 E-F, K)

Lateral margins evenly rounded, posterior part slightly convex; central field broad, convex, covered with round or egg-shaped cavities, outside central field

cavities smaller and irregular; distances between pairs of setae *c1*, *d1*, and *f1* smaller than those between pairs of *d2* and *e2*; setae *c2* twice shorter than *c1*, set approximately medially of setae *c1* and *c2*; notogastral setae smooth (except *p*, *h* and *f2* delicately branched distally), sharpened, covered with thin transparent sheath (it can be almost invisible when looked at against darker surface of body); seta *h2* longer than others (its length can exceed 150 μm).

Gnathosoma (Fig. 21; Phot. 2)

Subcapitulum with delicate reticulate pattern; setae *h* relatively long, narrow; setae a over twice longer than *m1*, *m2* very short (sometimes more than twice shorter than *m1*); distance *a-m1* considerably greater than *m1-m2*; pedipalp setation: 0-1-1-3-9[1]; both cheliceral setae with delicate spikes.

Ventral region (Fig. 19; Phot. 1)

Epimera III and IV separated medially by crevice; epimeral setation: (4-5)-3-(3-4)-(3-4).

Legs (Fig. 22)

Tarsi monodactylous. Leg setation (including famulus) and solenidial formulae:

I:	1-8-5-6-27	[1-2-3]
II:	1-8-5-5-24	[1-1-1]
III:	(2-4)-5-5-5-(22-23)	[1-1-0]
IV:	1-4-5-5-22	[1-1-0]

MATERIAL

224 specimens from 24 samples (3 habitats).

REMARKS

I have observed some specimens with doubled setae *m2* and with additional fourth adanal setae.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 110)

N. pratensis can be found in whole Poland although I have never noticed it above the altitude of 700 m a.s.l., highest localities were: reserves "Torfowisko Batorowskie" (Stołowe Mts.) and "Bór na Czerwonym" near Nowy Targ. Since in the Alps it was found at 1600 m a.s.l., it is supposed to occur also in humid mountain habitats in Poland[10]. *N. pratensis* can be recognized as a characteristic - exclusive species of peat-bogs (in Poland it occurred only accidentally in other habitats).
C = 2.0; D = 1.6.

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[10] Quite recently SENICZAK (pers. comm.) has found this species in the Tatra Mountains at 1200 m a.s.l.

PREVIOUS RECORDS FROM POLAND

FRENZEL 1936, WILLMANN 1939, 1949b, 1956, STRENZKE 1952, RAJSKI 1961, 1967, NIEDBAŁA 1967, SENICZAK 1978.

GENERAL DISTRIBUTION

Holarctic Region.

Nothrus silvestris NICOLET, 1855

Nothrus silvestris NICOLET, 1855: 458.
Angelia sylvestris: BERLESE 1896.
Nothrus anauniensis sensu BERLESE, 1885: SITNIKOVA 1975, BALOGH & MAHUNKA 1983; non CANESTRINI & FANZAGO, 1876.
Angelia anauniensis: LOMBARDINI 1936.
Nothrus silvestris var. *anauniensis*: SELLNICK & FORSSLUND 1955.

Type: not designated.

Body length: 710-810 µm; body width: 350-430 µm.

Colour: brown to light brown. Body slim, slightly broadened posteriorly; setae covered with relatively thin layer of cerotegument.

Prodorsum (Figs 23 A, 24 A-D, J; Phot. 5)

Prodorsum elongated; surface covered with oval or polyponate cavities; setae *ro* with no sheaths, slightly setose, curved medially; setae *le* longer and broader, setose; setae *in* of similar length as setae *le* but much broader distally, clearly branched; sensilli setiform, barbed.

Notogaster (Figs 23, 24 E-I, K; Phot. 5)

Notogaster separated from prodorsum by a less sclerified region, elongated, slightly broadened posteriorly (widest at level of setae *e2*); central field elongated, of rounded margins, slightly arched, covered with round or multilateral cavities; distances between pairs of setae on central field increase posteriorly down to setae *e1*; setae *c2* more than twice shorter than *c1*; distance *c1-c2* slightly smaller than *c2-c3*; notogastral setae rod-shaped, slightly branched and covered with sheaths; posterior setae slightly broadened distally, with clearly visible branches, setae *h2* long (to 180 µm), usually curved medially.

Gnathosoma (Fig. 25)

Subcapitulum with delicate reticulate pattern; setae *h* long, almost as long as setae *a*, thin; setae *a* more than three times longer than *m1*, setae *m1* only slightly longer than *m2* and set in their direct neighbourhood, specimens with doubled seta *m2* frequently found; pedipalp setation: 0-1-1-3-9[1]; both cheliceral setae minutely barbed.

Ventral region (Fig. 23 B)

Pairs of epimera III and IV fully separated medially; epimeral setation: (6-7)-(4-5)-(5-6)-(4-6).

Legs (Fig. 26)

Tarsi with 1 or 2 claws, in the latter case, apart from strong centrally set claw there is an additional claw, paraxial (tarsi I and II) or antiaxial (tarsi III and IV), much thinner and slightly shorter. Leg setation (including famulus) and solenidial formulae:

I:	1-(8-9)-5-6-27	[1-2-3]
II:	1-9-5-5-25	[1-1-1]
III:	(2-3)-5-5-5-22	[1-1-0]
IV:	(1-2)-5-5-5-22	[1-1-0]

MATERIAL

2551 specimens from 312 samples (18 habitats).

REMARKS

HAMMEN (1952, 1959) as well as SELLNICK & FORSSLUND (1955) discussed in detail the taxonomical problems related to this species. The character whose taxonomic value had raised doubts for a long time was the number of claws on tarsi. Having examined numerous populations of *N. silvestris* originating both from Poland and other European countries, I noticed that this feature cannot be attributed a diagnostic value (e.g. a lack of geographical and ecological correlation, number of claws varying between the legs of the same specimen, rare specimens with three claws) while the other differentiating features given by SELLNICK & FORSSLUND (1955) fall within the range of the species variability.

In the key for determination of moss mites, on the basis of BERLESE's description (1885), SITNIKOVA (1975) classified *N. silvestris* var. *anauniensis* as a distinct species *N. anauniensis*. Additional complications followed from assigning an erroneous name *anauniensis* (appropriate for the "*biciliatus*" form) to the two-claw specimens of *N. silvestris* and a widespread acceptance of this assignment (the number of claws is a good key character as it can be determined even under relatively low magnification). To clarify the present status of the above discussed species the erroneous and correct names are listed in Table 3.

It follows from the list that in papers mentioning both *N. anauniensis* (or *N. silvestris* var. *anauniensis*) and *N. biciliatus*, that these names refer to *N. silvestris* and *N. anauniensis*, respectively. When only the name *N. anauniensis* is mentioned, it could have been used erroneously or correctly.

Table 3. Erroneous and correct names used for *Nothrus silvestris* and *N. anauniensis* (explanation in the text).

Erroneous name (many authors)	Correct name
N. anauniensis	*N. silvestris*
N. silvestris var. *anauniensis*	*N. silvestris*
N. biciliatus	*N. anauniensis*

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 111)

The species is known to occur in the whole area of Poland. Its highest locality is situated at 1450 m a.s.l. (Tatra Mts. - Hala Kondratowa). *N. silvestris* is a very frequent and very abundant species which significantly prefers forest habitats. Apart from coniferous and mixed forests it most frequently inhabits also various types of deciduous forests. It is frequent in mixed forests and mountain forests of low subalpine zone.

C = 25.7; D = 17.7.

PREVIOUS RECORDS FROM POLAND

SELLNICK 1908, 1921, HARNISCH 1926, DYRDOWSKA 1931, FRENZEL 1936, WILLMANN 1939, 1956, STRENZKE 1952, KIEŁCZEWSKI 1957, 1958, RAJSKI 1961, 1967, NIEDBAŁA 1967, 1969, 1970, 1972, KIEŁCZEWSKI et al. 1970, NIEDBAŁA & ROHLOFF 1972, KIEŁCZEWSKI & WIŚNIEWSKI 1973, SENICZAK 1973, 1975, 1978, KACZMAREK 1977, ADAMSKA et al. 1978, DZIUBA et al. 1979, BOROWIAK & NIEDBAŁA 1980, 1982, ŻBIKOWSKA-ZDUN 1983, BŁOSZYK & OLSZANOWSKI 1985, DZIUBA & SKUBAŁA 1986, NIEDBAŁA et al. 1990, SELL 1990, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION

Holarctic and Neotropical Regions.

Camisiidae OUDEMANS, 1900

Notogastral shield broad, without rostral hollow, with 1-3 pairs of longitudinal ridges; lamellar setae barbed, set on larger or smaller apophyses; 15 or 16 pairs of notogastral setae[11], sometimes set on apophyses; 9-25 pairs of genital setae, 2 pairs of aggenital setae, 3 pairs of adanal setae.

[11] The absence of setae *f1* is not a very stable feature, they can appear sometimes or can remain in the form of alveoli.

REMARKS

Distinction between the genera *Heminothrus* and *Platynothrus* has been burdened with some problems for a long time. BERLESE himself (1885) omitted the diagnosis of the genus *Platynothrus* (he described *Heminothrus* as a subgenus of *Nothrus*). SELLNICK & FORSSLUND (1955) separated the two genera on the basis of the presence of "bothridial sacs". According to other authors the most important distinctive features were the presence or absence of longitudinal chitin ridges on notogaster and the degree of depression of the dorsal side of the body (SITNIKOVA 1975), arrangement and length of notogastral setae (HAMMEN 1959), or setting of notogastral setae on more or less distinct apophyses (BALOGH & MAHUNKA 1983). The latter authors treat *Platynothrus* and *Neonothrus* as subgenera of *Heminothrus*. NORTON (in MARSHALL et al. 1987) suggested that the problem could be solved by the studies on juvenile stages. In his recent papers SENICZAK (1990a,b, 1991) confirmed the importance of such studies revealing very similar morphology of juvenile stages of different camisiid species. In view of the above I decided to use the BALOGH & MAHUNKA's (1983) system.

Camisia VON HEYDEN, 1826

Type species: *Notaspis segnis* HERMANN, 1804.

Relatively large mites, frequently over 1 mm in length; body usually covered with dirt and debris; lamellar setae usually set on well-developed apophyses; sensilli club-shaped, short; surface of notogaster usually with longitudinal ridges; 15-16 pairs of notogastral setae, posterior ones often set on apophyses; 9-20 pairs of genital setae, 2 pairs of aggenital setae, 3 pairs of anal and adanal setae; posterior margin of notogastral shield on ventral side perpendicular to anal shields; tarsi tri- or monodactylous.

REMARKS

In 1987 KARPPINEN & KRIVOLUCKIJ placed *C. lapponica* sensu SELLNICK & FORSSLUND (1955) in a separate subgenus *Ivarsia*. Earlier also KUNST (1971) suggested separating this species as a subgenus *Ensicamisia*. Despite certain common characters of the species having broadened notogastral setae (*C. lapponica* sensu COLLOFF, 1993 and *C. solhoeyi*, COLLOFF, 1993), distinction of a new subgenus seems controversial.

Camisia biurus (C.L. KOCH, 1839)

Nothrus biurus C.L. KOCH, 1839: Vol. 30(2).
Nothrus segnis sensu C.L. KOCH, 1839, non HERMANN, 1804.
Nothrus furcatus sensu C.L. KOCH, 1839.
Nothrus pigerrimus sensu C.L. KOCH, 1839.

Camisia exuvialis GRANDJEAN, 1939.
Camisia exuvialis: HAMMEN 1952.
Uronothrus kochi WILLMANN, 1943.
Camisia segnis sensu SELLNICK, 1928, non HERMANN, 1804.
Uronothrus segnis sensu WILLMANN, 1939: WILLMANN 1952, non HERMANN, 1804.
Camisia biurus: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983, COLLOFF, 1993.

Type: unknown.

Body length: 950-1240 μm; body width: 420-500 μm.
Colour: light brown to brown.
Body elongated, covered with cerotegument (sometimes with dirt and debris) and, usually, with fragments of tritonymphal exuvia; all setae in sheaths.

Prodorsum (Figs 29, 31, 32 G)
Rostrum slightly elongated; surface of prodorsum delicately pointed, in central part, between bothridia, with some flat cavities; setae *ro* slightly branched distally; setae *le* long, curved, distinctly branched adaxially, set on large apophyses; tips of lamellar apophyses stand out of rostral margin; setae *in* long, delicately branched, set on apophyses much smaller than lamellar ones and bent anteriorly; interlamellar apophyses set on longitudinal ridges running towards rostrum and posteriorly towards bothridia, bothridia spherical, protruding over prodorsal surface; sensilli short, club-shaped, their tips covered with secretion of cerotegument.

Notogaster (Figs 29, 30, 32 A-F, H)
Notogaster longitudinal, lateral margins almost parallel to each other, slightly wavy; in central part rectangular belt spreading from level of setae *d1* to posterior part, slightly hollowed relative to lateral surfaces; central field smooth, laterally covered with round, slightly convex humps; rib-like chitinous swellings arranged perpendicularly to body axis visible on lateral parts of notogaster; all notogastral setae, except *h2*, short and smooth, usually covered (partly or completely) with thin sheaths; seta *c2* slightly closer to *c3* than to *c1*; distance *d1-d2* twice smaller than *d2-e2*; posterior part of notogaster with trapezoidal hollow in which setae *h1* are set; on both sides of the hollow longitudinal lobes directed posteriorly and ended with two convex humps, setae *h2* set on the inner ones, longer than other notogastral setae and branched distally.

Gnathosoma (Fig. 33, 34)
Setae *h* thick, twice longer than *a*; pedipalp setation: 0-1-1-2-7[1]; both cheliceral setae delicately barbed.

Ventral region (Fig. 30)
Pairs of epimera separated medially by fissure broadened posteriorly; epimeral setation: 3-1-3-3, medial setae of epimera IV significantly longer than others;

number of genital setae: 9 pairs; in certain specimens atypical number of anal setae: 2 or 4 pairs.

Legs (Figs 35, 36)
Tarsi tridactylous.
Leg setation (including famulus) and solenidial formulae:

I:	1-13-(5-6)-6-29	[1-1-1]
II:	1-13-5-6-26	[1-1-1]
III:	5-9-5-5-25	[1-1-0]
IV:	1-7-5-5-25	[0-1-0]

MATERIAL
436 specimens from 94 samples (13 habitats).

REMARKS
The shape of prodorsum shown in Fig. 29 is slightly different from the description and figure given by SELLNICK & FORSSLUND (1955) which is a result of a slightly different arrangement of proterosoma with respect to hysterosoma (compare remarks on *C. horrida*).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 112)
The species can be found in whole Poland, in the mountainous region as high as 2100 m a.s.l. (Tatra Mts. - Przełęcz Szpiglasowa Pass). Apart from the dwarf pine zone (the highest values of the constancy of occurrence and dominance), lowland and alpine forests, it was most frequently found in grasses on decalcified basement soil and peat-bogs.
C = 7.8; D = 3.0.

PREVIOUS RECORDS FROM POLAND
SELLNICK 1921, DYRDOWSKA 1931, FRENZEL 1936, WILLMANN 1939, 1956, STRENZKE 1952, RAJSKI 1961, 1967, WIŚNIEWSKI 1966, NIEDBAŁA 1969, 1970, 1972, 1977, NIEDBAŁA & ROHLOFF 1972, SENICZAK 1973, 1978, ADAMSKA et al. 1978, DZIUBA & SKUBAŁA 1987, NIEDBAŁA et al. 1990, SELL 1990, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION
Holarctic Region.

Camisia biverrucata (C.L. KOCH, 1839)

Nothrus biverrucata C.L. KOCH, 1839: Vol. 29 (15)
Nothrus horridus sensu NICOLET, 1855

Camisia fisheri Oudemans, 1900
Camisia nicoletii Oudemans, 1900
Camisia berlesei Oudemans, 1900
Camisia biverrucata: Sellnick & Forsslund 1955, Sitnikova 1975, Balogh & Mahunka 1983, Colloff 1993

Type: unknown.

Body length: 1040-1150 µm; body width: 490-580 µm.
Colour: brown to dark brown.
Body thickset with almost parallel lateral margins, covered with a layer of cerotegument and usually covered with stuck particles of soil and detritus.

Prodorsum (Figs 37, 39 A-D, J)
Rostrum elongated; sclerified ridges run from bothridia towards rostrum; prodorsal surface delicately pointed, less sclerified specimens with outlines of sparse cavities in central part, between bothridia; setae *ro* barbed distally; setae *le* curved towards each other with shortly sharpened branches, set on slim apophyses slightly longer than the setae themselves; setae *in* very small, smooth; bothridia clearly protruding beyond prodorsal surface; sensilli clavate, distally with numerous adjacent digitate extensions.

Notogaster (Figs 37, 38, 39 E-I, K)
Shape rectangular, lateral margins slightly wavy; central part slightly hollowed, restricted by longitudinal ridges starting at setae *d1*, running posteriorly to be joined in a semicircular way at setae *f2* (somewhat before the joint, branches form towards posterior notogastral corners), surface on central part covered with rounded humps; posterior part of notogaster with clearly marked convexity ended with two lobes bearing setae *p1*; between lobes semicircular hollow narrower than their width; ratio of distances *c1-c2* to *c2-c3* and *d1-d2* to *d2-e1* as 1:2; all notogastral setae short, with numerous, small, sharply ended appendices, set on small apophyses.

Gnathosoma (Fig. 40)
Setae *h* thick, few times longer then *a*; pedipalp setation: 0-1-1-2-7[1]; both cheliceral setae minutely barbed.

Ventral region (Fig. 38)
Epimera separated medially by longitudinal fissure; epimeral setation: (3-4)-1-2-3; number of genital setae: 9 pairs.

Legs (Fig. 41)
Tarsi tridactylous.
Leg setation (including famulus) and solenidial formulae:

I:	1-11-5-6-32	[1-1-1]
II:	1-11-5-6-29	[1-1-1]
III:	5-5-5-5-(25-27)	[1-1-0]
IV:	1-3-5-5-(25-26)	[0-1-0]

MATERIAL

24 specimens from 9 samples (6 habitats).

REMARKS

The shape of the lobes in the posterior part of the body is variable (cf. DUBININA et al. 1966 and the remarks on *C. horrida*).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 113)

C. biverrucata can be found in whole Poland. Its highest locality is at 1909 m a.s.l. (Tatra Mts. - Giewont Mt.). The specimens of this species were most abundantly found in mountain habitats (dwarf pine zone and grass on limestone-rich basement soil) and of the lowland habitats in brushwoods. The number of the collected individuals is too small to draw conclusions about its ecological preferences.

C = 0.7; D = 0.2.

PREVIOUS RECORDS FROM POLAND

RAFALSKI 1953, 1966, KIEŁCZEWSKI & WIŚNIEWSKI 1962a, 1962b, WIŚNIEWSKI 1965a, 1965b, NIEDBAŁA 1969, 1970, 1972, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION

Holarctic Region.

Camisia horrida (HERMANN, 1804)

Notaspis horridus HERMANN, 1804: 90
Nothrus horridus: MICHAEL 1884-1888
Oribata horrida: MICHAEL 1884-1888
Nothrus mutilus C.L. KOCH, 1839
Nothrus bistriatus C.L. KOCH, 1839
Nothrus sinuatus C.L. KOCH, 1839
Nothrus runcinatus C.L. KOCH, 1839
Nothrus angulatus C.L. KOCH, 1839 sensu BERLESE, 1883
Nothrus borealis THORELL, 1872
Nothrus rugulosus BANKS, 1895
Camisia horrida var. *borealis* sensu DALENIUS, 1950
Camisia horrida: SELLNICK & Forsslund 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983
Camisia borealis: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983

Type: not designated.

Body length: 825-960 μm; body width: 420-470 μm.

Colour: brown to grey-brown. Lateral margins almost parallel to each other, surface almost always tightly covered with cerotegument layer with dirt and detritus remains.

Prodorsum (Figs 42, 44 A-D, K, 47A, B)

Rostrum rounded; central part of prodorsal surface with distinct oval cavities; setae *ro* almost straight, barbed; setae *le* with pointed branches, covered with a layer of cerotegument (thanks to which lateral appendices can take finger-like shape or bulb-shape at their ends); lamellar apophyses broad at bases, narrowed distally, relatively long (reach or exceed rostrum); bases of apophyses joined by delicate swelling; setae in small, covered with cerotegument; longitudinal ridges start at certain distance from bases of lamellar apophyses, posteriorly branch out to lateral margins reaching setae *in*; sensilli club-shaped with short appendices, their tips covered with cerotegument.

Notogaster (Figs 42, 43, 44 E-J, K, 46, 47, 48; Phots. 6, 7)

Rectangular shape, lateral margins with sparse hollows; two longitudinal chitinous ridges, almost parallel to each other in the beginning, joined in semicircular way posteriorly and branched out towards shield corners; surface covered with flat-rounded humps; shape of posterior part variable: trapezoid convexity more or less protruding, indentation on its posterior margin of different shape (Figs 46, 47 B; Phot. 6); notogastral setae set on small apophyses, with needle-shaped branches (longer on lateral and posterior setae), covered in sheaths, setae *h2* longer than others; distance *c1-c2* slightly shorter than *d2-d3*, *d1-d2* almost equal to *d2-e1*. Gnathosoma (Fig. 45 A, B). Setae *h* long and relatively thick, a few times longer than setae *a*; pedipalp setation: 0-1-1-2-7[1]; both pairs of cheliceral setae minutely barbed.

Ventral region (Fig. 43)

Epimera separated medially by well marked fissure; epimeral setation: (3-4)-1-2-3; number of genital setae: 9 pairs.

Legs (Fig. 45 C)

Tarsi tridactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-10-5-6-(28-29)	[1-1-1]
II:	1-9-5-6-25	[1-1-1]
III:	3-6-4-5-(23-24)	[1-1-0]
IV:	1-3-4-(4-5)-22	[0-1-0]

MATERIAL

63 specimens from 22 samples (13 habitats).

REMARKS

SELLNICK & FORSSLUND (1955) redescribed *C. borealis* (THORELL, 1872) specifying the diagnosis differentiating this form from the species *C. horrida* and proposed to classify it as a separate species.

The distinctive features are specified in Table 4.

Table 4. Morphological characters differentiating *Camisia borealis* sensu SELLNICK & FORSSLUND (1955) from *C. horrida* (after SELLNICK & FORSSLUND 1955).

Feature	C. *borealis* sensu SELLN. & FORSSL.	*C. horrida*
shape of rostrum	rounded	flattened
width of prodorsum relative to width of notogaster	almost the same	prodorsum narrower than notogaster
shape of indentantion in prodorsum before bothridia	obtuse angle	right angle
length of lamellar apophyses	exceed rostrum	do not reach rostrum
connection between lamellar apophyses	present	absent
setae *fl*	present	absent
posterior part of body	almost straight, slightly concave medially	clearly concave between setae *p1*

The last two characters were considered the most important by the authors.

Since I found in Poland a few specimens in which setae *fl* were present, I could carefully study the features mentioned above and compare them with specimens of *C. horrida* (without setae *fl*). The conclusions are as follows:

1. The shape of rostrum, indentations in the prodorsal sides, width of prodorsal posterior part and the shape of the posterior part of the body are affected by the following factors:

- individual variability (Figs 46, 47),
- the angle at which the prodorsum or notogaster are viewed, determined by the way the mite's body was placed on the slide,
- changes in the shape (formation of projections and hollows) caused by the effects of lactic acid.

A high individual variability of this species was already noted by TRÄGÅRDH (1904) and DUBININA et al. (1966) and recently by BECK & WOAS (1991). Mites of the genus *Camisia* are relatively high and of much differentiated body surface so even small deviations from the horizontal orientation of the animal may lead to significant changes in the shape of the viewed and described structures. The effect of lactic acid can be especially important in less sclerified specimens.

2. The length of lamellar apophyses relative to the rostral margin and the presence of a darker band between their bases are also dependent on the angle at which the prodorsum is viewed.

3. The presence of setae *f1* in different camisiid species has been recently indicated by SENICZAK et al. (1990). In my opinion the case of *C. horrida* may be similar to the variability of the occurrence of this seta in *Heminothrus capillatus*, however in specimens of *C. horrida* with no setae *f1* I could not find any remnants of them (apophyses, alveoli). One of the specimens with setae *f1* also had an additional seta *e1*.

4. I did not find any differences between the two forms as far as the following features are concerned: the shape of prodorsal and notogastral setae, the number of epimeral and genital setae, structure of hypostome and leg phanerotaxy.

THORELL's (1872) description of *C. borealis* is incomplete and no figure is given. The author does not mention an additional pair of notogastral setae. This was the basis, apart from other features, for COLLOFF's conclusion (1993) that THORELL described a form different from that redescribed by SELLNICK & FORSSLUND as *C. borealis*[12]. He described specimens with additional setae *f1* as a new species - *C. anomia*. In my opinion the distinctive features specified by him are not sufficiently convincing as still the only certain feature is the presence or absence of the pair of setae *f1*. Therefore, distinction of a separate species is doubtful and indicates the need for further studies on the variability of *C. horrida*.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 114)

Known to occur in whole Poland. Its highest locality is at 1650 m a.s.l. in the Tatra Mts. (Dolina Kondratowa Valley). Most frequently met in grasses, more abundant in those on decalcified basement soil, in lowland and alpine forests. Among merocenoses relatively numerous in hollows scooped out in tree trunks.

C = 1.8; D = 0.4.

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[12] COLLOFF in his work (1993) redescribed as *C. borealis* the specimens collected by C.L. KOCH, large mites without setae *f1*, of the shape somewhat similar to that of *C. biverrucata*.

PREVIOUS RECORDS FROM POLAND:
WILLMANN 1956, RAJSKI 1961, 1967, KIEŁCZEWSKI & SENICZAK 1971, KACZMAREK 1977, NIEDBAŁA 1977, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION
Holarctic and Neotropical Regions.

Camisia invenusta (MICHAEL, 1888)

Nothrus invenustus MICHAEL, 1888: 500.
Camisia invenusta: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983.

Lectotype: British Museum (Natural History), London.

Body length: 670-800 μm; body width: 330-430 μm.
Colour: light brown to brown. Body of oval shape, usually covered with a thin layer of cerotegument.

Prodorsum (Figs 49 A, 50 A-D, M)
Rostrum rounded; longitudinal chitinous folds almost parallel to one another run between interlamellar setae, anteriorly they almost reach bases of lamellar apophyses; prodorsal surface delicately pointed, without cavities; setae *ro* smooth; setae *le* branched distally, covered with sheaths, protrude beyond rostrum; lamellar apophyses short, their bases joined; setae *in* long, reaching beyond bases of lamellar apophyses, delicately barbed, set on small apophyses; sensilli club-shaped with minute shoots on tips.

Notogaster (Figs 49, 50 E-L)
Oval shape; central part with two longitudinal ridges with small bumps run towards middle of shield at level of setae *d1*, *d2* and *e1* (a delicate transverse ridge is formed there) and joined immediately in posterior part before setae *h1*; surface of shield between ridges distinctly hollowed, lack of humps and cavities; posterior margin more or less convex; notogastral setae with numerous short branches, covered with cerotegument, set on small apophyses; setae *h2* and *h3* distinctly longer than other; distance *c1-c2* slightly shorter than *c2-c3*; distances *c1-d1*, *d1-d2* and *d2-e1* close to one another.

Gnathosoma (Figs 51 A-C)
Setae *h* only a little longer than *a*; pedipalp setation: 0-1-1-1-7[1]; cheliceral setae delicately barbed.

Ventral region (Fig. 49 B)
Epimera separated medially by wide furrow; epimeral setation: 3-1-3-3; number of genital setae: 9 pairs.

Legs (Fig. 51 D)
Tarsi tridactylous.
Leg setation (including famulus) and solenidial formulae:

I:	1-7-5-6-(18-21)	[1-1-1]
II:	1-8-5-6-16	[1-1-1]
III:	3-4-3-4-15	[1-1-0]
IV:	2-2-3-4-15	[0-1-0]

MATERIAL
9 specimens from 6 samples (4 habitats).

REMARKS
In contrast to the description and figure given by SELLNICK & FORSSLUND (1955), the specimens found in Poland are characterized by a more convex shape of the posterior part of the body and longer interlamellar setae (their thin ends are sometimes poorly visible).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 115)
C. invenusta is new for the Polish fauna.
Localities: [0133/11] - 22.V.1970, Ślęża Mt. (altitude 700 m a.s.l.), sifted litter and soil under *Picea excelsa*, leg. excursion of Department of Animal Morphology, A. Mickiewicz University; [0829/21] - 23.V.1973, Karkonosze Mts., near "Samotnia" shelter, alpine forest, sifted litter, leg W. NIEDBAŁA; [0839/29] - 24.V.1973, Karkonosze Mts., Śnieżka Mt., from moss and grass, leg. W. NIEDBAŁA; [0010/3] - 12.VIII.1968, Bieszczady Mts., Krzemień Mt. (altitude 800 m a.s.l.), detritus from rocks, leg. P. LEGEŻYŃSKI; [0392/61] - 1.VII.1974, Kremnica near Nowy Targ (altitude 680 m a.s.l.), limestone rocks, from mosses and soil, leg. J. RAFALSKI & H. DASTYCH; [ZO-239] - 27.VII.1989, pass between Trzydniowiański Wierch Mt. and Przykra Kopa Mt. (altitude 1550 m a.s.l.), scree near Trzydniowiański Potok stream, from moss, leg. Z. OLSZANOWSKI.
The range of the occurrence of *C. invenusta* is limited to the mountainous and submountainous areas in the south of Poland. Its highest locality is at 1550 m a.s.l. (Tatra Mts.). It is a characteristic - selective species of grasses on decalcified basement soil.
C = 0.5; D = 0.1.

GENERAL DISTRIBUTION
Holarctic and Oriental Regions.

Camisia lapponica (TRÄGÅRDH, 1910)

Nothrus lapponicus TRÄGÅRDH, 1910: 526.
Camisia lapponica: COLLOFF 1993; non *C. lapponica* sensu SELLNICK & FORSSLUND, 1955.
Camisia labradorica BEHAN, 1978.

Lectotype: Swedish Museum of Natural History, Stockholm, Sweden.

Body length: 740-780 µm; body width: 400-430 µm.
Colour: light brown - grey.
Body with rounded lateral margins, smooth, without dirts.

Prodorsum (Figs 52 A, 53 A-D, K)

Rostrum rounded; between interlamellar setae two folds, almost parallel to each other, anteriorly almost reaching bases of lamellar apophyses, behind interlamellar setae each fold divided into two; prodorsal surface covered with cavities, more distinct in central part; setae ro slightly curved medially and barbed distally; setae *le* barbed, sometimes with preserved fragments of cerotegument sheaths, set on well visible but relatively short apophyses, whose bases join through transversal chitinous fold; setae *in* smooth, phylliform or lanceolate; sensilli club-shaped, with numerous short appendices on their tips.

Notogaster (Figs 52, 53 E-J, 54)

Oval shape, lateral margins slightly wavy; two longitudinal ridges run along shield, joined at level of setae *f2* through transversal ridge, branched out towards corners of notogastral shield and approaching each other at level of setae *e1*; surface without humps and cavities; all notogastral setae flattened and slightly curved, shape from broad lanceolate to almost oval, significantly broader than those in *C. solhoeyi* (Fig. 54); distances *c1-c2* equal to *c2-c3* and *d1-d2* equal to *d2-e1*; posterior margin flat or slightly convex.

Gnathosoma (Fig. 55)

Setae *h* slightly lanceolate and a little shorter than setae *a*; pedipalp setation: 0-1-1-1-7[1]; both cheliceral setae minutely barbed.

Ventral region (Fig. 52 B)

Epimera separated medially by fissure getting broader posteriorly; epimeral setation: 3-1-(3-4)-(3-4); number of genital setae: 13-15 pairs.

Legs (Figs 56, 57)

Tarsi monodactylous.

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[13] In redescription of this species COLLOFF (1993) gives the following formulae of leg setation: I(1-11-5-6-28); II(1-13-5-6-26); III(4-6-4-4-18); IV(1-2-4-4-18).

Leg setation (including famulus) and solenidial formulae[13]:

I:	1-11-5-6-(27-28)	[1-1-1]
II:	1-10-5-6-(24-26)	[1-1-1]
III:	4-4-4-4-(19-20)	[1-1-0]
IV:	1-2-3-4-20	[0-1-0]

MATERIAL

4 specimens from 1 sample (1 habitat).

REMARKS

The species is similar to *C. solhoeyi*, however, these are a few important differences between them, first of all the shape of notogastral setae (Fig. 54) and the number of the genital setae. A comprehensive explanation of the reasons for a mistaken attribution of the name *C. lapponica* to a separate species (*C. solhoeyi*) is given by COLLOFF (1993).

DISTRIBUTION IN POLAND (Fig. 115)

C. lapponica is new for the Polish fauna.

Locality: [ZO-235] - 26.VII.1989, Tatra Mts., Hala Chochołowska - under Wołowiec Mt. (1800 m a.s.l.), moss and soil under deposited snow layer, leg. Z. OLSZANOWSKI.

C = <0.1; D = <0.1.

GENERAL DISTRIBUTION

The species so far known to occur in the north of Sweden (COLLOFF 1993) and Canada (BEHAN 1978).

Camisia segnis (HERMANN, 1804)

Notaspis segnis HERMANN, 1804: 94.
Nothrus segnis: MICHAEL 1880.
Uronothrus segnis: BERLESE 1913.
Nothrus bicarinatus C.L. KOCH, 1839.
Camisia bicarinata: WILLMANN 1931.
Nothrus rostratus C.L. KOCH, 1839.
Nothrus rostratus: MICHAEL 1884-1888.
Nothrus ventricosus C.L. KOCH, 1844.
Nothrus ventricosus: MICHAEL 1884-1888.
Nothrus excisus BANKS, 1895.
Camisia segnis: GRANDJEAN 1936, SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983.

Type: not designated.

Body length: 830-900 µm; body width: 420-450 µm.

Colour: grey brown.

Lateral margins rounded, posterior - slightly concave, surface covered with cerotegument and dirt stuck to it.

Prodorsum (Figs 58, 60 A-E)

Rostrum slightly produced; in central part of prodorsum two darker rows approaching each other anteriorly and joined at bases of interlamellar apophyses; bands of thickened chitin run beyond apophyses towards postero-central part of prodorsum; surface delicately pointed, in less sclerified specimens with oval shapes of sparse cavities between interlamellar setae; setae *ro* straight, with short spikes; setae *le* curved medially, with numerous branches, because of sheaths they get the shape of digitate appendices; lamellar apophyses large, distinctly protruding from rostrum, their bases sometimes connected by band of darker chitin; setae *in* very long, reaching end of lamellar apophyses, delicately barbed, set on apophyses much smaller than lamellar ones; sensilli club-shaped with numerous appendices, distally covered with cerotegument.

Notogaster (Figs 58, 59, 60 F, 61)

Shape elongated, lateral margins slightly convex; two longitudinal ridges run posterior to setae *d1*, join in semicircular way before bases of setae *h1* and branch out towards posterior corners of notogaster; whole surface covered with flat round humps, slightly less visible in central part; all notogastral setae set on small apophyses, barbed (greater setae: *h2*, *h3* and *ps1* with longer branches) sometimes partly or entirely covered with sheath; distances *c1*-c2 and *c2-c3* close, *d1-d2* significantly greater than *d2-e1*; the posterior margin with semicircular hollow, its edges bear setae *h2* usually curved laterally.

Gnathosoma (Fig. 62 A, B)

Setae *h* almost twice longer than setae *a*; pedipalp setation: 0-1-1-2-7[1]; both cheliceral setae distinctly barbed.

Ventral region (Fig. 59)

Epimera separated medially; epimeral setation: 3-1-3-(3-4); number of genital setae: 9 pairs.

Legs (Fig. 62 C)

Tarsi tridactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-8-5-6-23	[1-1-1]
II:	1-8-5-6-20	[1-1-1]
III:	5-5-(4-5)-4-17	[1-1-0]
IV:	1-2-(4-5)-4-17	[0-1-0]

MATERIAL

32 specimens from 24 samples (12 habitats).

REMARKS

At it has been mentioned earlier (see remarks on *C. horrida*), the shape of certain structures and their mutual arrangement can be dependent on the angle of viewing. I believe that this is the reason for the differences between figures given by SELLNICK & FORSSLUND (1955) and GRANDJEAN (1936) showing the prodorsum of *C. segnis* (the shape of rostrum, lamellar apophyse length, hollows at the lateral margins). Subspecies of *C. segnis* have been analysied by COLLOFF (1993).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 116)

C. segnis can be found in whole Poland. Its highest locality is at 1407 m a.s.l. in the Karkonosze Mts. (the summit of Czarna Kopa Mt.). The highest values of the constancy of occurrence and dominance of this species were obtained in bird nests, brushwoods and parks. In the other types of habitats only single individuals were found. *C. segnis* is a typical arboreal species.

C = 2.0; D = 0.2.

PREVIOUS RECORDS FROM POLAND

SELLNICK 1921, WILLMANN 1939, 1956, STRENZKE 1952, RAJSKI 1961, 1967, WIŚNIEWSKI 1966, NIEDBAŁA 1969, 1970, 1972, 1977, KIEŁCZEWSKI et al. 1970, KIEŁCZEWSKI & WIŚNIEWSKI 1973, SENICZAK 1973, 1974, 1978, KIEŁCZEWSKI 1976, BŁOSZYK & OLSZANOWSKI 1985, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION

Cosmopolitan exc. Ethiopian Region.

Camisia solhoeyi COLLOFF, 1993

Camisia solhoeyi COLLOFF, 1993: 1375.
Camisia lapponica sensu SELLNICK & FORSSLUND 1955 non TRÄGÅRDH, 1910.
Camisia lapponica: SITNIKOVA 1975, BALOGH & MAHUNKA 1983.
Camisia (Ivarsia) lapponica sensu KARPPINEN & KRIVOLUTSKY, 1987.

Type: Museum of Zoology, University of Bergen, Norway.

Body length: 790-890 µm; body width: 400-450 µm.

Colour: light brown-grey.

Lateral margins slightly rounded, distinctly convex posteriorly, rounded; surface smooth, usually without distinct layer of cerotegument or dirt.

Prodorsum (Figs 63, 65 A-D, J; Fot. 8)

Rostrum rounded; central part of prodorsum with two longitudinal rows reaching anteriorly bases of lamellar apophyses, posteriorly deviating laterally and

ending at bases of interlamellar setae; two folds of thickened chitin run posteriorly towards shield's center, each of them divided in two (internal ones connected, forming a crescent close to notogastral border); surface covered with oval cavities (better visible in central field); setae *ro* curved medially, sharpened, covered with sparse minute spikes; setae *le* relatively long (longer than their mutual distance), with individual, delicate appendices, straight or slightly curved towards each other, set on relatively short apophyses whose bases connect through transversal fold; setae *in* smooth, lanceolate; sensilli club-shaped with smooth tips without appendices.

Notogaster (Figs 63, 64, 65 E-I, K; Phot. 8, 9)

Shape oval, lateral margins slightly wavy, posterior margin convex; two longitudinal rows run along shield joined semicircularly in posterior part and branched out towards corners; surface covered with flat convexities (areas between them form delicate pattern of polygonal reticulum); all notogastral setae flattened, slightly lanceolate (Phot. 9); distance *c1-c2* equal to *c2-c3* one, distance *d1-d2* much smaller than *d2-e1* one.

Gnathosoma (Figs 66, 67 A)

Setae *h* short, lanceolate; setae *a* needle-shaped, twice longer than mental ones; pedipalp setation: 0-1-1-2-7[1]; both cheliceral setae delicately barbed.

Ventral region (Fig. 64)

Epimera separated medially by longitudinal fissure; epimeral setation: 3-1-(2-3)-3; number of genital setae: 9-11 pairs; in certain specimens an additional asymmetrical adanal seta.

Legs (Fig. 67 B)

Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-12-5-6-(29-30)	[1-1-1]
II:	1-12-5-6-26	[1-1-1]
III:	5-(4-5)-4-4-(18-20)	[1-1-0]
IV:	1-2-5-4-19	[0-1-0]

MATERIAL

218 specimens from 27 samples (6 habitats).

REMARKS

Due to misinterpretation of TRÄGÅRDH's specimens in the redescription by SELLNICK & FORSSLUND (1955), in many papers *C. solhoeyi* is mentioned under the name *C. lapponica* (COLLOFF 1993).

In contradistinction to the specimens from Sweden (SELLNICK & FORSSLUND 1955), in the majority of Polish specimens, the distance between setae *c1-c2* was

close to that between *c2-c3* and there was no significant difference between the length of setae *h2* and the other notogastral setae. However, I found a specimen with a higher number of genital setae (11) than usually stated.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 117)

In Poland *C. solhoeyi* was found only in the mountainous regions (Karkonosze Mts., Ślęża Mt., Śnieżnik Massif, Babia Góra Mt., Tatra Mts., Gorce Mts. and Bieszczady Mts.) in the range of altitudes from 600 (Ślęża Mt., Bieszczady Mts.) to 2100 m (Tatra Mts. - over Granacka Przełęcz Pass). Most frequently it occurs in the dwarf pine zone, alpine forests and in grasses on decalcified basement soil. In these habitats it can be treated as a characteristic - selective species. From among merocenoses it is most numerous in marmot nests.

C = 2.2; D = 1.5.

PREVIOUS RECORDS FROM POLAND

HARNISCH 1926, WILLMANN 1939, PAX 1943, RAFALSKI 1966, MAHUNKA 1969, SELL 1990.

GENERAL DISTRIBUTION

Holarctic and Nearctic Regions.

Camisia spinifer (C.L. KOCH, 1835)

Nothrus spinifer C.L. KOCH, 1835
Nothrus echinatus C.L. KOCH, 1835
Nothrus sordidus C.L. KOCH, 1839
Nothrus spiniger C.L. KOCH: NICOLET, 1855
Nothrus taurinus BANKS, 1906
Camisia taurinus: PEARSE 1946
Camisia spinifer: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983

Type: unknown.

Body length: 940-1140 µm; body width: 440-510 µm.

Colour: light brown to brown.

Body elongated, lateral margins slightly rounded, two long lobes in posterior part; almost all setae very long; surface usually covered with thick layer of cerotegument with dirt and debris; apophyses with characteristic bottle-shaped structures made of cerotegument.

Prodorsum (Figs 68, 70, 71 E)

Tip of rostrum slightly pointed; longitudinal chitinous ridges run from interlamellar setae to internal sides of bases of lamellar apophyses; surface pointed,

in central part weakly marked shapes of irregular cavities; setae *ro* barbed; setae *le* long, with sparse branches, curved medially, set on elongated apophyses reaching distinctly beyond rostrum, between their bases more or less visible ridge of thickened chitin; setae *in* very long, whip-shaped, almost smooth, set on small apophyses; sensilli club-shaped with numerous extensions covered with secretion.

Notogaster (Figs 68, 69, 71 A-D, F)

Shape elongated, posteriorly with two distinct extensions, apophyses of setae *h2* set at tops of their bulbous swellings; at base of extensions from internal sides apophyses of setae *h1*; surface delicately pointed with brighter spots connected by darker bands forming reticulate structure (visible only in less sclerified and clean specimens); no longitudinal ridges; lateral and posterior setae set on long apophyses; central setae (*d1*, *d2* and *e1*) curved anteriorly, their apophyses much shorter; notogastral setae smooth but covered with sheaths; setae *c2* located much closer to *c3* than to *c1*; distance *d1-d2* as long as *d2-e1*.

Gnathosoma (Figs 72, 73 A)

Setae *h* long and thick, twice longer than setae *a*; pedipalp setation: 0-1-1-2-7[1].

Ventral region (Fig. 69)

Epimera separated medially by furrow; epimeral setation: 3-1-(2-3)-3; number of genital setae: 9 pairs.

Legs (Fig. 73 B)

Tarsi tridactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-10-5-6-(25-26)	[1-1-1]
II:	1-11-5-6-23	[1-1-1]
III:	5-8-4-4-21	[1-1-0]
IV:	1-6-3-5-22	[0-1-0]

MATERIAL

433 specimens from 118 samples (16 habitats).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 118)

C. spinifer occurs in the area of whole Poland. Its highest locality was at 1420 m a.s.l. in the Karkonosze Mts. (Słonecznik under Smogornia Mt.). It is a characteristic - selective species of lowland coniferous forests where its representatives are found most frequently and in the greatest numbers. *C. spinifer* is also frequent in mixed forests both upland and lowland.

C = 9.7; D = 3.0.

PREVIOUS RECORDS FROM POLAND

DYRDOWSKA 1931, WILLMANN 1939, STRENZKE 1952, RAJSKI 1961, 1967, KIEŁCZEWSKI & WIŚNIEWSKI 1962a, 1962b, WIŚNIEWSKI 1965a, 1965b, NIEDBAŁA 1969, 1970, 1977, KIEŁCZEWSKI et al. 1970, NIEDBAŁA & ROHLOFF 1971, 1972, SENICZAK 1973, 1978, KIEŁCZEWSKI 1976, BŁOSZYK & OLSZANOWSKI 1985, DZIUBA & SKUBAŁA 1986, 1987, NIEDBAŁA et al. 1990, SELL 1990.

GENERAL DISTRIBUTION

Holarctic and Oriental Regions.

Camisia tatrica OLSZANOWSKI, 1994

Camisia tatrica OLSZANOWSKI, 1994: 209

Type: Collection of Z. OLSZANOWSKI, Department of Animal Taxonomy and Ecology, A. Mickiewicz University, Poznań, Poland.

Body length: 700-730 µm; body width: 380-420 µm.
Colour: light - brown.
Body oval in shape, smooth, without dirt and debris.

Prodorsum (Figs 74 A, 75 A-D, I)

Rostrum rounded; central part with two longitudinal ridges, divergent posteriorly; surface delicately pointed, without cavities; setae *ro* almost smooth, slightly curved medially; setae *le* short (their length equal to their mutual distance), barbed distally and distinctly curved towards each other; lamellar apophyses very short, connected by transversal chitinous fold; setae *in* short and smooth; sensilli thickened distally, spoon-like, curved, tips covered with secretion.

Notogaster (Figs 74, 75 E-H, J)

Lateral margins distinctly convex; central part with pair of longitudinal ridges parallel to each other (surface between them somewhat hollowed), joined before setae *h1*, no chitinous ridge between setae *e1*; surface covered with delicate pattern made of rounded forms, more distinct near ridges; all notogastral setae short, similar in length, smooth and pointed; distance *c1-c2* slightly smaller than *c2-c3*, distance *d2-e1* much greater than *c1-d1* and *d1-d2*; posterior margin of notogaster rounded (like in *C. invenusta*).

Gnathosoma (Fig. 76)

Setae *h* a little shorter than setae *a*, both pairs relatively long (longer than in *C. invenusta*); pedipalp setation: 0-1-1-1-7[1]; cheliceral setae minutely barbed.

Ventral region (Fig. 74 B)

Epimera distinctly separated medially; epimeral setation: 3-1-3-3; number of genital setae: 11-12 pairs.

Legs (Figs 77, 78)

Tarsi tridactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-7-5-6-19	[1-1-1]
II:	1-8-5-6-16	[1-1-1]
III:	3-3-3-4-15	[1-1-0]
IV:	2-2-3-4-15	[0-1-0]

MATERIAL

5 specimens (adults: holotype and 4 paratypes) from 1 sample (1 habitat).

REMARKS

C. tatrica is closest to *C. invenusta*. These species can be distinguished on the basis of the following characters: shape of apophyses *le*, setae *in*, sensilli, notogastral setae and number of genital setae (cf. OLSZANOWSKI 1994 for details). I have had an opportunity to study the morphology of the third species, close to the above two - *C. foveolata* HAMMER, 1955, based on specimens from Canada. The differences between these species include a different shape of notogastral setae and a number of genital setae. However, there is no doubt that all the three species are closely related (this conclusion is also supported by the leg setation of *C. foveolata* similar to those of *C. invenusta* and *C. tatrica*).

DISTRIBUTION IN POLAND (Fig. 115)

Locality: [ZO-168] - 18.VII.1987, Tatra Mts., Czarny Staw Gąsienicowy Lake (altitude 1620 m a.s.l.), mosses partly immersed in water, leg. Z. OLSZANOWSKI. C = <0.1; D = <0.1.

GENERAL DISTRIBUTION

Poland (Tatra Mts.).

Heminothrus BERLESE, 1913

Type species: *Nothrus targionii* BERLESE, 1885.

Sensilli setose or slightly broadened distally; rostral and lamellar setae as well as setae on posterior margin of the body usually set on apophyses; hysterosomal surface smooth or with longitudinal ridges; epimera IV separated or fused; number

of genital setae: 9-25 pairs; number of pairs of aggenital, anal and adanal setae: 2, 2 and 3, respectively; postero-ventral edges of notogastral shield behind anal shields parallel to the latter; tarsi mono- or tridactylous.

Heminothrus capillatus (Berlese, 1914)

Angelia capillata Berlese, 1914: 192.
Heminothrus capillatus: Mahunka 1980, Balogh & Mahunka 1983.
Platynothrus capillatus var. *septentrionalis* Sellnick & Forsslund 1955.
Platynothrus maior Willmann, 1956 **syn. nov.**
Platynothrus septentrionalis: Aoki 1965.
Heminothrus septentrionalis: Sitnikova 1975, Balogh & Mahunka 1983.

Syntypes: Stazione di Entomologia Agraria (Instituto Sperimentale per la Zoologia Agraria, Firenze, Italy

Body length: 960-1060 µm; body width: 560-680 µm.
Colour: brown.
Body a little broadened posteriorly, dorsum convex, surface free from dirt and debris.

Prodorsum (Figs 80, 82 A-D, F; Phot.10)
Rostrum rounded; two poorly visible ridges run posteriorly from bases of lamellar apophyses; surface with distinct round cavities; setae *ro* sparsely ciliated; setae *le* twice longer than setae *ro*, relatively thick, uniformly barbed; lamellar apophyses relatively short, interconnected by thin fold; setae *in* long, reaching significantly beyond bases of lamellar apophyses (thin ends of setae often poorly visible), smooth; sensilli slightly broadened distally, covered with adherent spikes.

Notogaster (Figs 80, 81, 82 E, G; Phot. 10, 11)
Egg-shaped, dorsal part convex, lateral margins slightly divergent posteriorly; posterior margin rounded; surface covered with small cavities (Phot. 11) seen as bright spots (in less sclerified specimens spots connected by thread-like formations making reticulate pattern); two almost parallel ridges, better or poorer visible, never forming distinct folds, run along middle part of shield; posteromarginal parts with characteristic transversal folds; all notogastral setae long, of almost the same size and shape, smooth, without apophyses; distance *c1-c2* slightly longer than *c2-c3*, distance *c1-c1* significantly smaller than *d1-d1*.

Gnathosoma (Fig. 83)
Setae *h* slightly shorter than setae *a*, *m1* and *m2* much shorter; pedipalp setation: 0-1-0-3-7[1]; both cheliceral setae distinctly barbed.

Ventral region (Fig. 81)

Epimera I-III completely fused medially, epimera IV partly fused; epimeral setation: 3-1-(2-3)-(3-4); number of genital setae: 19-21 pairs.

Legs (Fig. 84)

Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae[14]:

I:	1-9-5-(5-6)-31	[1-2-3]
II:	1-9-5-5-(26-27)	[1-1-2]
III:	5-8-4-4-26	[1-1-0]
IV:	1-(5-6)-4-4-(25-26)	[1-1-0]

MATERIAL

56 specimens from 9 samples (6 habitats).

REMARKS

In 1944 SELLNICK described a variety of *Platynothrus capillatus* naming it *septentrionalis* (SELLNICK's text was included in a paper by HAMMER (1944)). A thorough diagnosis of the taxon was given by SELLNICK & FORSSLUND (1955) in their monograph. In 1965 AOKI compared their description with the drawing provided by BERLESE (1914) and concluded that both forms were well defined species, however he did not give a differential diagnosis. On the basis of the key for identification of the species of *Platynothrus*, one of the distinctive features (perhaps the only one) distinguishing *P. septentrionalis* from *P. capillatus* is a very small or medium-sized posteromarginal seta in the former. The type specimens were studied by HAMMEN (1959) and MAHUNKA (1980). The latter, who recognized the two separate species, gave other diagnostic features, such as the shape of rostral and lamellar setae, the length of interlamellar setae and the dorsal microsculpture. On the other hand, HAMMEN (1959) belittled the differences although he admitted that weak chitinous bands seen in *P. capillatus* most probably do not occur in specimens of the variety *septentrionalis*.

SENICZAK et al. (1990) represent a different approach, they claim that *septentrionalis* is a junior synonym of *H. capillatus*. The results of my comprehensive studies on the specimens found in Poland seem to confirm this view. The interlamellar setae in this species usually exceed the bases of the lamellar apophyses while two delicate longitudinal bands of thickened chitin on the notogaster can be better or poorer visible in almost all specimens, in particular in the anterior part of the body (Phot. 10).

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[14] FUJIKAWA (1982) gave the following leg setation for one of the syntypes: I (1-9-5-5-?), II (1-10-5-5-?), III (5-?-4-4-?), IV (0-1-?); and for specimens found in Japan: I (1-9-5-5-33), II (1-10-5-5-28), III (5-8-4-4-27), IV (1-6-4-4-27).

In 1956 WILLMANN described a new species which he named *Platynothrus maior*, on the basis of only one specimen collected in Poland (Czarna Kopa Mt. in the Karkonosze Mts.). In his diagnosis distinguishing it from *H. capillatus* he mentioned the following features: shorter lamellar setae and sensilli, longer interlamellar setae and the lack of longitudinal furrows on the hysterosoma. In view of the results of my studies this species should be treated as a junior synonym of *H. capillatus*.

There is another feature observed in *H. capillatus* which requires some comment, since it has been also reported as occurring in other species and even in another genus (see comment on *Nothrus borussicus*). It is the so-called "reticulum" observed on the surface of the body, usually on notogaster but sometimes also on prodorsum, of different camisiid species. I performed thorough observations of this structure and the results can be summed up as follows:

- the reticulum is a kind of polygonal structure made of bright threads,
- it does not occur on the surface of the shield but can be seen through the external, transparent layers of the shield, so it is better visible in less sclerotized specimens, of lighter colour, or in specimens kept for a long time in lactic acid,
- the sites where the threads join one another are seen as spots slightly brighter than the surface of the shield (e.g. *H. capillatus*, *C. spinifer*, *C. solhoeyi*; compare Figs 82 G, 65 K, 71 F); sometimes the spots can be seen in much sclerified specimens as small hollows in the surface of the shield (Phot. 11),
- the reticulum usually does not cover the whole surface of notogaster but is much better visible either in the central part near longitudinal bands of thickened chitin or on the margins of the shield.

The presence of reticulum in *H. capillatus* was reported by many authors (SELLNICK & FORSSLUND 1955, FUJIKAWA 1982, MAHUNKA 1980). SENICZAK et al. (1990) postulated a correlation of its structure with the presence of other notogastral features. The question requires further studies e.g relating this feature with the age of a given specimen. In view of the above I would suggest that it should not be treated as a major distinctive feature, in particular, when no data on its variability are available. In my opinion PÉREZ-ÍÑIGO (1969) describing a new species - *Platynothrus nevadensis* could not avoid this mistake. After careful analysis of his description and figures, and knowing that the main features he gave as distinguishing this species were the the shape of rostrum and sculpture of the body, I am inclined to think that this species is also a junior synonym of *H. capillatus*. However, further studies of type specimens are necessary.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 119)

H. capillatus can be found in Southern Poland, preferably in the mountainous and submountainous regions (Karkonosze Mts., Babia Góra Mt., Beskid Makowski Mts. and Beskid Niski Mts.). Its highest locality was at 1400 m a.s.l. (Babia Góra Mt.). As yet it has been found in the Tatra Mts.. *H. capillatus* was most frequently found in the dwarf pine zone and in the alpine coniferous forests.

C = 0.7; D = 0.4.

PREVIOUS RECORDS FROM POLAND
SENICZAK & KLIMEK 1990.

GENERAL DISTRIBUTION
Palaearctic Region.

Heminothrus humicolus (FORSSLUND, 1955)

Neonothrus humicola FORSSLUND, 1955: 512.
Neonothrus humicola: SELLNICK & FORSSLUND 1955, SITNIKOVA 1975.
Neonothrus humicolus: MARSHALL et al. 1987.
Heminothrus humicola: BALOGH & MAHUNKA 1983.

Type: Swedish Museum of Natural History, Stockholm, Sweden.

Body length: 565-660 µm; body width: 250-330 µm.
Colour: light brown-grey.
Body elongated, usually covered with thin layer of cerotegument.

Prodorsum (Figs 85 A, 86 A-D, L)
Rostrum rounded; two ridges run posterior from bases of lamellar apophyses; surface with distinct round cavities; setae *ro* narrow, delicately barbed; setae *le* twice longer than rostral ones, of dense ciliation, set on relatively short apophyses (bases of apophyses joined by thickened band); setae *in* longer than lamellar ones, slightly lanceolate, ciliated; sensilli long, setose, with minute spikes over their whole length.

Notogaster (Figs 85, 86 E-J; Phot. 12, 13)
Lateral margins almost parallel to each other or distinctly diverging posteriorly; two chitinous ridges run almost throughout whole length of shield - setae *c1*, *d1*, and *e1* set between ridges, *d2* on the outside (Phot. 13); two longitudinal bands darker in colour run near lateral margins; posterior indentation V-shaped, separated by fold; surface without microsculpture; all notogastral setae narrow-lanceolate, their width varies individually (Fig. 86, Phot. 13), delicately ciliated, *h1*, *h2*, *h3* and *p1* set on distinct apophyses.

Gnathosoma (Fig. 87)
Setae *h* twice shorter than setae *a*; *m1* and *m2* a few times shorter than setae *a*, set close to each other; pedipalp setation: 0-2-1-3-7[1], both cheliceral setae ciliated.

Ventral region (Figs 85 B, 86 L)
Epimeral setation: 3-1-3-3; number of genital setae: 12-13 pairs.

Legs (Figs 88, 89)
Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-10-5-5-27	[1-2-3]
II:	1-10-5-5-24	[1-1-2]
III:	4-4-5-4-23	[1-1-0]
IV:	1-4-5-4-23	[1-1-0]

MATERIAL
18 specimens from 18 samples (5 habitats).

REMARKS
BŁOSZYK et al. (1986) pointed out that the specimens found in Poland differed from the nominate form in two characters: more rounded body shape and the shape of notogastral setae. A thorough study has shown that the shape of the body is variable (although in the majority of specimens the lateral edges actually are rounded) and the notogastral setae are slightly flattened, narrow lanceolate, but not as wide as in the figure by SELLNICK & FORSSLUND (1955).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 120)
In Poland the occurrence of this species is restricted to mountainous regions (Karkonosze Mts., Izerskie Mts., Tatra Mts., Pieniny Mts., Gorce Mts.). It was not found below 700 m a.s.l. while the highest locality was at 2100 m a.s.l. in the Tatra Mts. (near Przełęcz Szpiglasowa pass). It is characteristic - selective species of grasses on decalcified basement soil, dwarf pine zone and alpine coniferous forests.
C = 1.5; D = 0.3.

PREVIOUS RECORDS FROM POLAND
BŁOSZYK et al. 1986, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION
Holarctic Region.

Heminothrus longisetosus WILLMANN, 1925

Heminothrus paolianus longisetosus WILLMANN, 1925: 9.
Heminothrus paolianus var. *longisetosus*: SELLNICK & FORSSLUND 1955, AOKI 1958.
Heminothrus longisetosus: SITNIKOVA 1975, BALOGH & MAHUNKA 1983.

Type: lost.

Body length: 670-680 µm; body width: 310-350 µm.
Colour: light brown to brown.

Body elongated, lateral margins slightly diverging posteriorly, surface usually covered with thick layer of cerotegument and dirt.

Prodorsum (Figs 90 A, 91 A-D , I)

Surface covered with small cavities (more distinct in central part); tip of rostrum slightly pointed; bases of lamellar apophyses connected with bothridia by two arched ridges; setae *ro* straight, minutely barbed; setae *le* long and thick, with numerous sharp spikes; lamellar apophyses large, interconnected by band of thickened chitin; setae *in* long (reach bases of lamellar apophyses), with small adherent spikes; sensilli as long as setae *in*, narrowed distally and sparsely barbed.

Notogaster (Figs 90, 91 E-H)

Shape elongated, lateral margins almost parallel to each other; dorsal surface slightly hollowed, almost completely smooth; posterior margin convex with shallow oval dorso-lateral hollow; notogastral setae different in shape: *c1*, *c2*, *d1*, *d2* and *e1* short, without apophyses, *c3*, *cp*, *e2* and *f2* over three times longer than the former, smooth, sometimes with sheaths, set on short apophyses; posterior setae (*h1*, *h2*, *h3* and *p1*) slightly shorter, distinctly barbed, set on strong apophyses; distance *c1-c2* almost equal to *c2-c3*, *d1-d2* equal to *d2-e1*.

Gnathosoma (Fig. 92 A, B)

Setae *h* as long as *a*, over three times longer than setae *m1* and *m2*; distance *a-m1* greater than *m1-m2*; pedipalp setation: 0-1-1-3-7[1], both cheliceral setae minutely barbed.

Ventral region (Fig. 90 B)

Epimera separated medially; epimeral setation: 3-1-3-3; number of genital setae: 9-10 pairs.

Legs (Fig. 92 C, D)

Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-10-5-5-26	[1-2-3]
II:	1-10-5-5-22	[1-1-2]
III:	4-6-5-5-23	[1-1-0]
IV:	1-(4-5)-5-5-23	[1-1-0]

MATERIAL

87 specimens from 32 samples (8 habitats).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 121)

H. longisetosus can be found in whole Poland. Its highest locality was at 1700 m a.s.l. (Babia Góra Mt.). It was most frequently found in mixed forests (lowland and upland) and grasses on decalcified basement soil.

C = 2.6; D = 0.6.

PREVIOUS RECORDS FROM POLAND

STRENZKE 1952, RAJSKI 1961, 1967, SENICZAK 1978.

GENERAL DISTRIBUTION

Holarctic Region.

Heminothrus peltifer (C.L. KOCH, 1839)

Nothrus peltifer C.L. KOCH, 1889: vol. 29 (9).
Platynothrus peltifer: WILLMANN 1931, SELLNICK & FORSSLUND 1955.
Heminothrus peltifer: BALOGH & MAHUNKA 1983.
Nothrus palliatus C.L. KOCH, 1839.
Angelia palliata: BERLESE 1896.
Nothrus bistriatus NICOLET, 1855, non C.L. Koch, 1839: MICHAEL 1884-1888.
Nothrus cirrosus CANESTRINI et FANZAGO, 1876.
Nothrus cirrosus: MICHAEL 1884-1888.
Platynothrus grandjeani SITNIKOVA, 1975.
Heminothrus grandjeani: BALOGH & MAHUNKA 1983.
Heminothrus abchasicus TARBA, 1990 **syn. nov.**

Type: unknown.

Body length: 770-980 µm; body width: 480-570 µm.

Colour: dark brown.

Body more or less significantly broadened posteriorly, in certain specimens covered with layer of cerotegument and dirt.

Prodorsum (Figs 93, 95 A-D, I)

Tip of rostrum rounded; two ridges of thickened chitin run from bothridia towards lamellar apophyses; surface with distinct, round or oval cavities, setae *ro* relatively short, smooth; setae *le* longer, reaching much beyond rostral margin, distinctly barbed almost throughout whole length, set on apophyses interconnected by ridge; setae *in* longer than *le*, narrow and smooth; sensilli considerably shorter than setae *in*, somewhat thickened and barbed distally.

Notogaster (Figs 93, 94, 95 E-H)

Lateral margins diverging posteriorly, posterior edge more or less convex (shape of shield varies from egg-like to almost triangular); central part convex

anteriorly and somewhat hollowed posteriorly; two distinct longitudinal chitinous ridges run between pairs of central setae to end at hollowed part, two more pairs of longitudinal folds of thickened chitin run outside ridges: one pair outside central setae, second - along lateral margins of notogaster; surface with small sparsely distributed brighter spots; notogastral setae long, their tips reach considerably beyond bases of subsequent pair, smooth or slightly serrated (rows of setae *f, h, p*); setae *p1*, *h1* and *h2* with whip-like curved ends, set on small apophyses; distance *c1-c2* greater than *c2-c3*; distance between bases of setal pairs of *c1*, *d1* and *d2* almost the same.

Gnathosoma (Fig. 96)

Setae *h* equal to *a*, only one pair of setae *m*, twice shorter than setae *a*; pedipalp setation: 0-1-0-3-7[1].

Ventral region (Fig. 94)

Epimera fused medially (I-III - completely, IV - partly); epimeral setation: 3-1-(2-3)-4; number of genital setae: 8-13 pairs[15].

Legs

Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-9-5-5-26	[1-2-3]
II:	1-9-5-5-23	[1-1-2]
III:	(2-4)-5-4-4-23	[1-1-0]
IV:	1-(4-5)-4-4-23	[1-1-0]

MATERIAL

7358 specimens from 474 samples (21 habitats).

REMARKS

In 1975 SITNIKOVA in her determination key distinguished a new species *Platynothrus grandjeani*, however, with no figures or detailed description included. In 1981 she recognized it as a synonym of *P. peltifer*, however, this fact was ignored by BALOGH & MAHUNKA (1983). The fact that the two species were identical was pointed out by TRAVÉ & OLSZANOWSKI (1988) and Seniczak & KLIMEK (1990). Detailed studies revealed a considerable variability of a number of morphological features of the species (e.g. the number of genital setae, leg setation, length of notogastral setae, size of the body).

Recently, TARBA (1990) described a new species *Heminothrus abchasicus* whose characters are intermediate between those of *H. peltifer* and *H. grandjeani* (the

[15] 7-17 pairs in certain specimens collected outside Poland (TRAVÉ & OLSZANOWSKI 1988).

authoress did not take into regard the synonymy). I suggest that this species should be treated as a junior synonym of *H. peltifer*.

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 122)

It is the most abundant and most frequent species of all the representatives of *Nothridae* and *Camisiidae* considered. It can be found in whole Poland. In the mountains it reaches 1900 m a.s.l. (Tatra Mts. - Koprowy Żleb under Kopa Kondracka Mt.). *H. peltifer* occurs in all distinguished types of habitats and reaches the highest values of "C" and "D" in most of them. In the forest habitats it is characterized by significantly higher values of the index of constancy of occurence, while in the open habitats by significantly higher index of dominance.

C = 39.1; D = 51.0.

PREVIOUS RECORDS FROM POLAND

SELLNICK 1908, 1921, DYRDOWSKA 1931, FRENZEL 1936, WILLMANN 1936, 1939, 1949a, 1949b, 1956, PAX & WILLMANN 1937, STRENZKE 1952, KIEŁCZEWSKI 1958, RAJSKI 1961, 1967, WIŚNIEWSKI 1966, NIEDBAŁA 1969, 1967, 1970, 1972, 1977, KIEŁCZEWSKI et al. 1970, NIEDBAŁA & ROHLOFF 1971, SENICZAK 1973, 1978, KACZMAREK 1977, ADAMSKA et al. 1978, BOROWIAK & NIEDBAŁA 1980, 1982, ŻBIKOWSKA-ZDUN 1983, BŁOSZYK & OLSZANOWSKI 1985, DZIUBA & SKUBAŁA 1986, 1987, OLSZANOWSKI & BŁOSZYK 1987, TRAVÉ & OLSZANOWSKI 1988, DZIUBA et al. 1990, NIEDBAŁA et al. 1990, SELL 1990, SENICZAK & KLIMEK 1990, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION

Holarctic, Neotropical and Australian Regions.

Heminothrus targionii (BERLESE, 1885)

Nothrus targionii BERLESE, 1885: vol. 17 (8).
Heminothrus targionii: WILLMANN 1931, SELLNICK & FORSSLUND 1955, SITNIKOVA 1975, BALOGH & MAHUNKA 1983.
Nothrus princeps BERLESE, 1916.

Syntypes: Stazione di Entomologia Agraria (Istituto Sperimentale per la Zoologia Agraria), Firenze, Italy.

Body length: 870-950 μm; body width: 450-500 μm.

Colour: light brown to grey-brown.

Body elongated, broadened posteriorly, usually covered with thick layer of cerotegument and dirt.

Prodorsum (Figs 97, 99 A-D, M)

Tip of rostrum rounded; surface with distinct round or oval cavities; setae *ro* relatively thick and densely ciliated; setae *le* long, densely barbed; lamellar apophyses

large and connected by band of thickened chitin; setae *in* slightly shorter than setae *le*, densely ciliated; sensilli long, distally with short spikes.

Notogaster (Figs 97, 98, 99 E-H)

Lateral margins diverge posteriorly, posterior margin rounded; surface of central part slightly hollowed, covered with polygonal reticulate pattern (better visible on sides of less sclerotized specimens); ellyptical hollow present in dorsolateral part of notogaster; all notogastral setae densely barbed: anterior (*c1* and *c2*) and central (*d1*, *d2* and *e1*) setae shorter than others, posterior setae (*p1*, *h1*, *h2* and *h3*) set on strong apophyses; distance *c1-c2* twice smaller than *c2-c3*, distance *e1-e1* twice greater than *d2-d2*.

Gnathosoma (Fig. 100)

Setae *h* as long as setae *a*, setae *m1* and *m2* much shorter; setae *m1* set between setae *a* and *m2*; pedipalp setation: 0-2-1-3-7[1]; both cheliceral setae barbed.

Ventral region (Figs 98, 99 I-L)

Epimera fused into uniform plate; epimeral setation: 2-1-3-(3-4); number of genital setae: 21-23 pairs; epimeral, aggenital, anal, and adanal setae short and strongly barbed.

Legs (Fig. 101)

Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae:

I:	1-12-5-4-31	[1-2-3]
II:	1-11-5-5-23	[1-1-2]
III:	5-8-5-5-27	[1-1-0]
IV:	1-8-5-5-26	[1-1-0]

MATERIAL

643 specimens from 119 samples (13 habitats).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 123)

The species can be found in whole Poland, in the mountains up to 1377 m a.s.l. (Tatra Mts. - Sarnia Skała). It is frequent and abundant. I consider it to be a characteristic - selective species of grasses on limestone-rich basement soil and of parks. It is also frequent in brushwoods.

C = 9.8; D = 4.5.

PREVIOUS RECORDS FROM POLAND

HARNISCH 1926, DYRDOWSKA 1931, FRENZEL 1936, KIEŁCZEWSKI 1957, RAJSKI 1961, 1967, NIEDBAŁA 1967, SENICZAK 1978, MIKO & OLSZANOWSKI, in print.

GENERAL DISTRIBUTION
Holarctic Region.

Heminothrus thori (BERLESE, 1904)

Angelia thori BERLESE, 1904: 275.
Platynothrus thori: WILLMANN 1931, SELLNICK & FORSSLUND 1955.
Nothrus (Heminothrus) thori: BERLESE 1913.
Heminothrus thori: SITNIKOVA 1975, BALOGH & MAHUNKA 1983.

Type: Stazione di Entomologia Agraria (Istituto Sperimentale per la Zoologia Agraria), Firenze, Italy.

Body length: 960-1010 µm; body width: 580-600 µm.
Colour: brown to brown-black.
Body flattened, significantly broadened posteriorly, sometimes covered with cerotegument and dirt.

Prodorsum (Figs 102, 104 A-D, G)
Tip of rostrum slightly pointed; hollow in central part surrounded by delicate fold, running between bothridia and lamellar apophyses; surface covered with small, round cavities; setae *ro* ciliated, slightly curved medially; setae *le* long, with distinct spikes (distinctly barbed) curved towards each other, set on short apophyses connected by band of thickened chitin; setae *in* long, delicately ciliated, reach beyond bases of lamellar apophyses; sensilli rod-shaped, thickened and minutely barbed distally.

Notogaster (Figs 102, 103, 104 E-G)
Posterior part significantly broadened and egg-like rounded; dorsum flat, somewhat hollowed posteriorly; surface with small round, brighter spots; two longitudinal folds of thickened chitin beyond setae *c1*; notogastral setae very long, either smooth and without apophyses (rows *c*, *d*, *e*) or sparsely serrated and set on short but distinct apophyses (rows f, h, p), their ends whip-like curved; setae *c2* advanced anteriorly; distance *c1-c2* almost equal to *c2-c3*, distance *d1-d1* much shorter than *c1-c1* and *d2-d2*.

Gnathosoma (Fig. 105)
Setae *h* slightly shorter than setae *a*, setae *m1* and *m2* distinctly shorter; pedipalp setation: 0-1-0-3-7[1], both cheliceral setae distinctly barbed.

Ventral region (Fig. 103)
Epimera fused medially; epimeral setation: 3-1-3-4; number of genital setae: 12-14 pairs.

Legs

Tarsi monodactylous.

Leg setation (including famulus) and solenidial formulae[16]:

I:	1-11-5-5-31	[1-2-3]
II:	1-11-5-5-(23-24)	[1-1-2]
III:	5-8-5-5-26	[1-1-0]
IV:	1-10-5-5-25	[1-1-0]

MATERIAL

155 specimens from 30 samples (10 habitats).

DISTRIBUTION IN POLAND AND ECOLOGICAL NOTES (Fig. 124)

This species can be found in whole Poland although it clearly avoids mountaineous regions, the highest locality being 840 m a.s.l. (Karkonosze Mts.). It is a characteristic - selective species of marshy forests and alder forests, though it is also frequently met in peat-bogs and meadows. Scarcely found in forests. High values of dominance of this species in mole nests and nests of other mammals are worth noting.

C = 2.5; D = 1.1.

PREVIOUS RECORDS FROM POLAND

SELLNICK 1920, DYRDOWSKA 1931, PAX & MASCHKE 1936, STRENZKE 1952, RAJSKI 1961, 1967.

GENERAL DISTRIBUTION

Holarctic Region.

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[16] FUJIKAWA (1982) gives the following leg setation for the type specimen: I(1-11-5-5-?); II(1-10-5-5-?); III(?); IV(1-6-5-5-?); and for the specimens found in Japan: I(1-11-5-5-30); II(1-(10-11)-5-5-26); III(5-6-5-5-26); IV(1-(6-8)-5-5-(25-26)).

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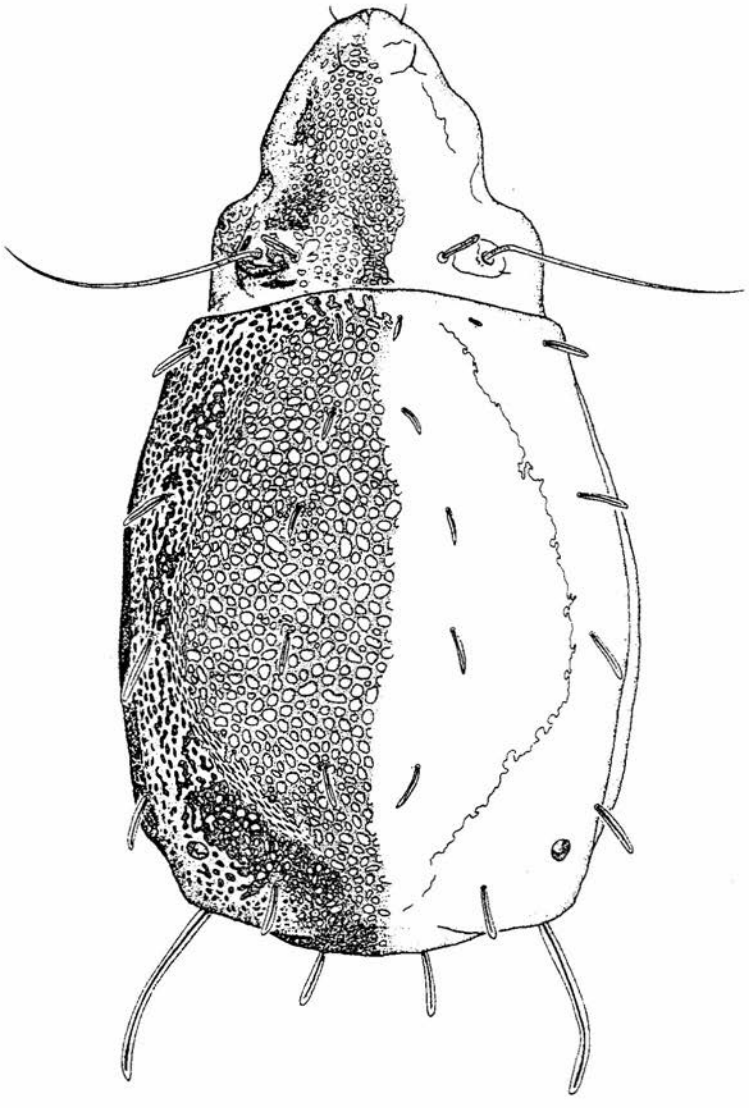


Fig. 1. *Nothrus pratensis* SELLNICK - microsculpture of dorsum.

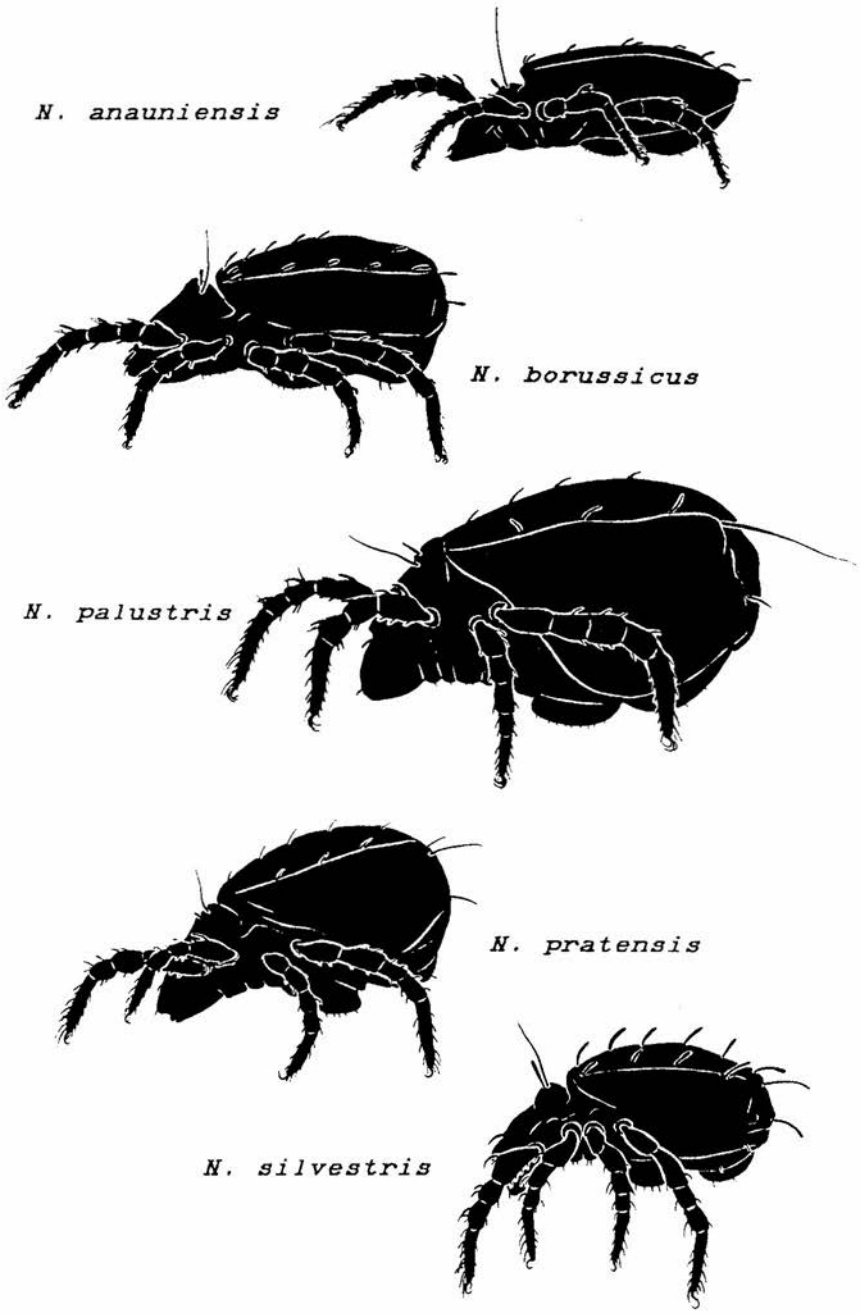


Fig. 2. The body shape in species of the genus *Nothrus*, lateral view.

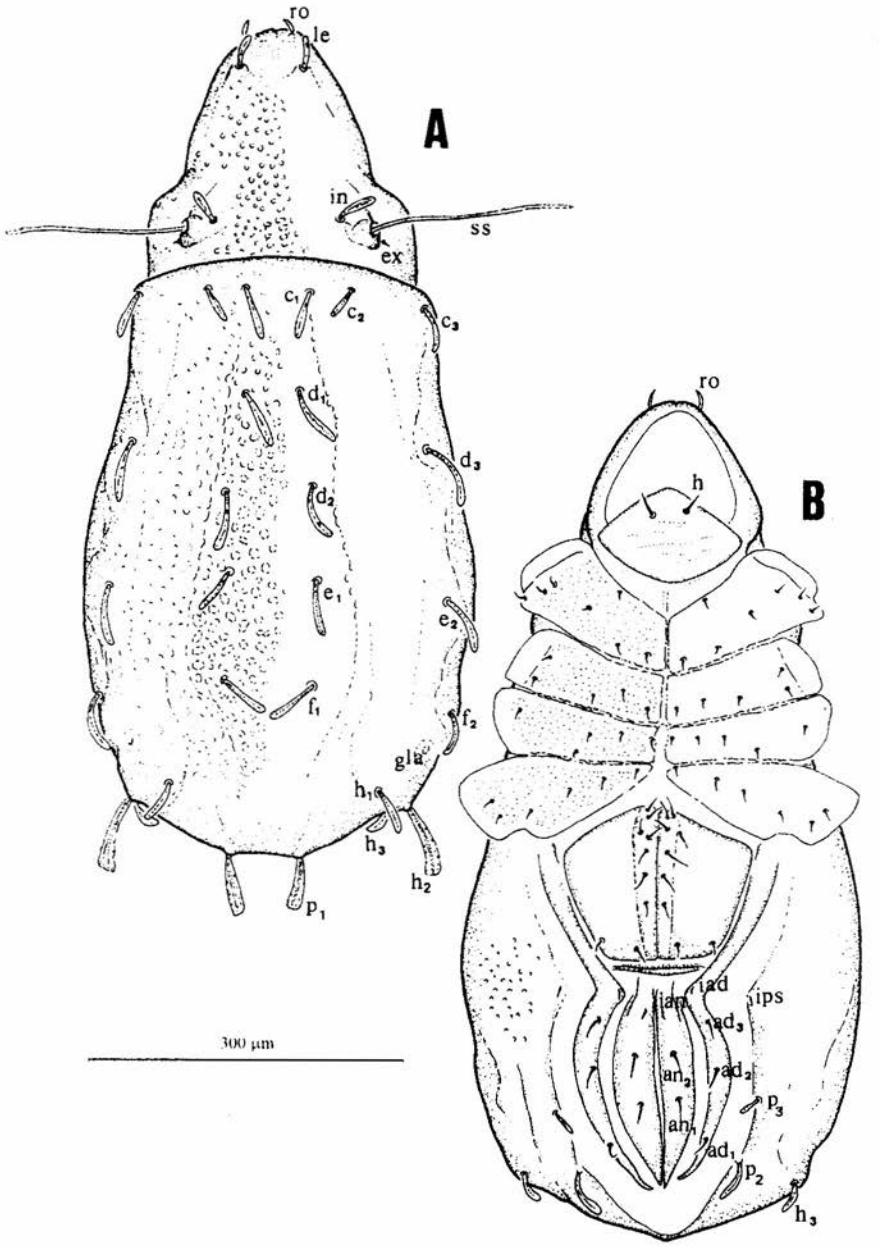


Fig. 3. *Nothrus anauniensis* Canestrini et Fanzago: A - dorsal view; B - ventral view.

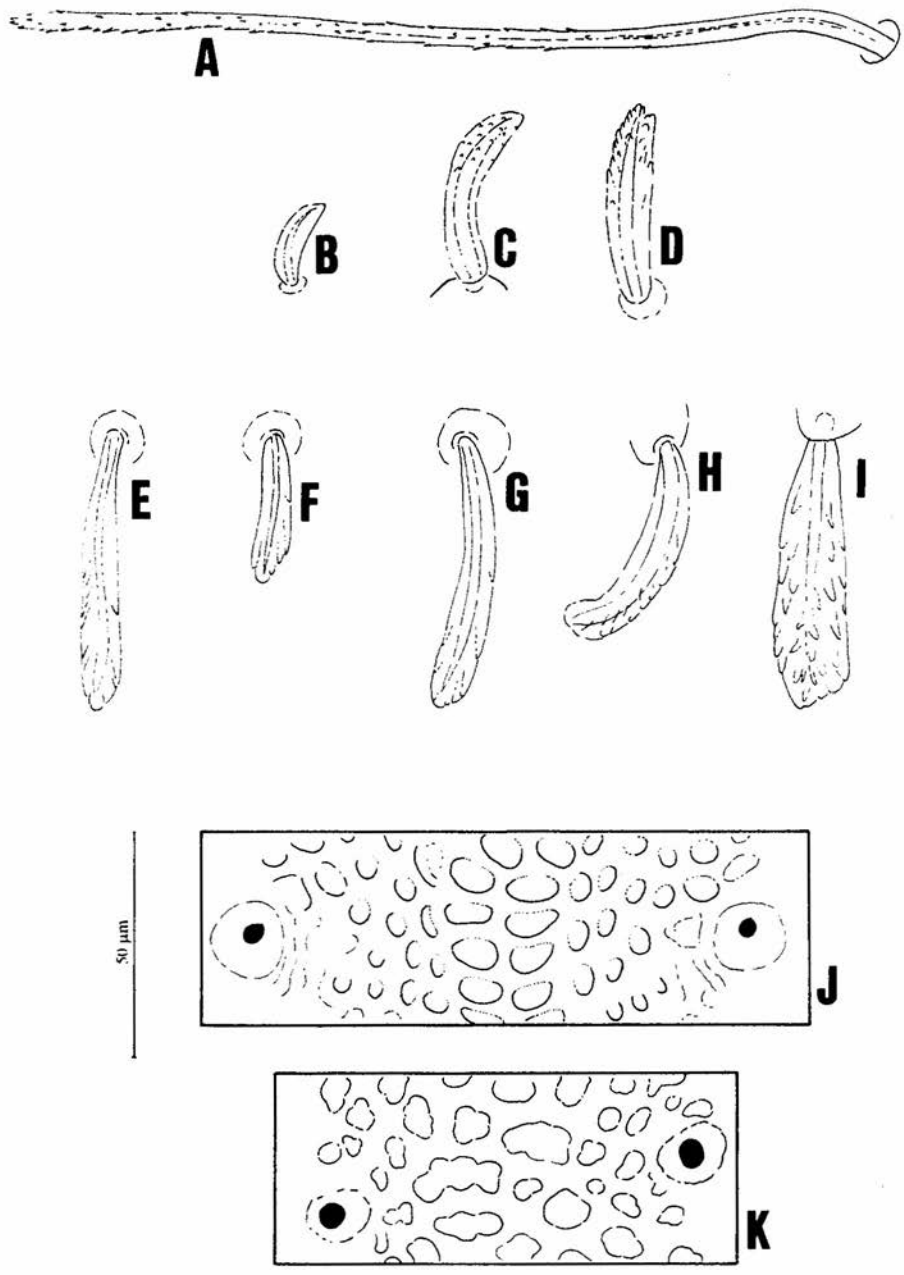


Fig. 4. *Nothrus anauniensis* Canestrini et Fanzago: A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *p1*; J - microsculpture of prodorsum between setae *in*; K - microsculpture of notogaster between setae *d2*.

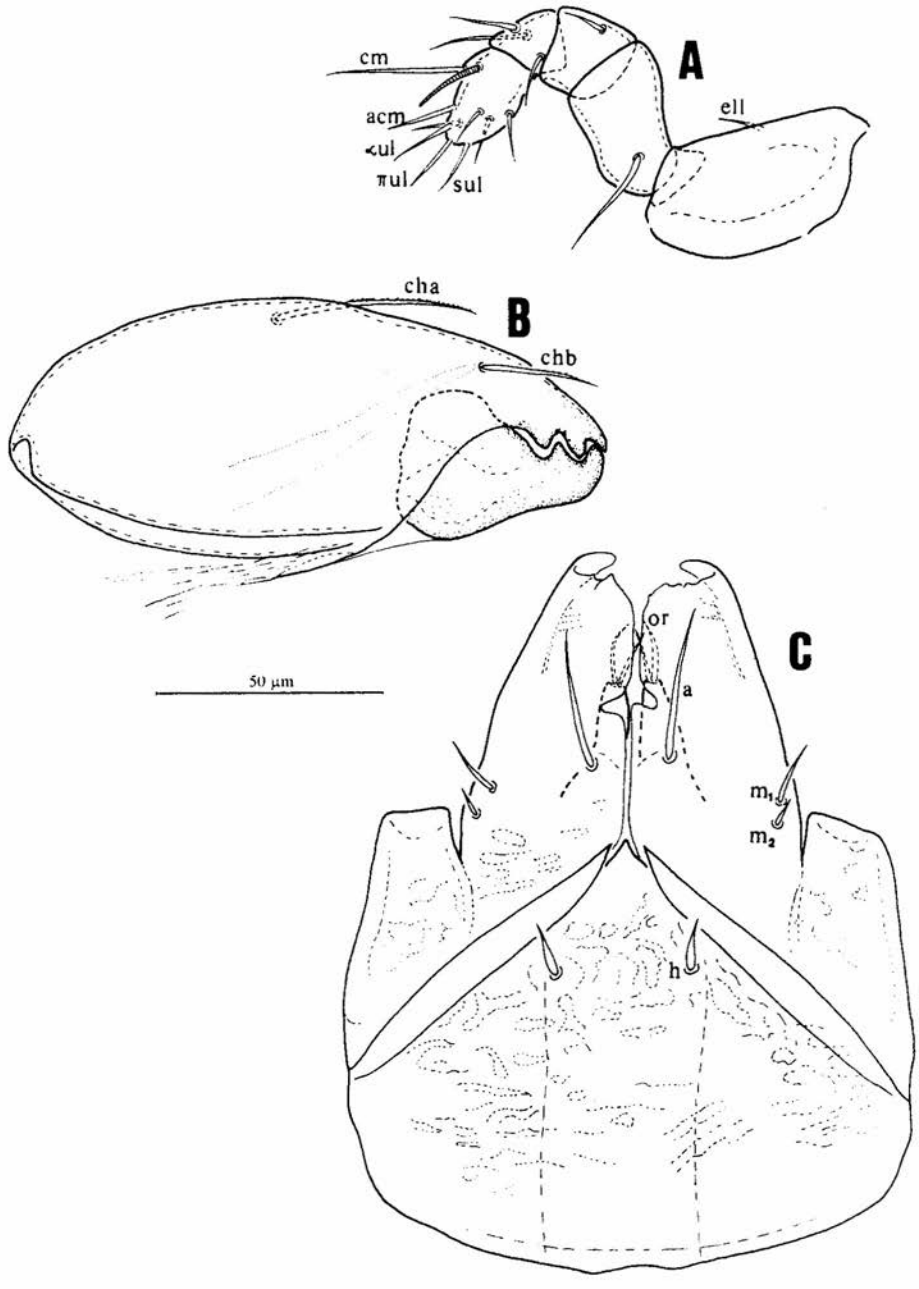


Fig. 5. *Nothrus anauniensis* Canestrini et Fanzago: A - pedipalp, antiaxial view; B - chelicera, antiaxial view; C - subcapitulum, ventral view.

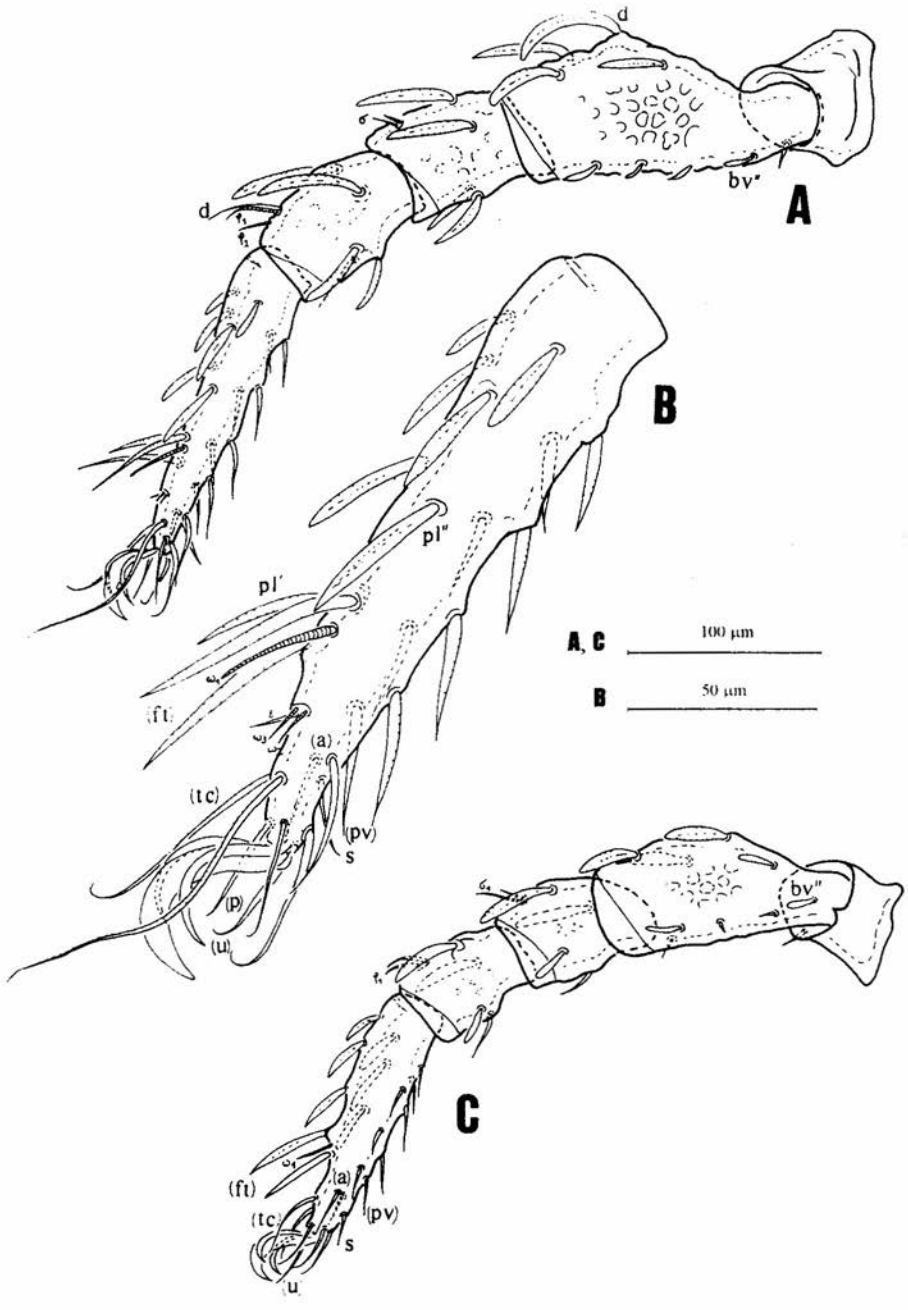


Fig. 6. *Nothrus anauniensis* Canestrini et Fanzago: A - leg I, antiaxial view; B - leg I - tarsus, antiaxial view; C - leg II, antiaxial view.

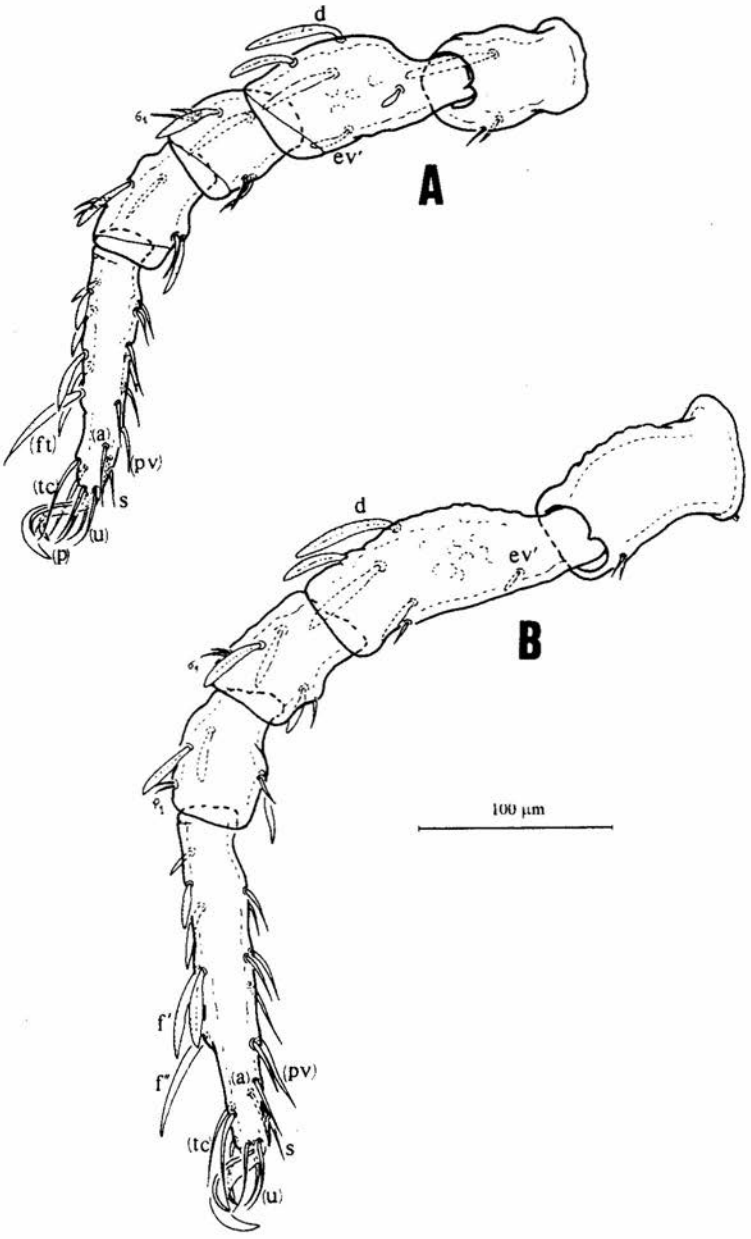


Fig. 7. *Nothrus anauniensis* Canestrini et Fanzago: A - leg III, paraxial view; B - leg IV, paraxial view.

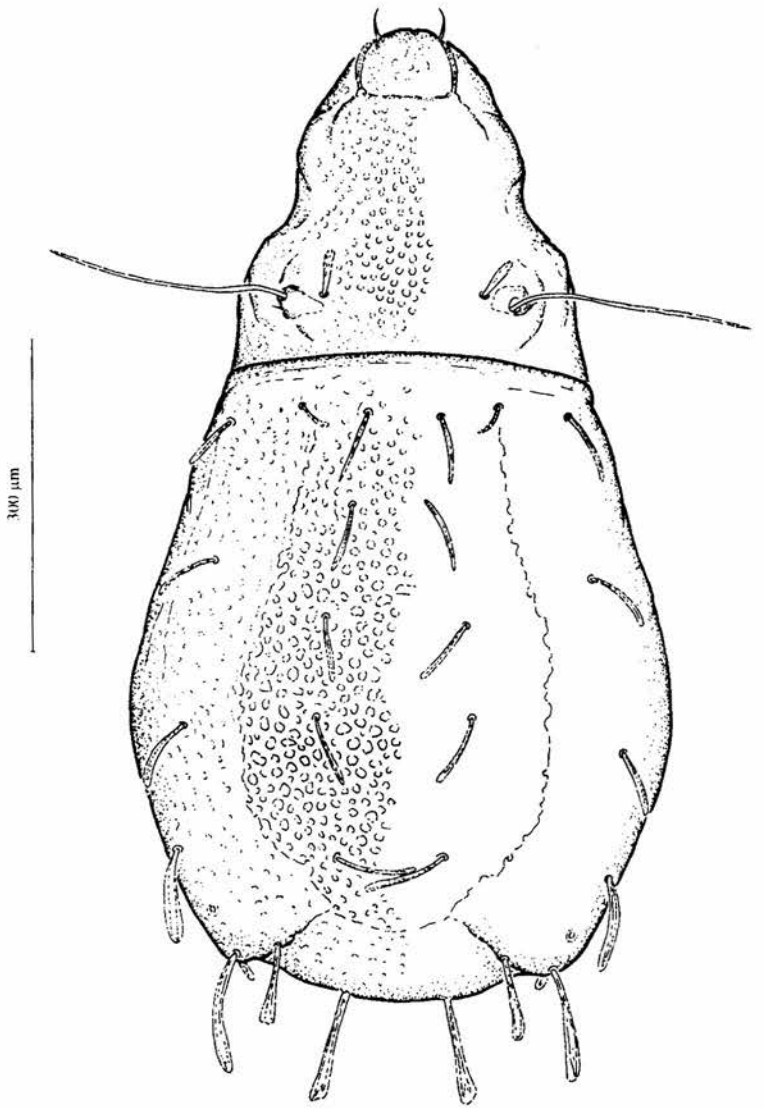


Fig. 8. *Nothrus borussicus* SELLNICK: dorsal view.

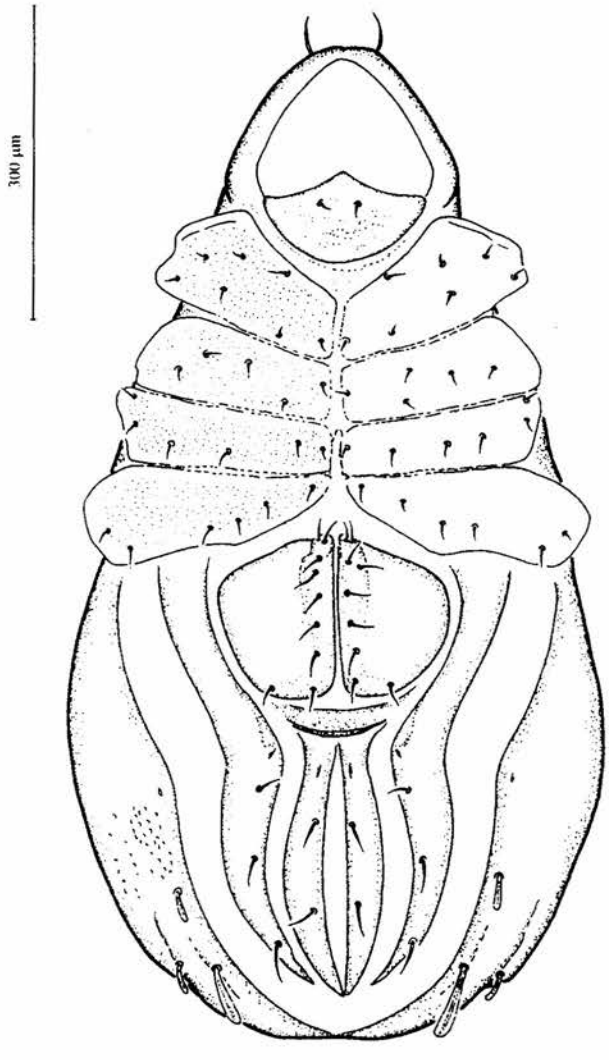


Fig. 9. *Nothrus borussicus* SELLNICK: ventral view.

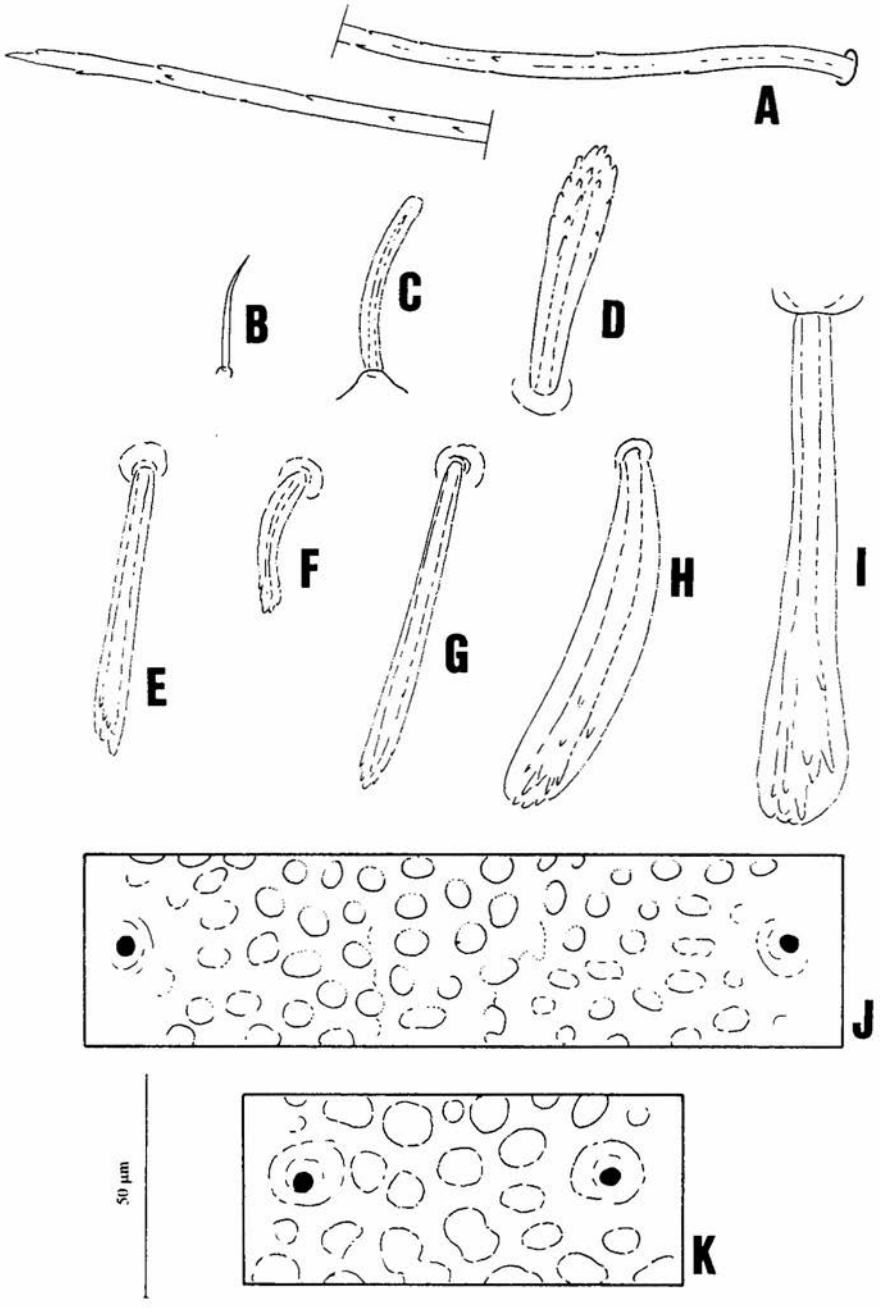


Fig. 10. *Nothrus borussicus* Sellnick: A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *p1*; J - microsculpture of prodorsum between setae *in*; K - microsculpture of notogaster between setae *d2*.

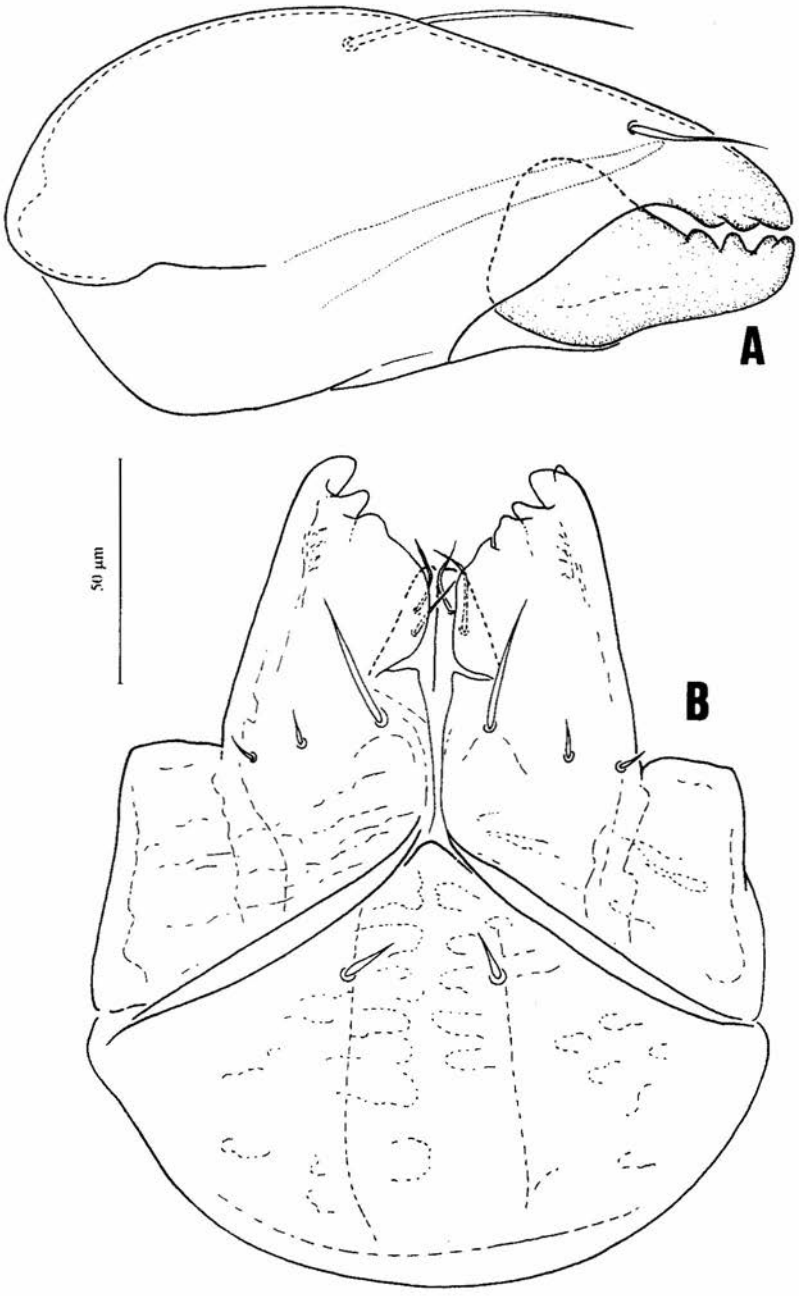


Fig. 11. *Nothrus borussicus* Sellnick: A - chelicera, antiaxial view; B - subcapitulum, ventral view.

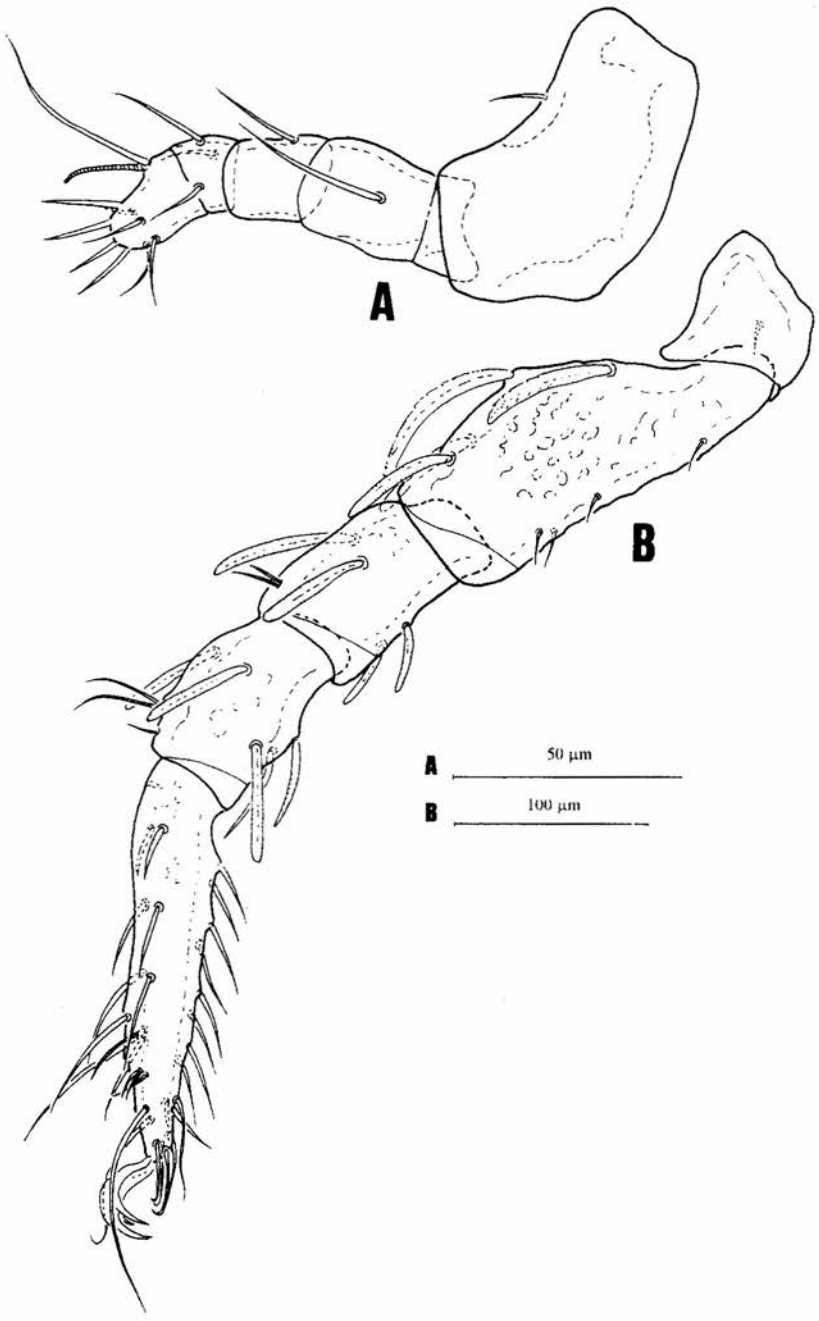


Fig. 12. *Nothrus borussicus* Sellnick: A - pedipalp, antiaxial view; B - leg I, antiaxial view.

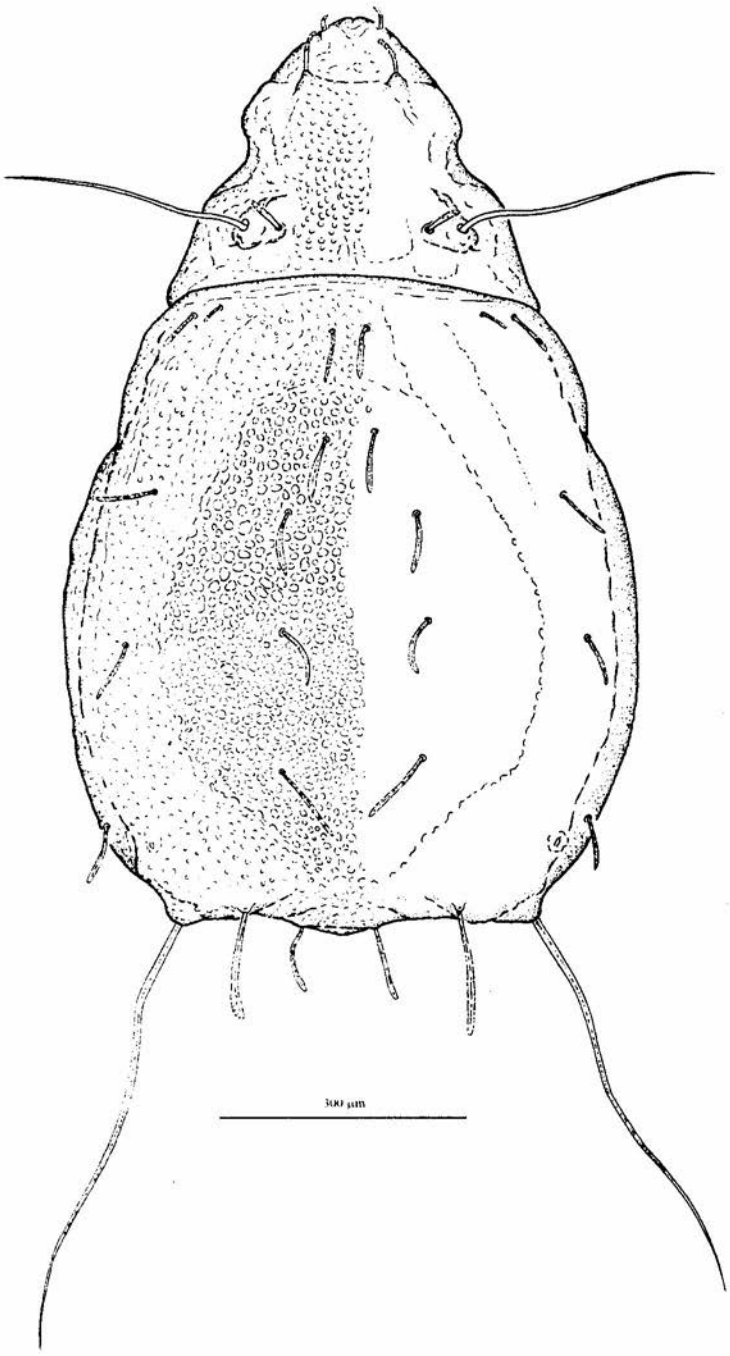


Fig. 13. *Nothrus palustris* C.L. Koch: dorsal view.

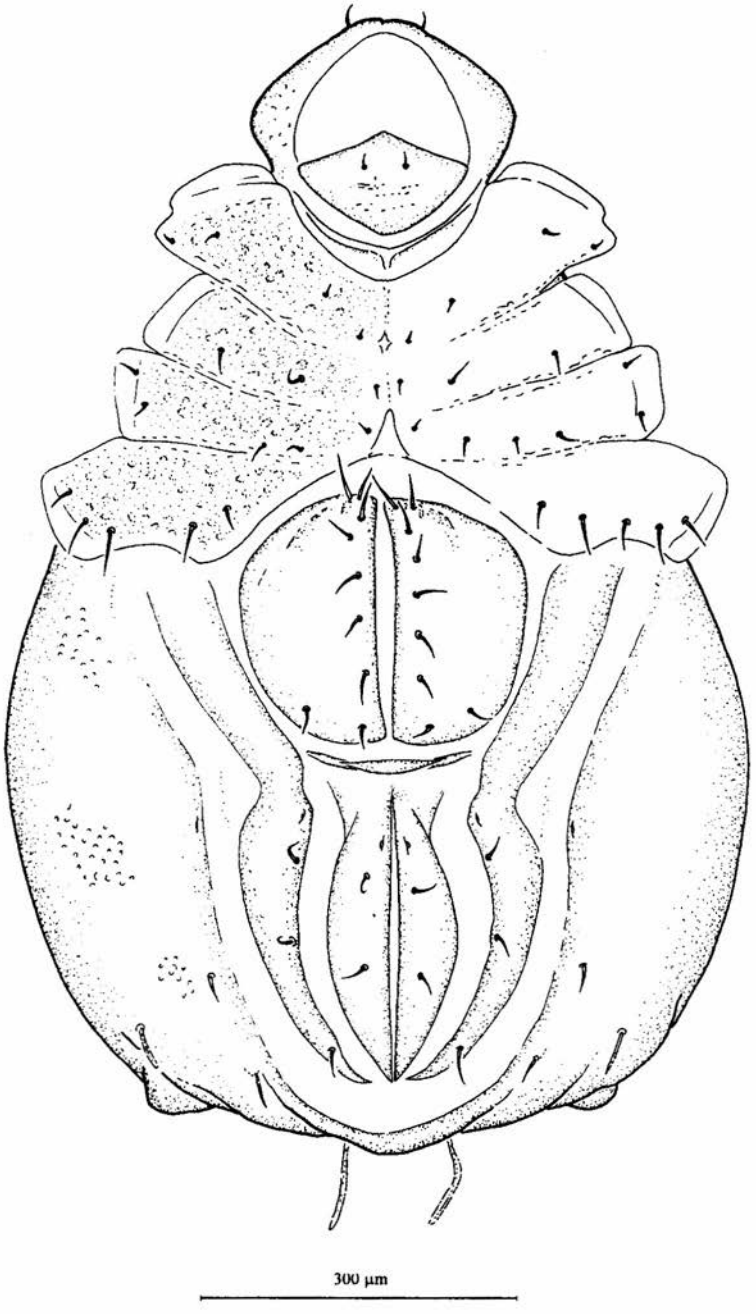


Fig. 14. *Nothrus palustris* C.L. Koch: ventral view.

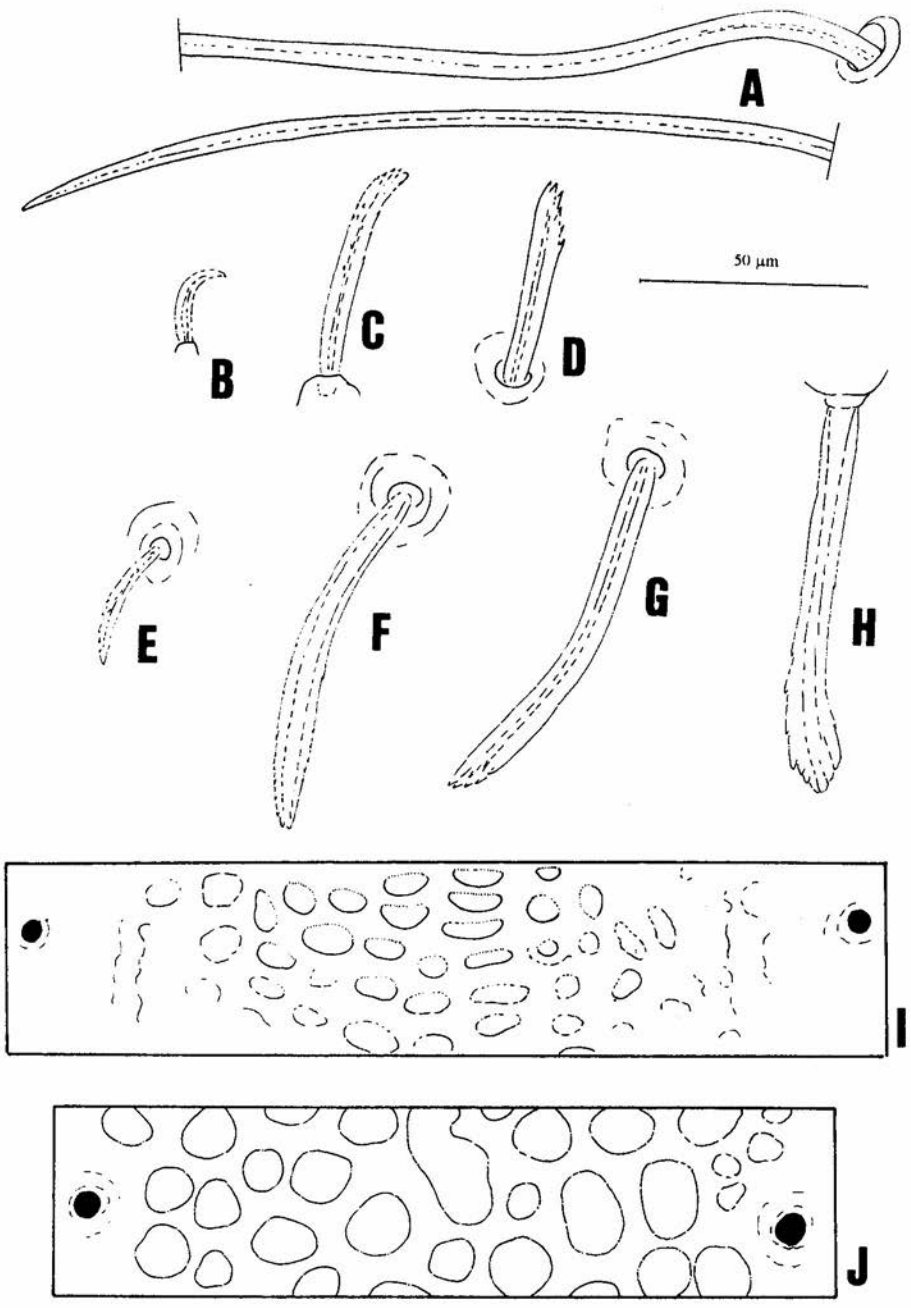


Fig. 15. *Nothrus palustris* C.L. Koch: A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c2*; F - seta *d2*; G - seta *f2*; H - seta *p1*; I - microsculpture of prodorsum between setae *in*; J - microsculpture of notogaster between setae *d2*.

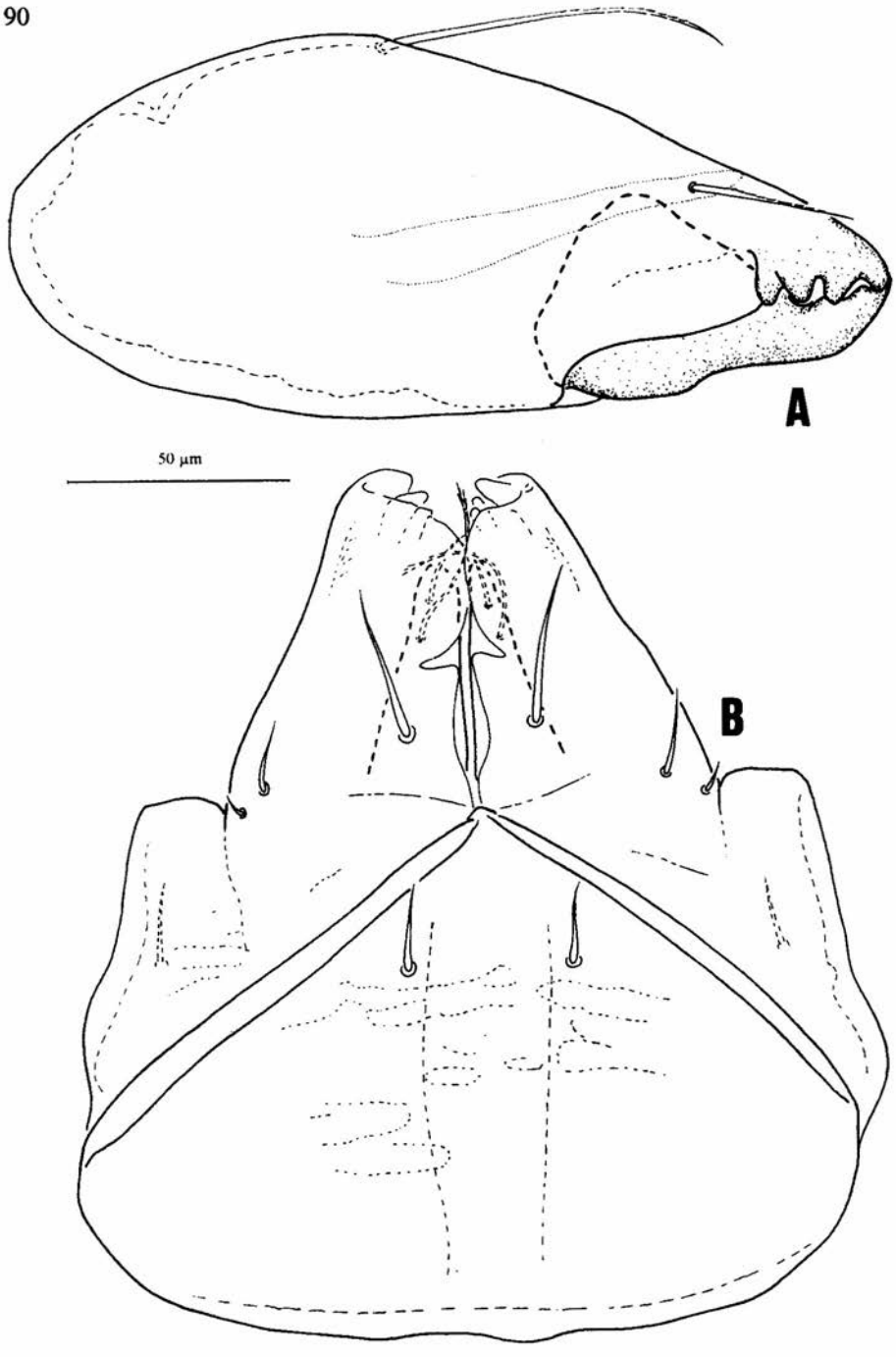


Fig. 16. *Nothrus palustris* C.L. Koch: A - chelicera, antiaxial view; B - subcapitulum, ventral view.

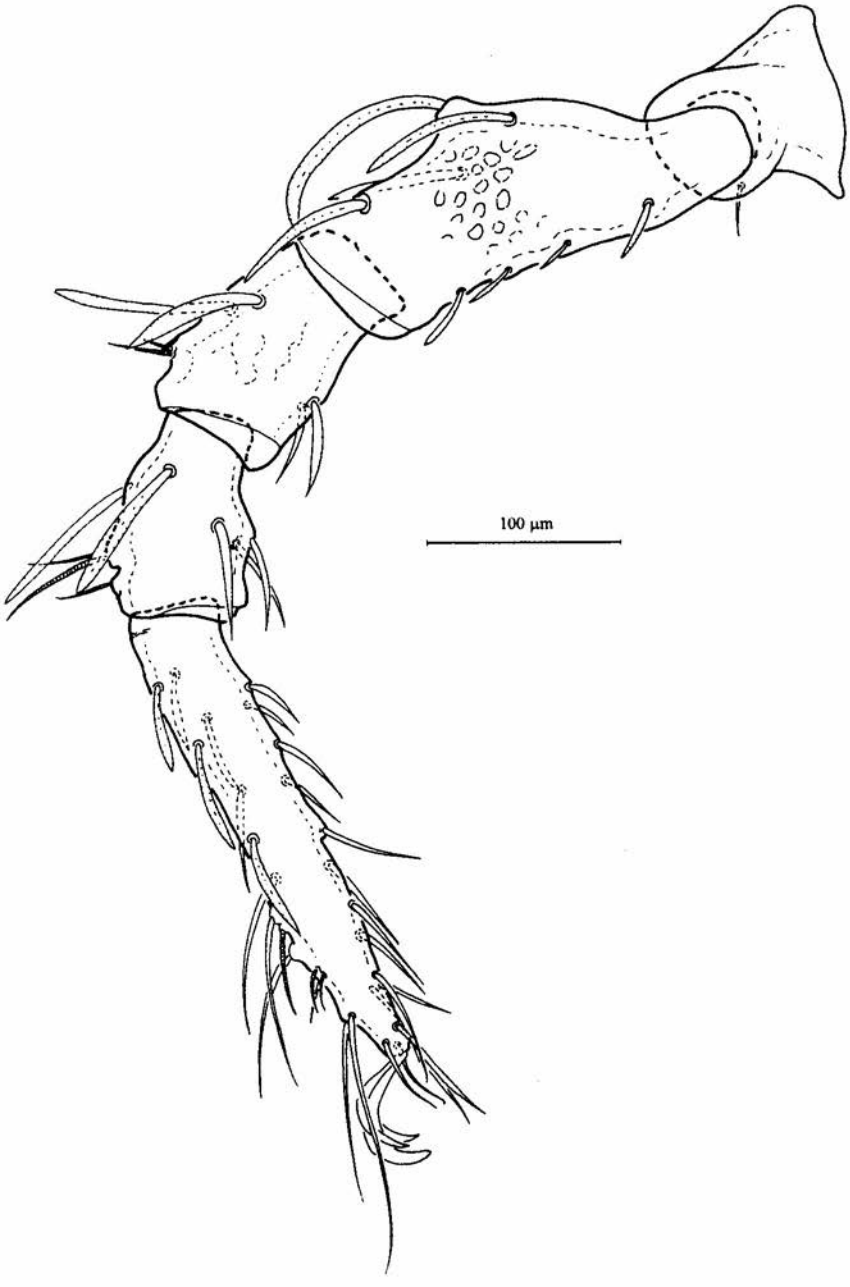


Fig. 17. *Nothrus palustris* C.L. Koch: leg I, antiaxial view.

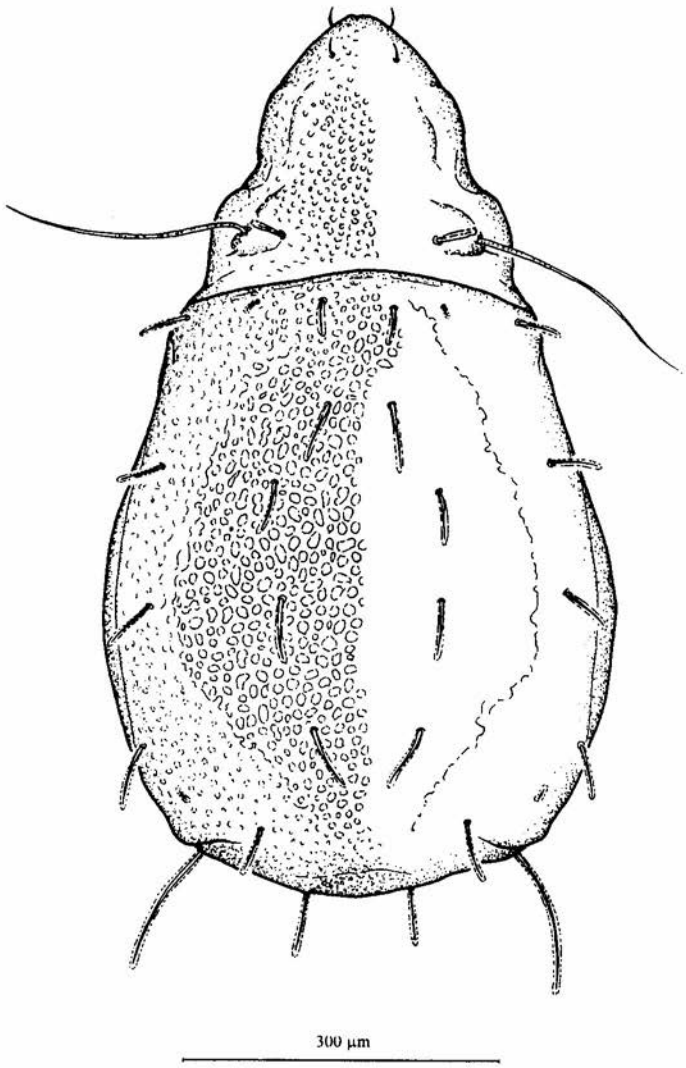


Fig. 18. *Nothrus pratensis* SELLNICK: dorsal view.

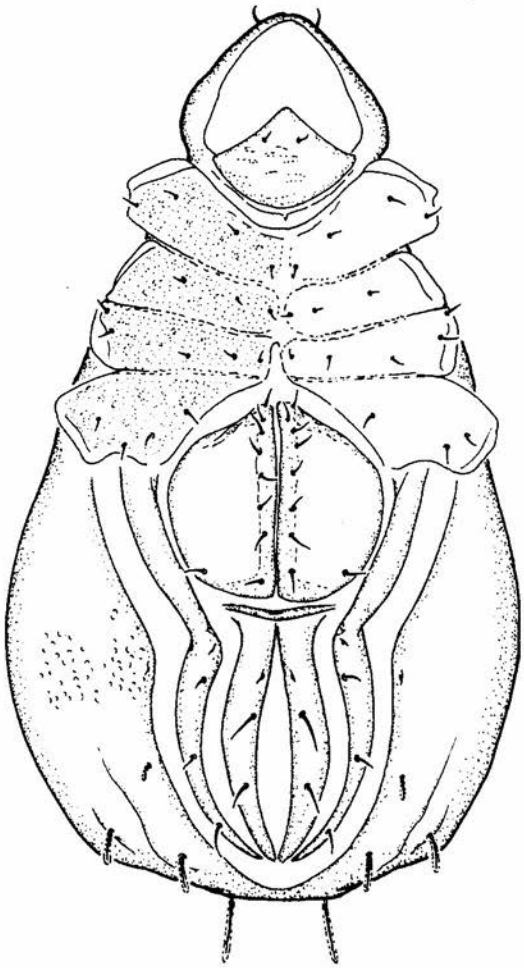


Fig. 19. *Nothrus pratensis* Sellnick: ventral view.

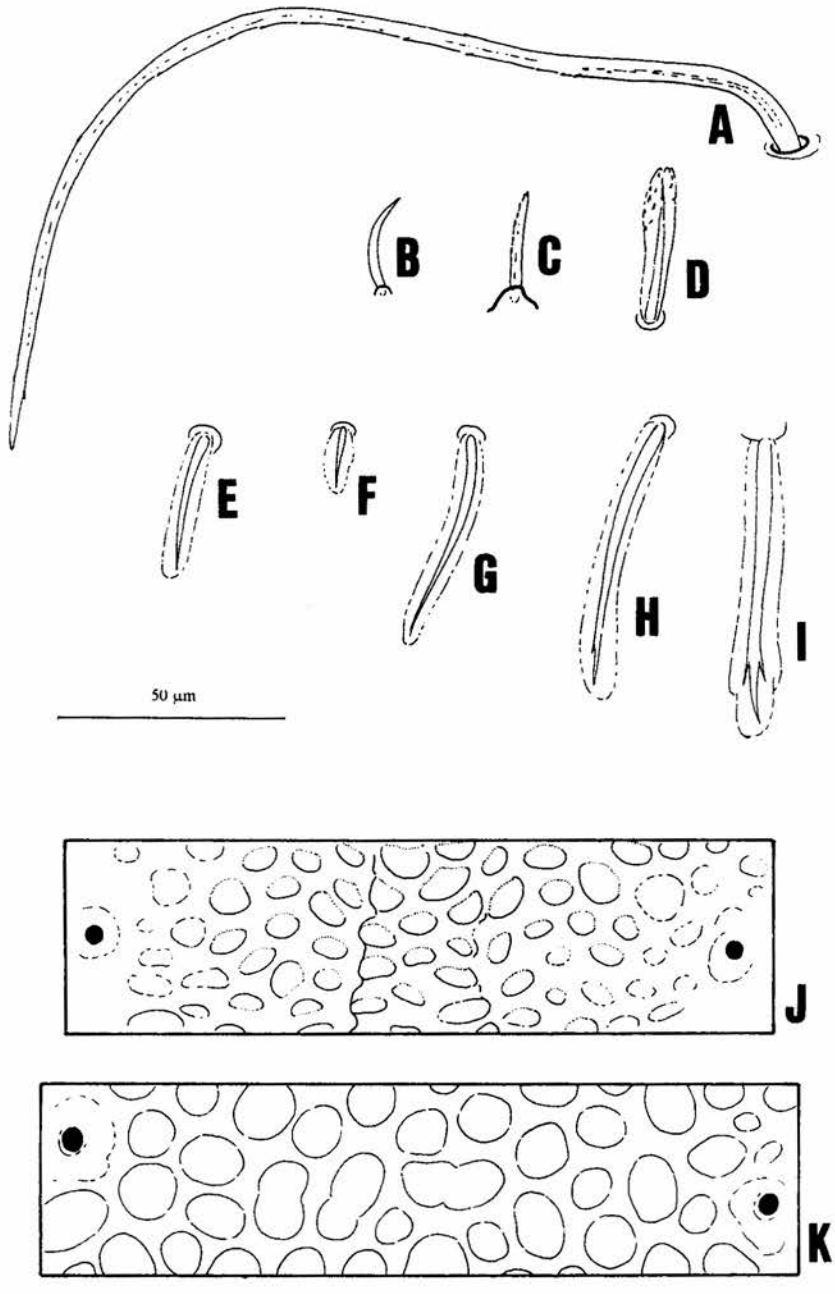


Fig. 20. *Nothrus pratensis* Sellnick: A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *p1*; J - microsculpture of prodorsum between setae *in*; K - microsculpture of notogaster between setae *d2*.

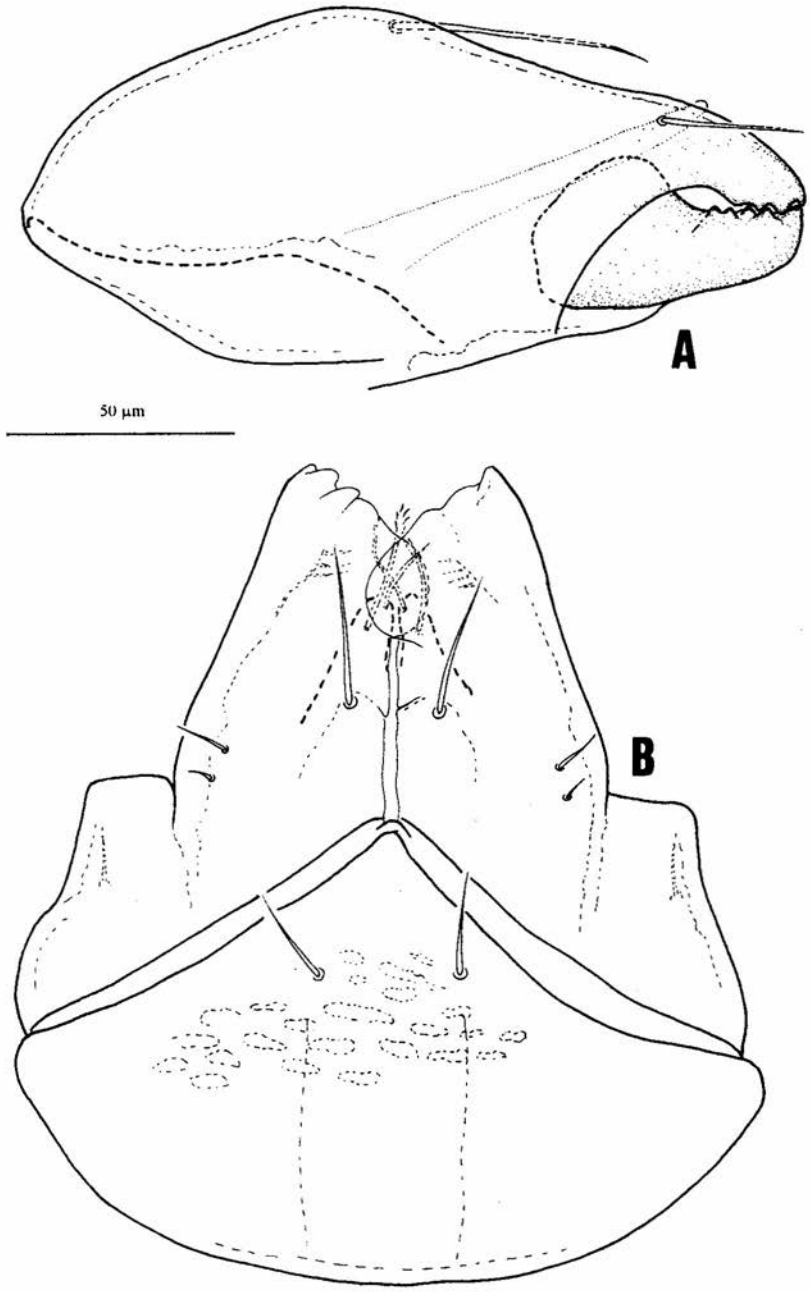


Fig. 21. *Nothrus pratensis* Sellnick: A - chelicera, antiaxial view; B - subcapitulum, ventral view.

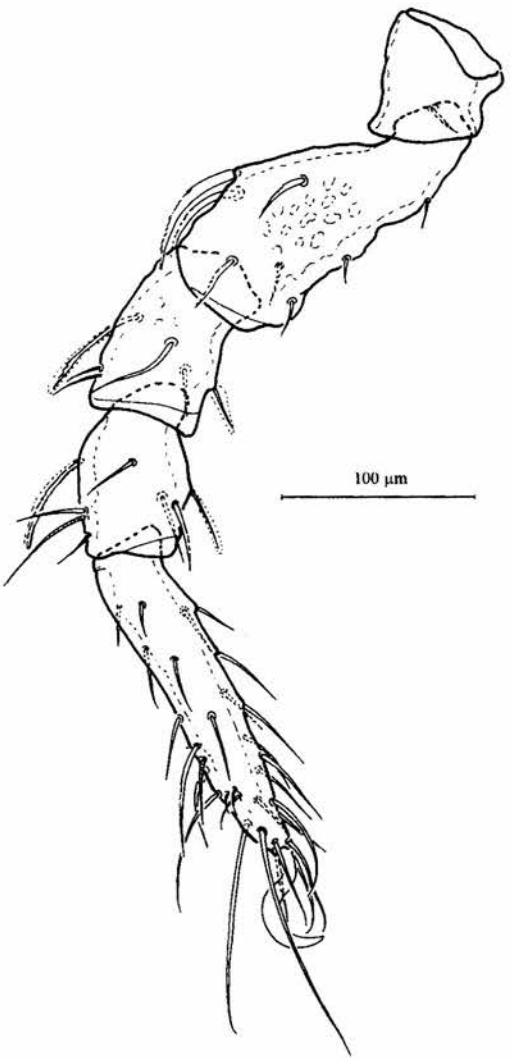


Fig. 22. *Nothrus pratensis* Sellnick: leg I, antiaxial view.

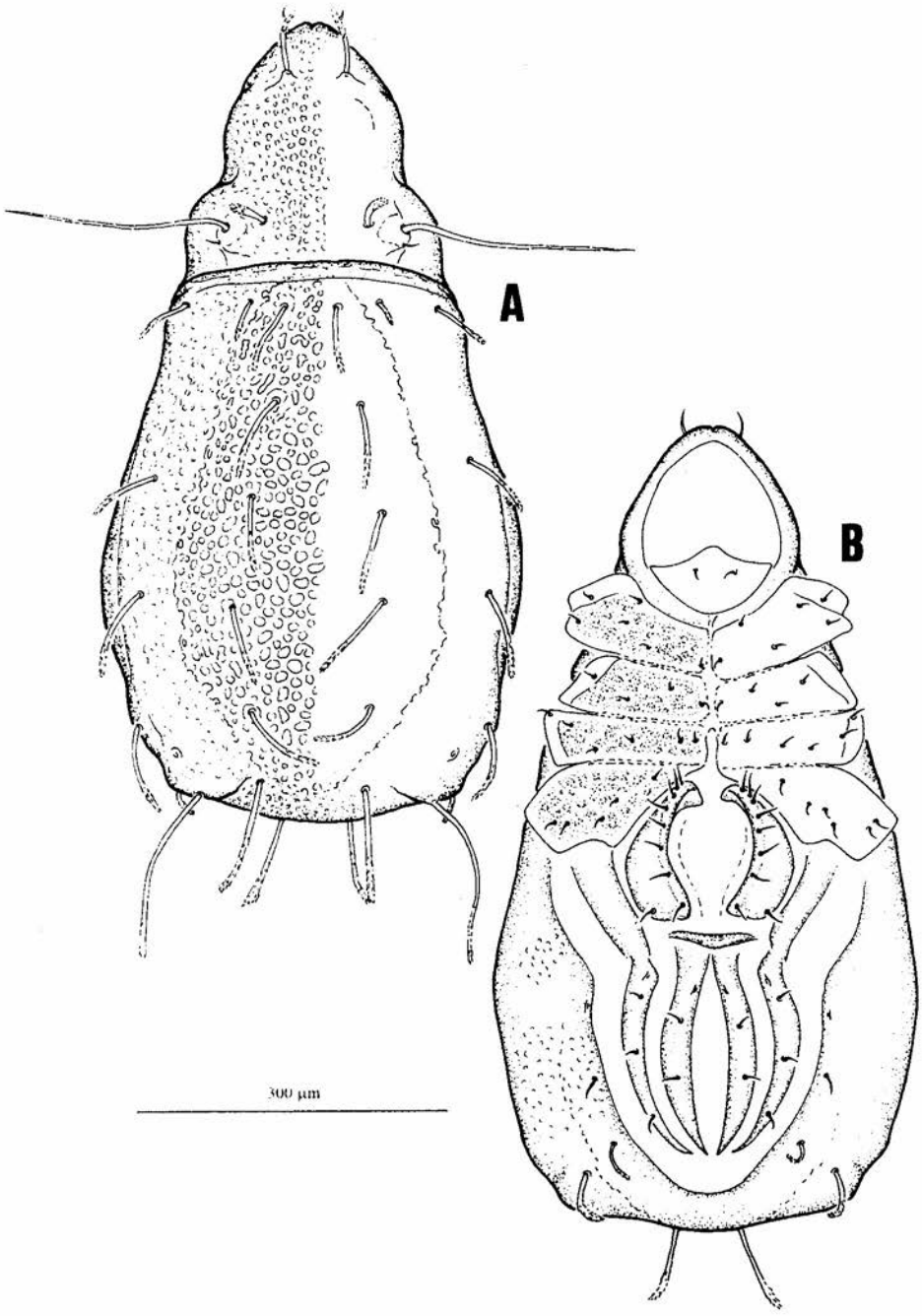


Fig. 23. *Nothrus silvestris* Nicolet: A - dorsal view; B - ventral view.

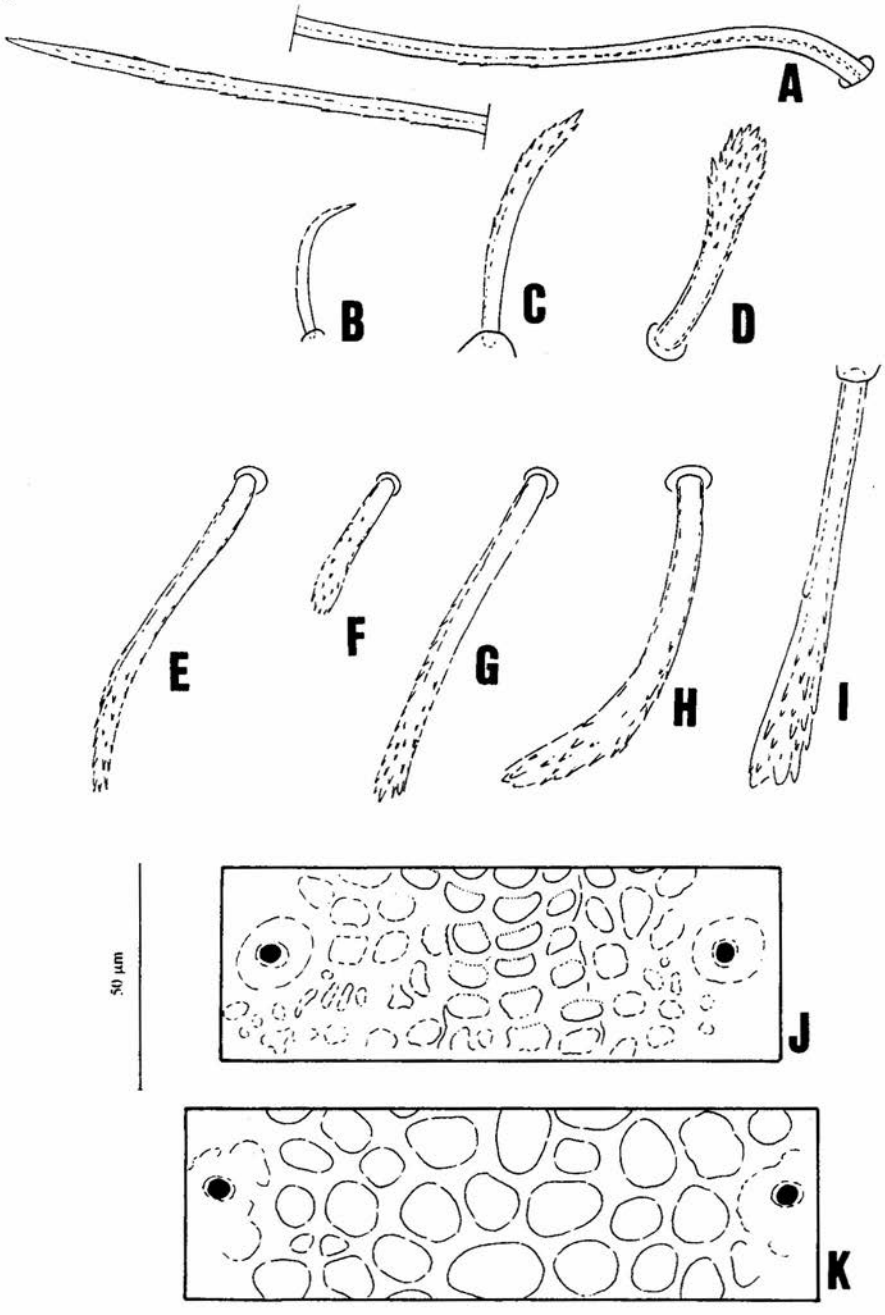


Fig. 24. *Nothrus silvestris* Nicolet: A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *p1*; J - microsculpture of prodorsum between setae *in*; K - microsculpture of notogaster between setae *d2*.

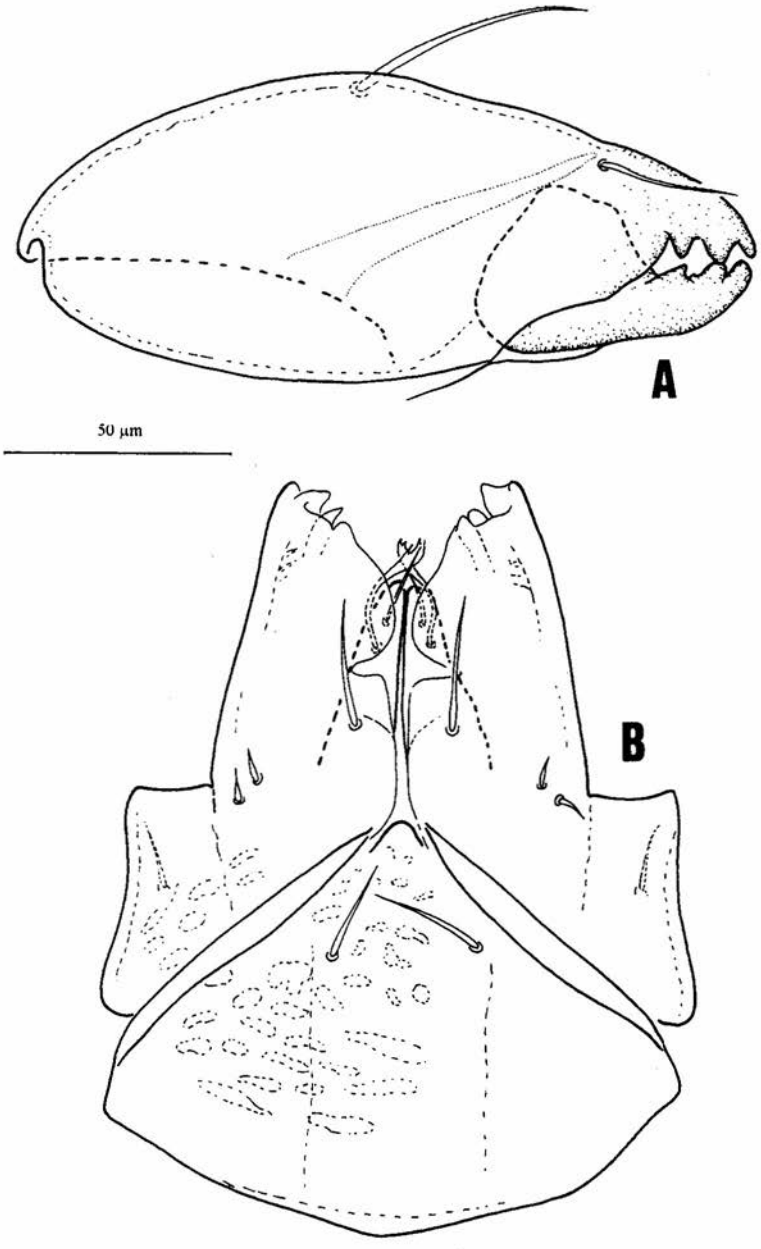


Fig. 25. *Nothrus silvestris* Nicolet: A - chelicera, antiaxial view; B - subcapitulum, ventral view.

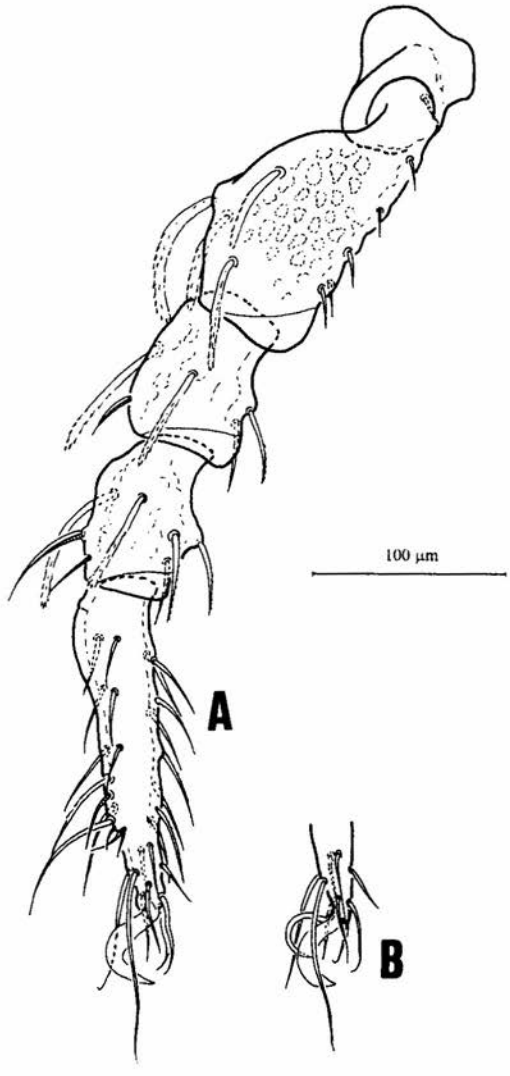


Fig. 26. *Nothrus silvestris* Nicolet: A - leg I, antiaxial view; B - leg I, end of tarsus with two claws, antiaxial view.

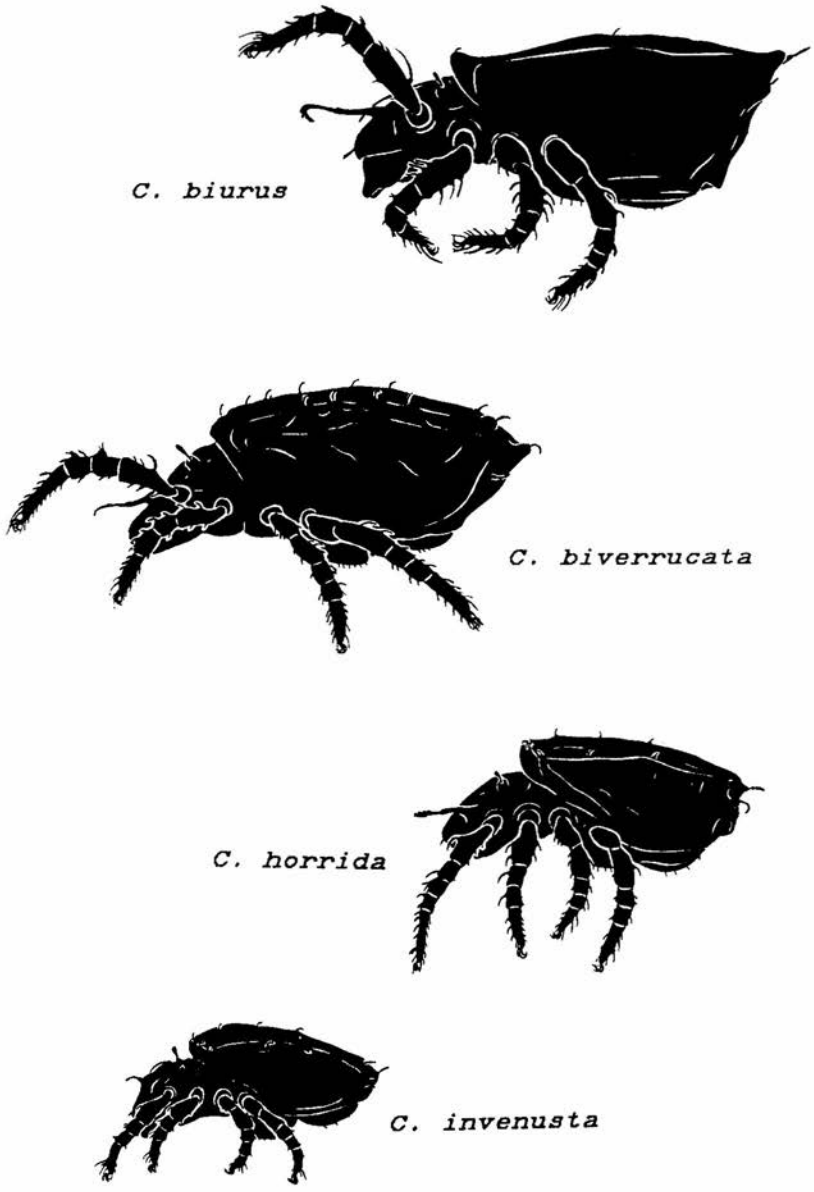


Fig. 27. The body shape in species of the genus *Camisia*, lateral view (1).

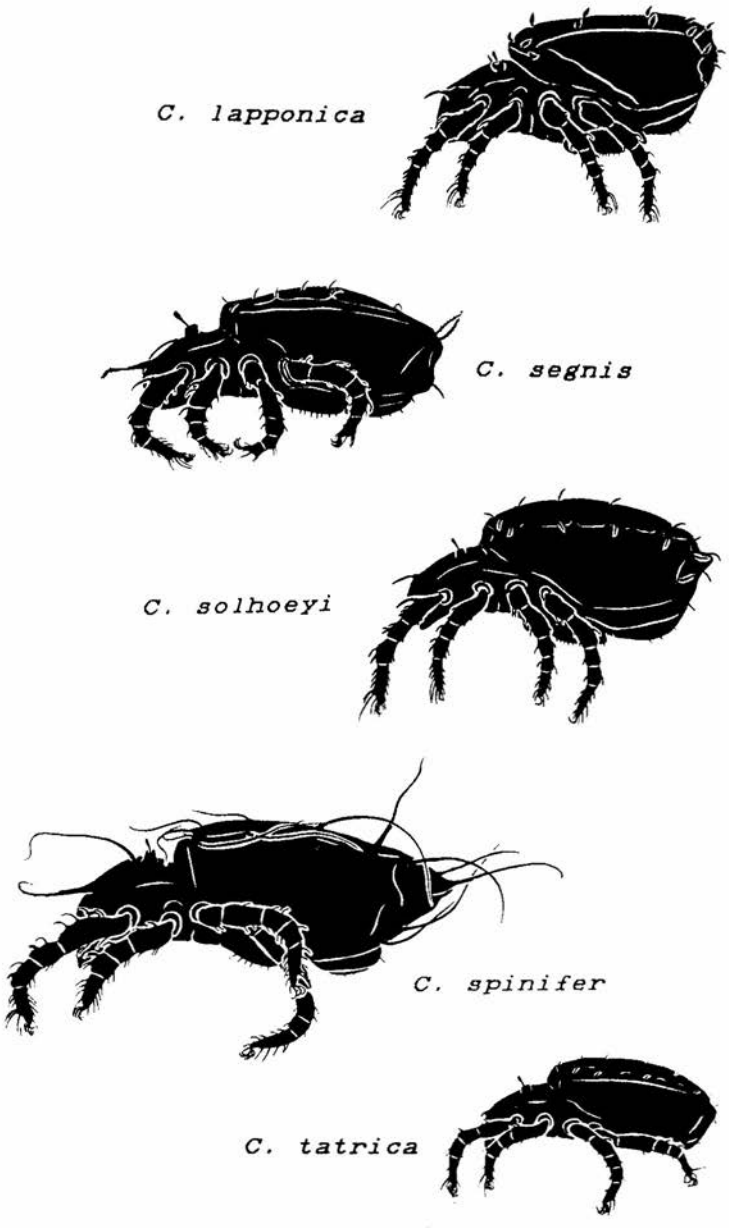


Fig. 28. The body shape in species of the genus *Camisia*, lateral view (2).

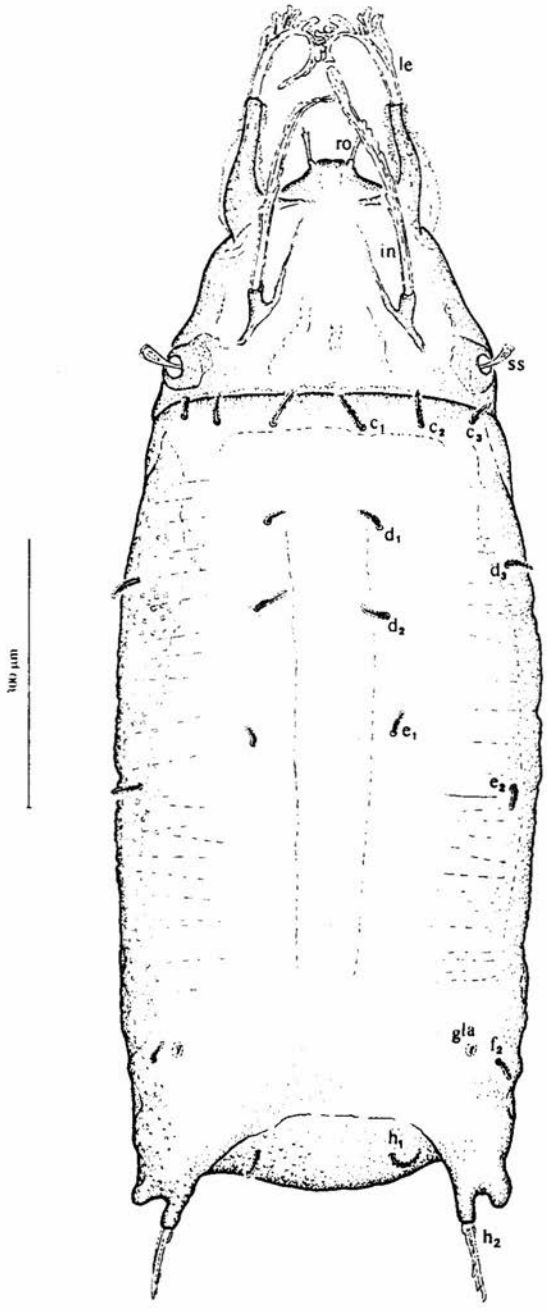


Fig. 29. *Camisia biurus* (C.L. Koch): dorsal view.

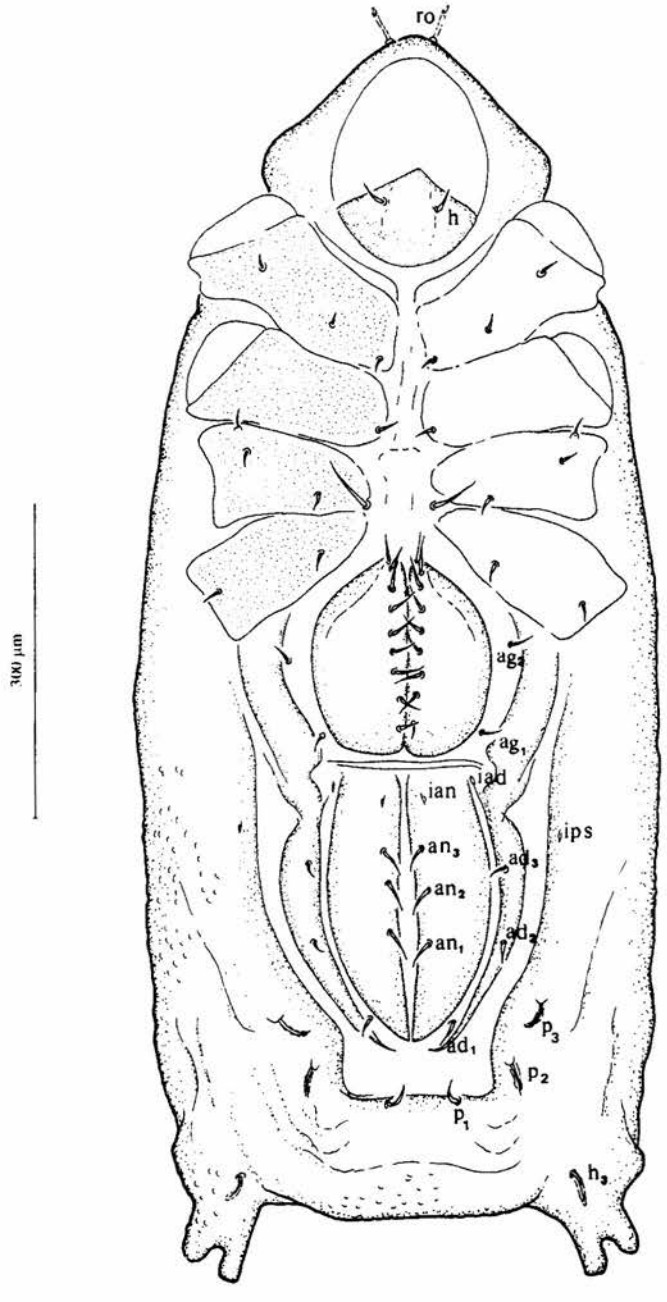


Fig. 30. *Camisia biurus* (C.L. Koch): ventral view.

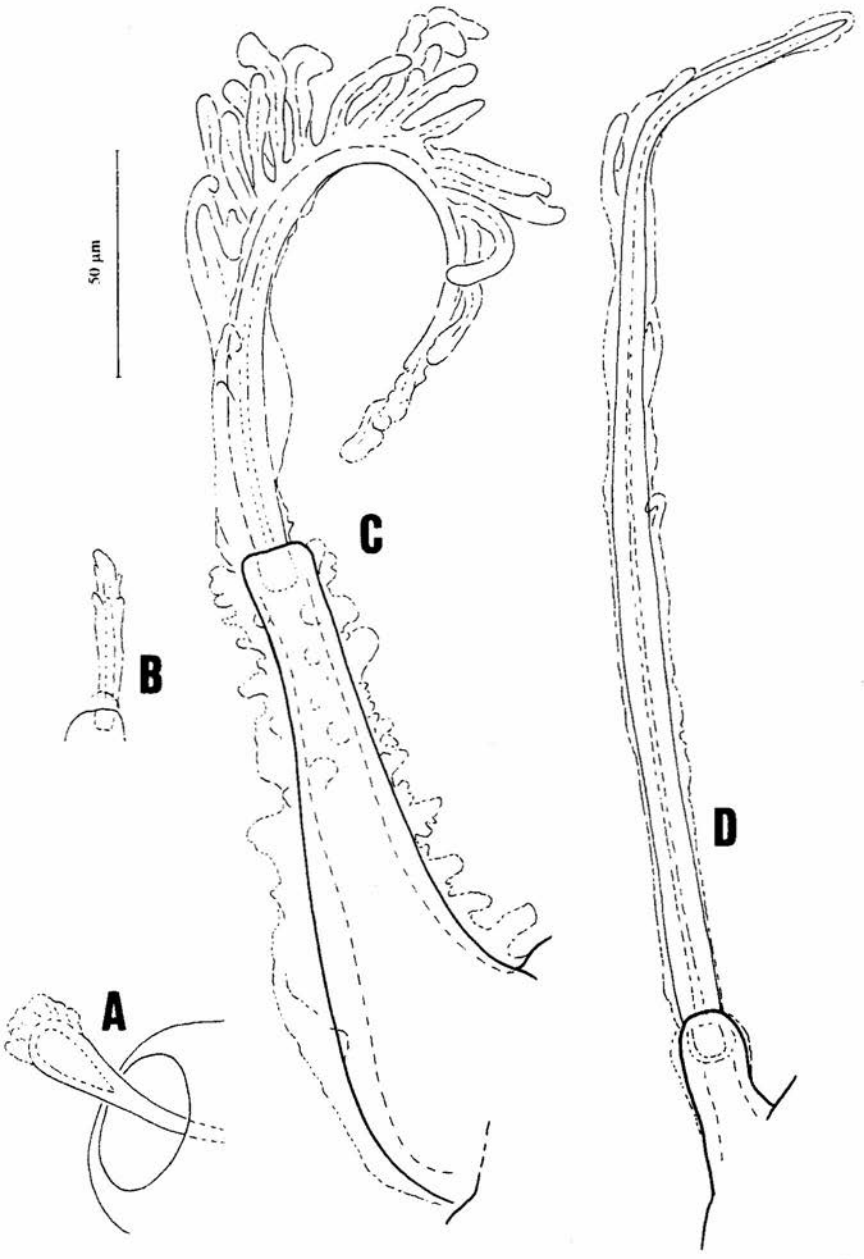


Fig. 31. *Camisia biurus* (C.L. Koch): A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*.

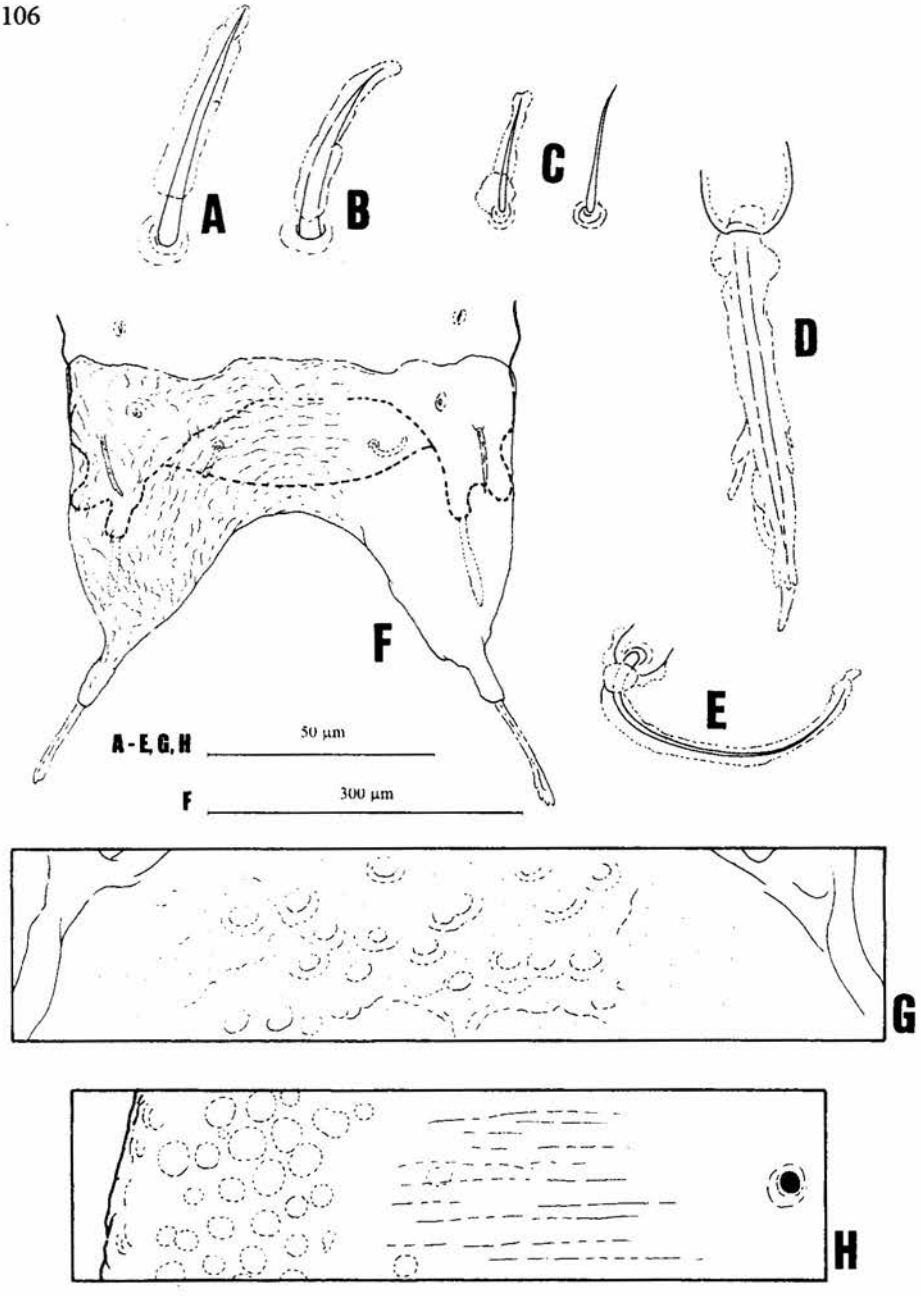


Fig. 32. *Camisia biurus* (C.L. Koch): A - seta *c1*; B - seta *c2*; C - seta *d2* (with and without sheath of cerotegument); D - seta *h1*; E - seta *h2*; F - posterior region of notogaster with fragment of tritonymphal exuvium; G - microsculpture of prodorsum between setae *in*; H - microsculpture of prodorsum between setae *d2*.

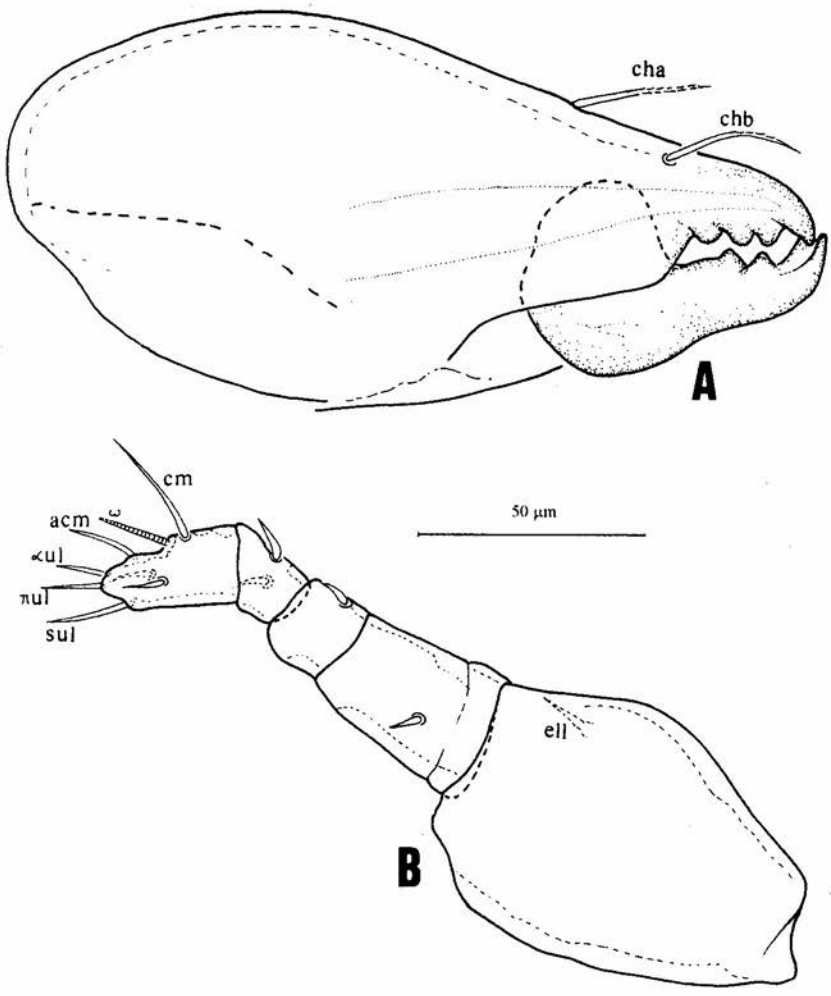


Fig. 33. *Camisia biurus* (C.L. Koch): A - chelicera, antiaxial view; B - pedipalp, antiaxial view.

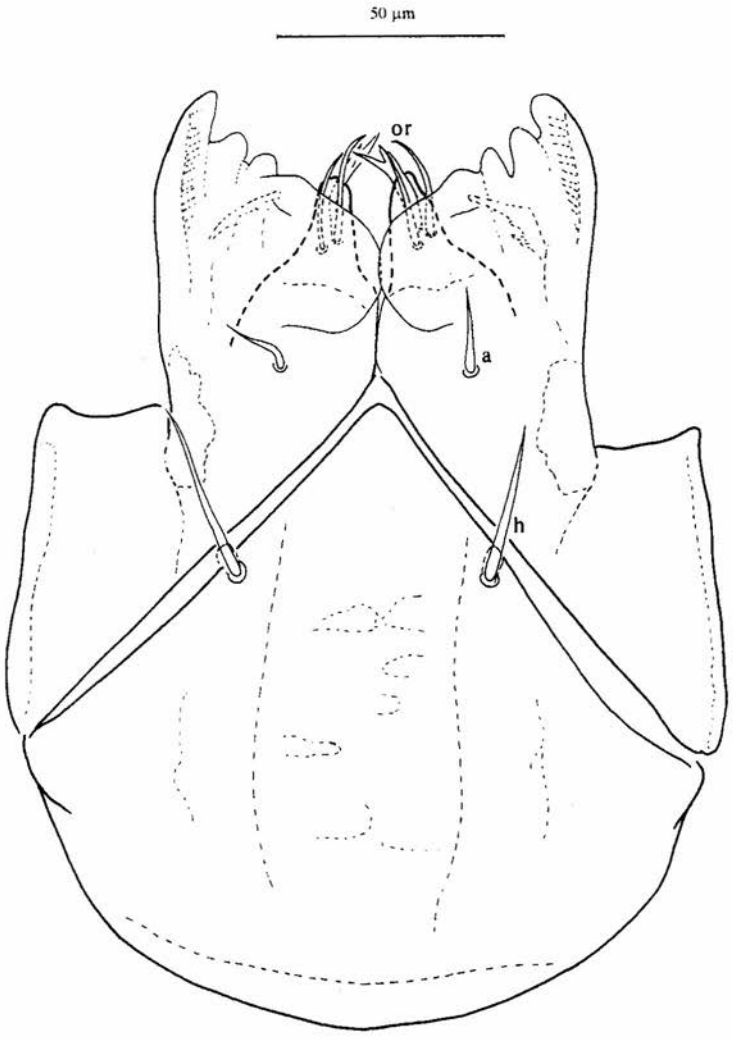


Fig. 34. *Camisia biurus* (C.L. Koch): subcapitulum, ventral view.

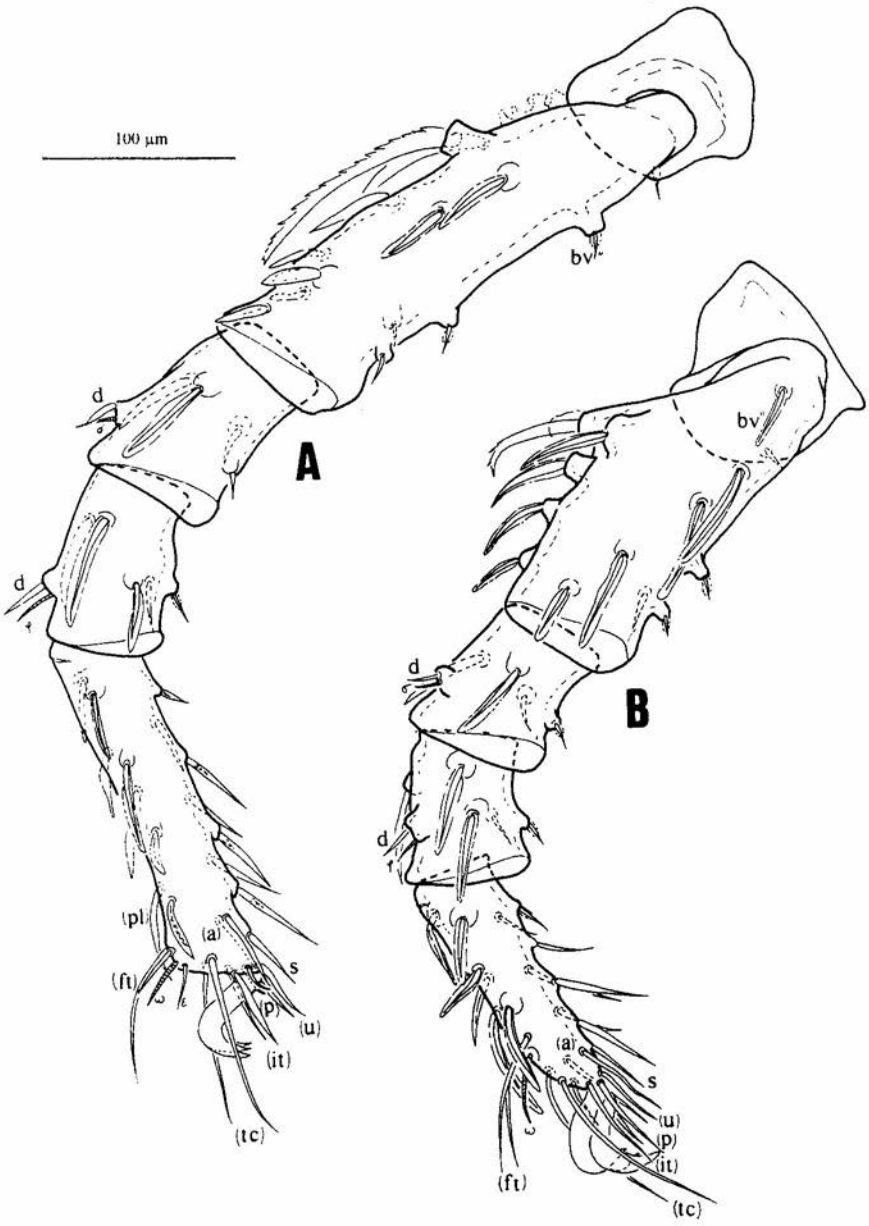


Fig. 35. *Camisia biurus* (C.L. Koch): A - leg I, antiaxial view; B - leg II, antiaxial view.

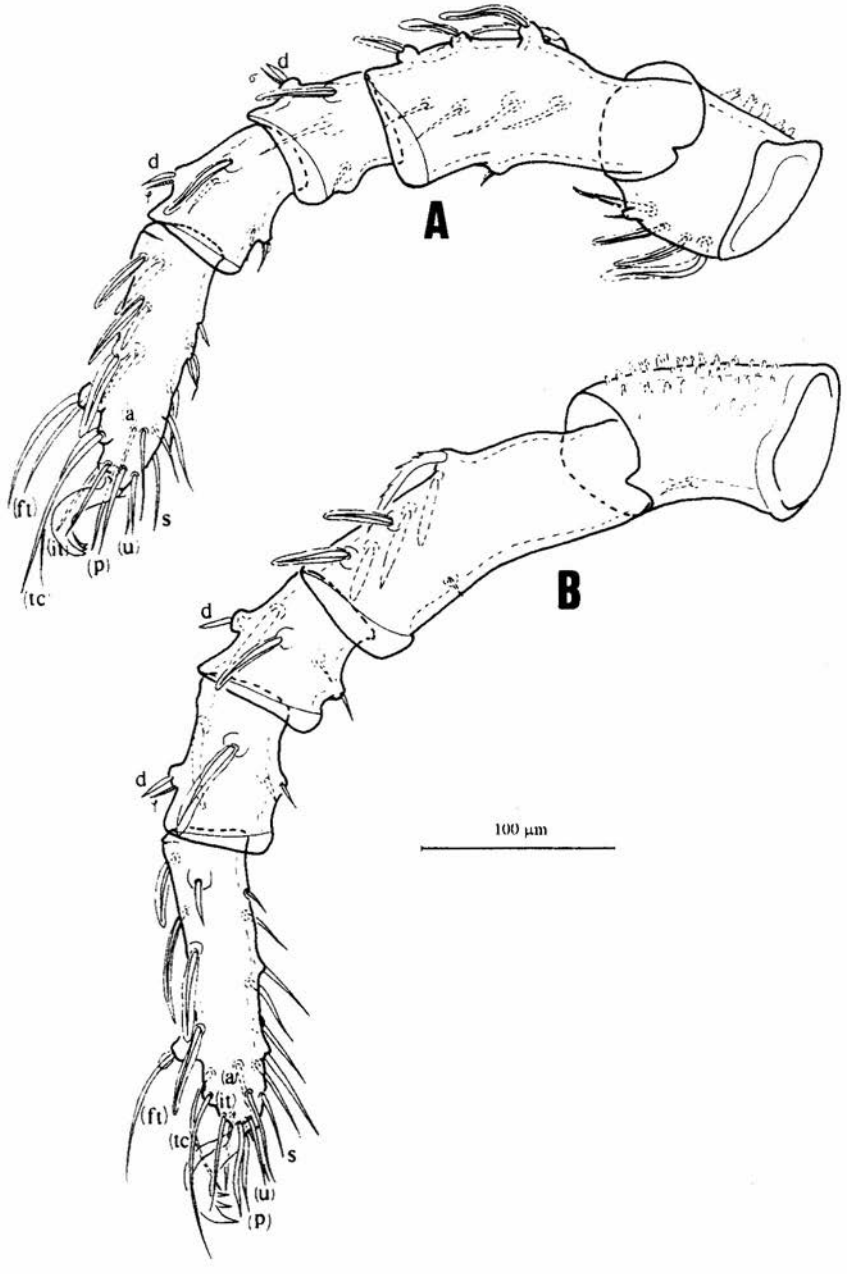


Fig. 36. *Camisia biurus* (C.L. Koch): A - leg III, paraxial view; B - leg IV, paraxial view.

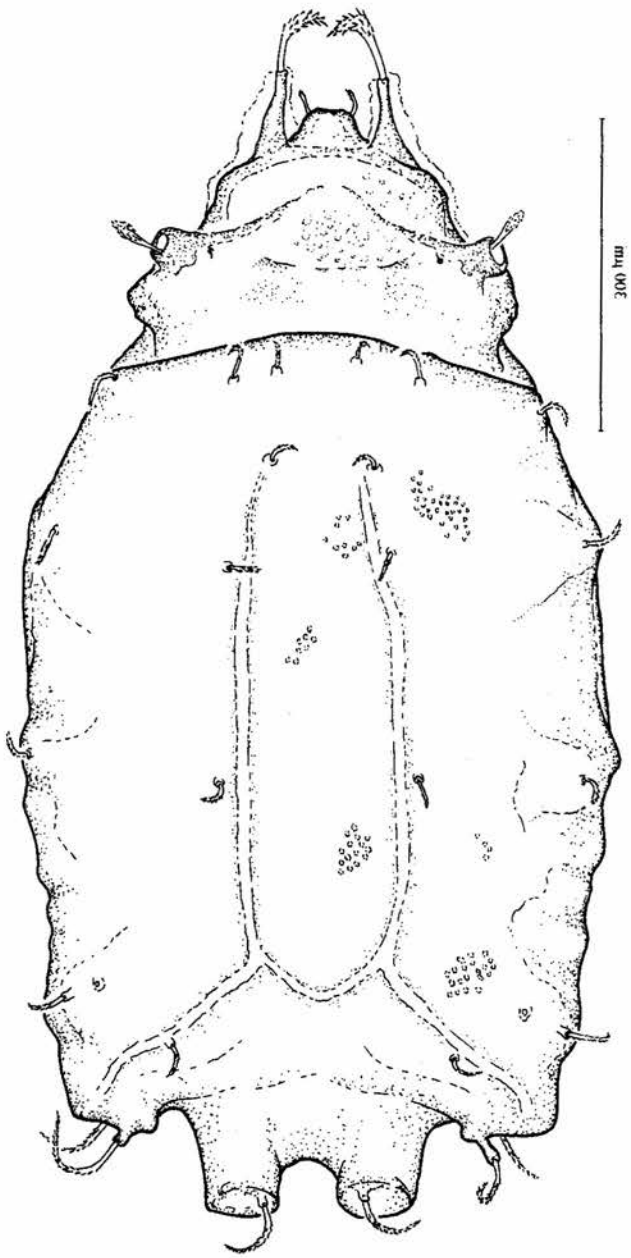


Fig. 37. *Camisia biverrucata* (C.L. Koch): dorsal view.

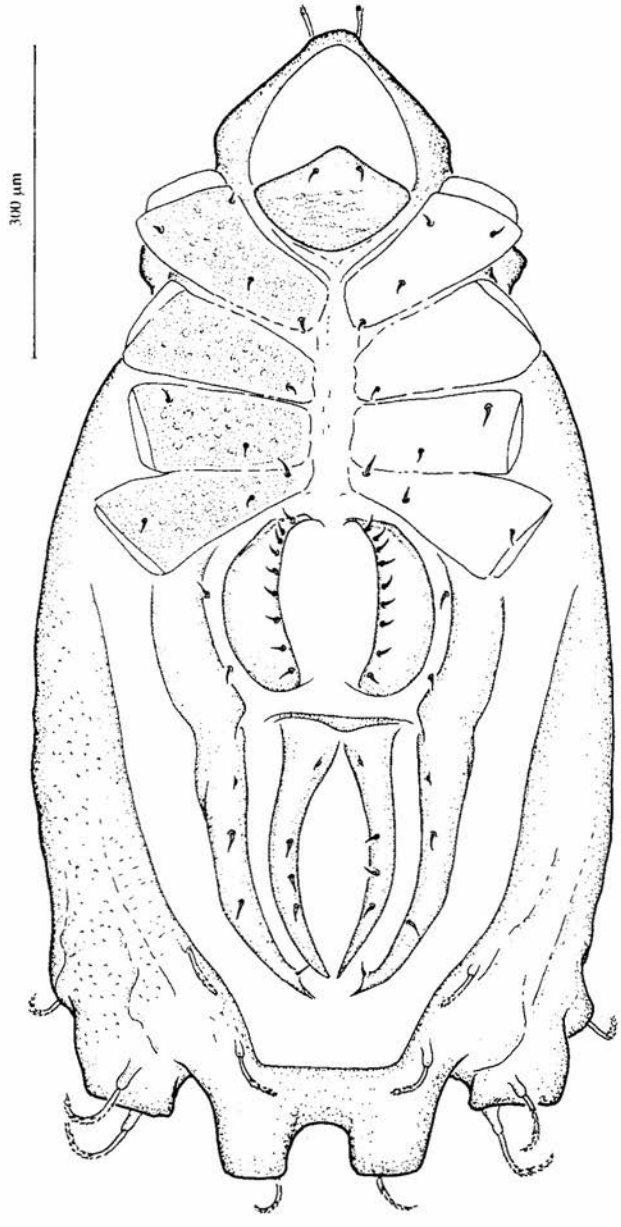


Fig. 38. *Camisia biverrucata* (C.L. Koch): ventral view.

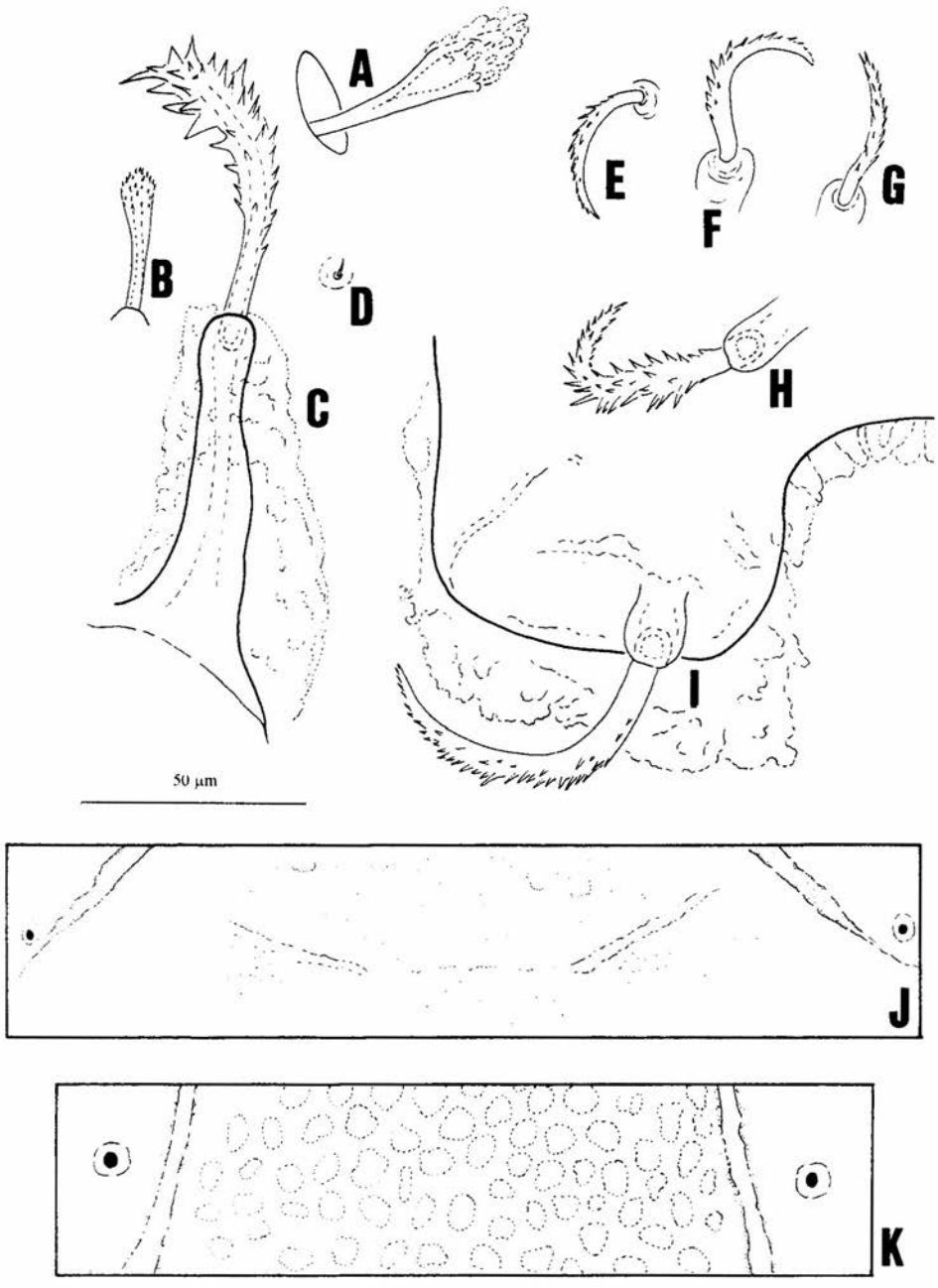


Fig. 39. *Camisia biverrucata* (C.L. Koch): A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *p1*; J - microsculpture of prodorsum between setae *in*; K - microsculpture of notogaster between setae *d2*.

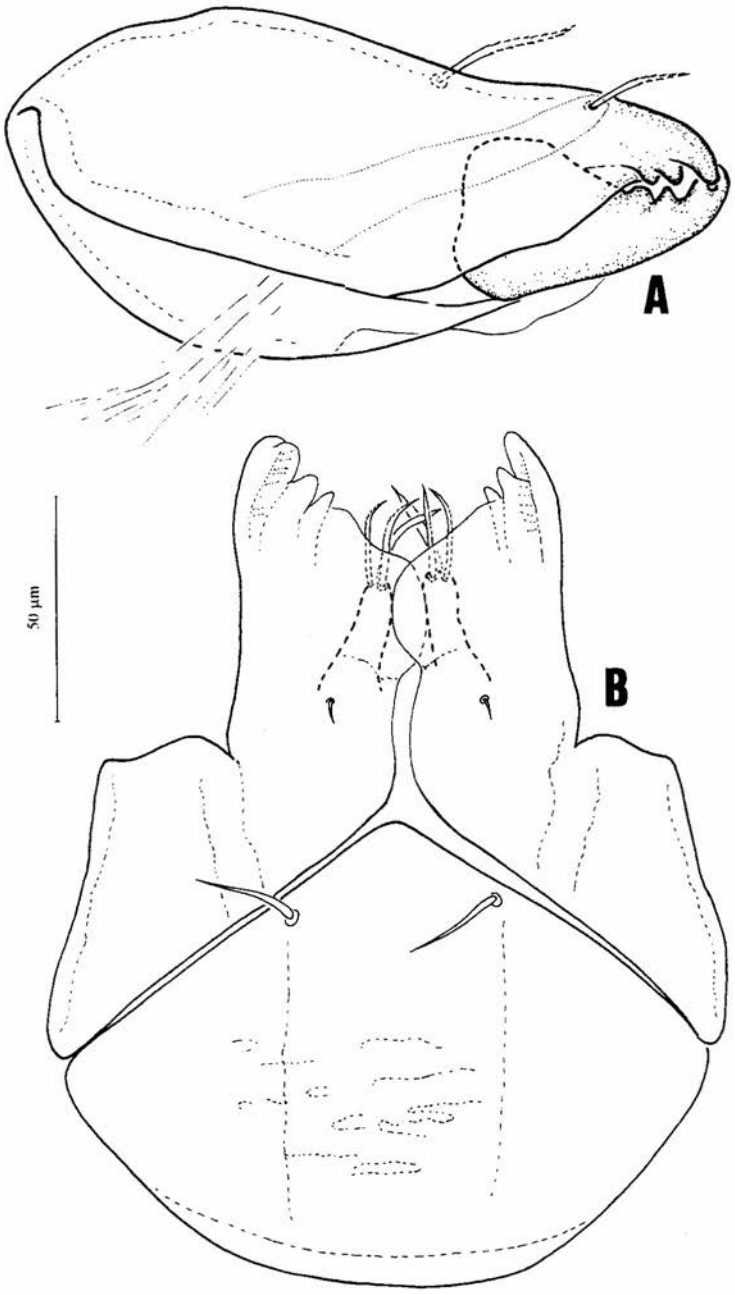


Fig. 40. *Camisia biverrucata* (C.L. Koch): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

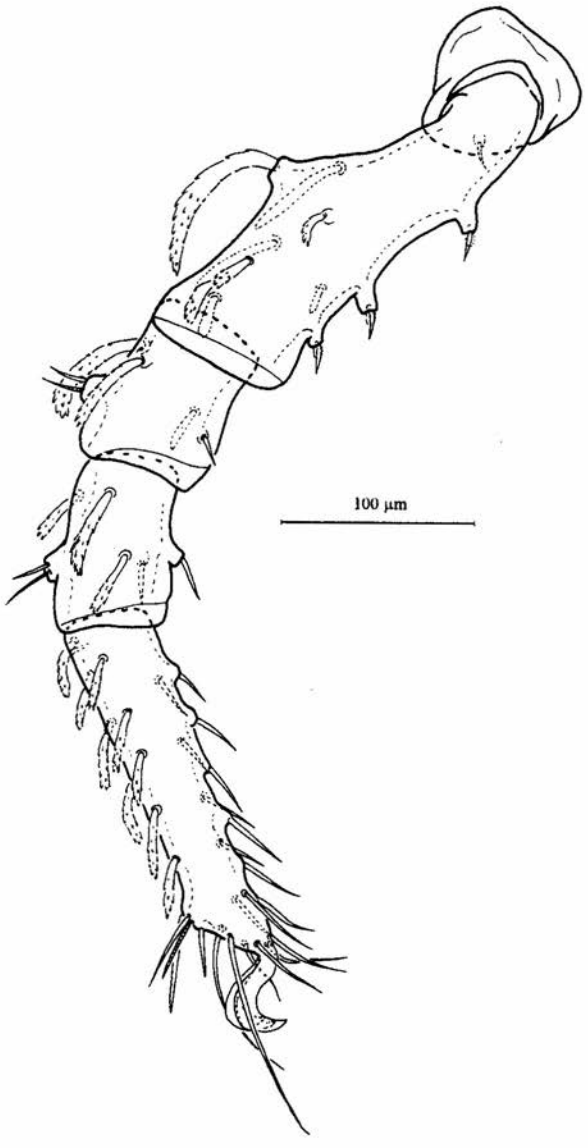


Fig. 41. *Camisia biverrucata* (C.L. Koch): leg I, antiaxial view.

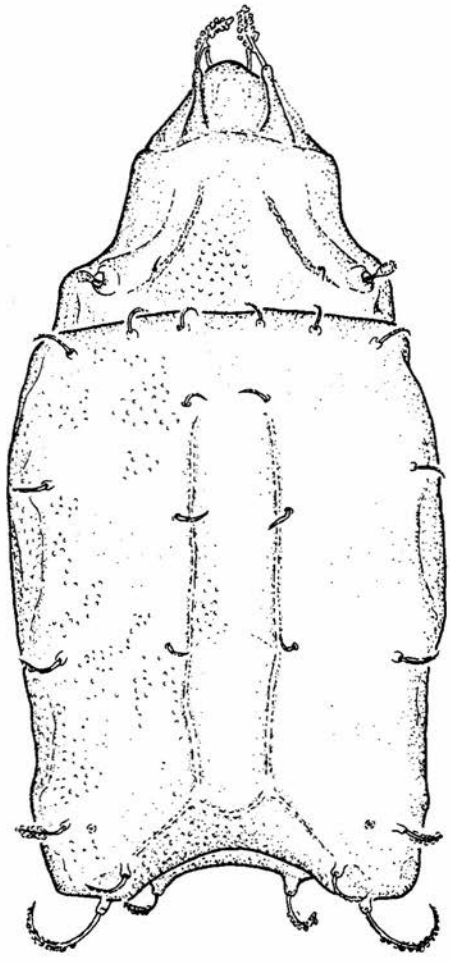


Fig. 42. *Camisia horrida* (HERMANN): dorsal view.

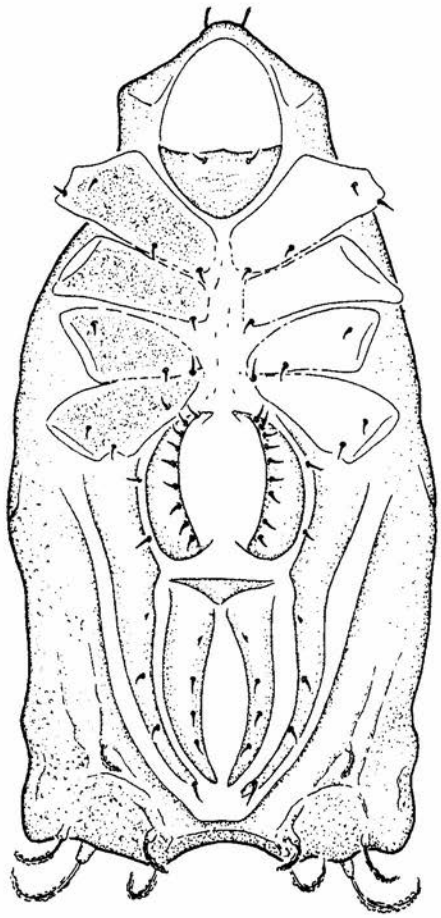


Fig. 43. *Camisia horrida* (HERMANN): ventral view.

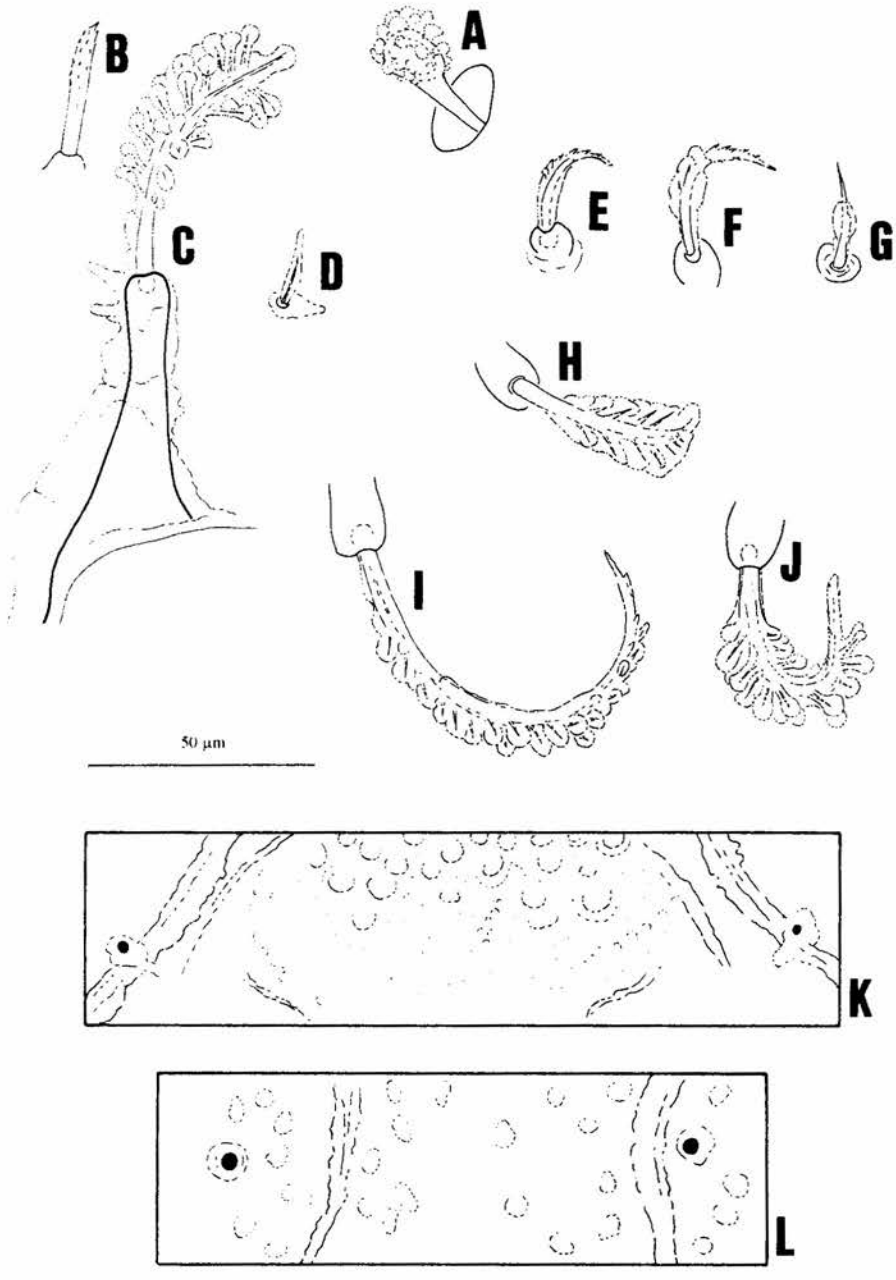


Fig. 44. *Camisia horrida* (HERMANN): A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *h2*; J - seta *p1*; K - microsculpture of prodorsum between setae *in*; L - microsculpture of notogaster between setae *d2*.

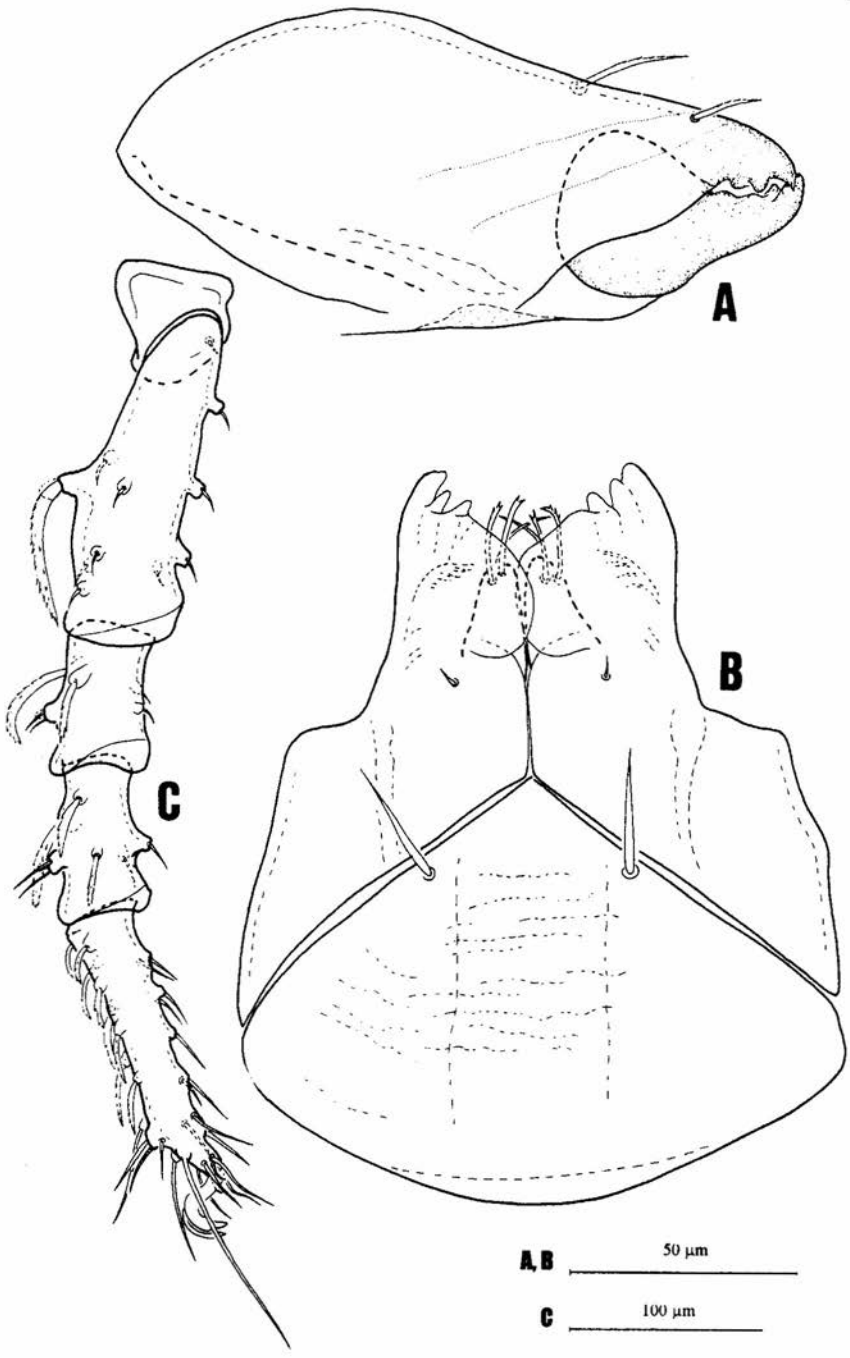


Fig. 45. *Camisia horrida* (HERMANN): A - chelicera, antiaxial view; B - subcapitulum, ventral view; C - leg I, antiaxial view.

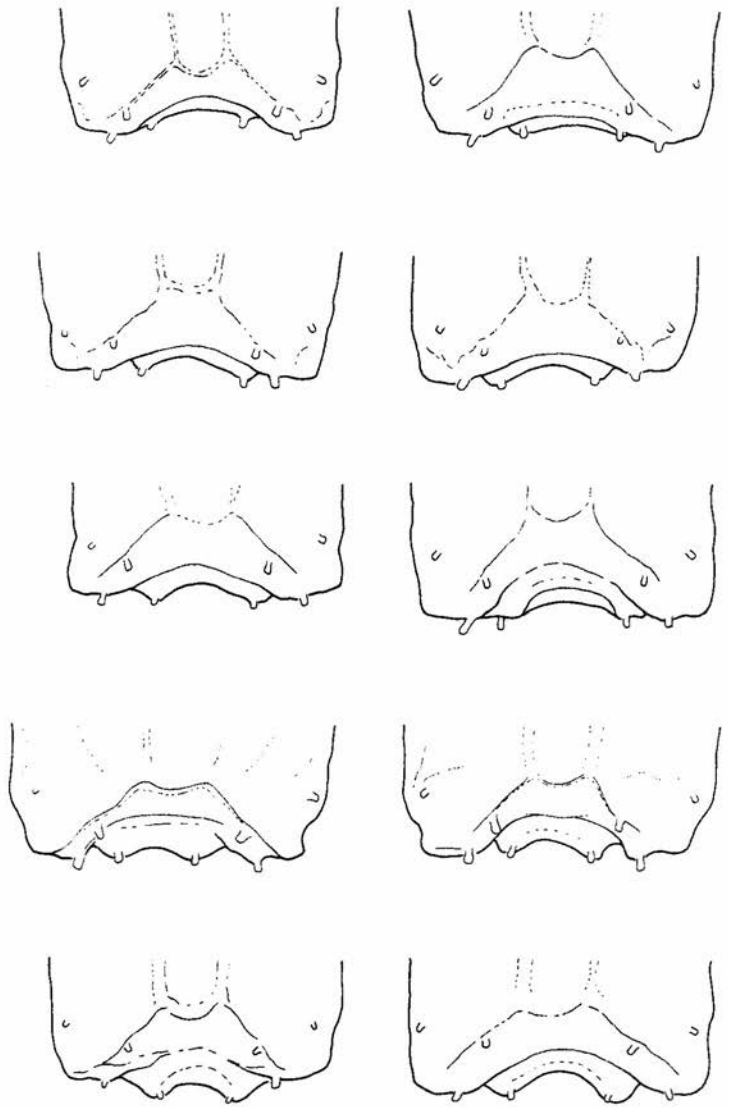


Fig. 46. *Camisia horrida* (HERMANN): posterior part of notogaster of different specimens without additional setae *fl*, dorsal view (explanation in text).

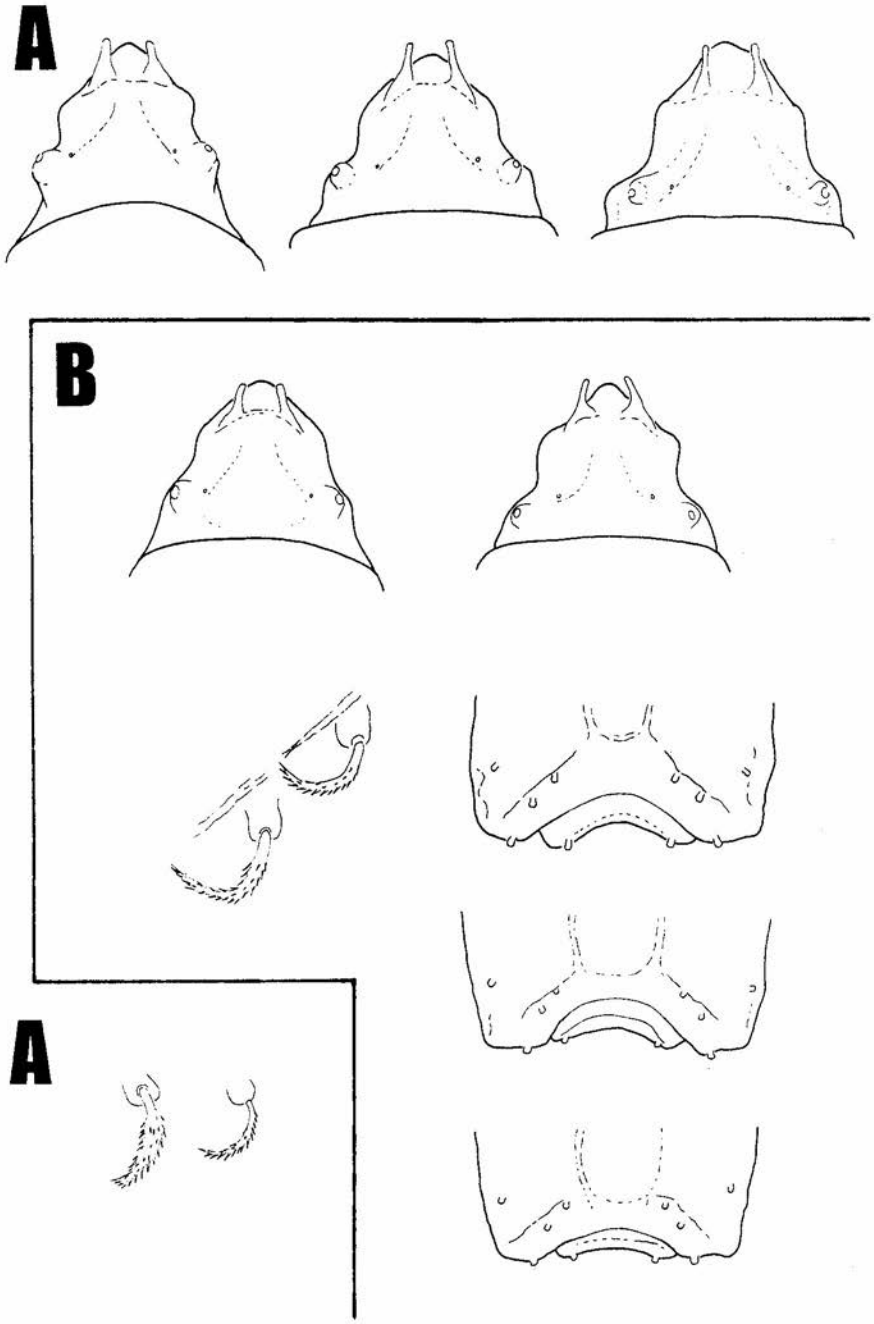


Fig. 47. *Camisia horrida* (HERMANN): A - prodorsum and setae *h1* of different specimens without additional setae *f1*, dorsal view; B - prodorsum, posterior part of notogaster and setae *f1* and *h1* of different specimens with additional setae *f1*, dorsal view (explanation in text).

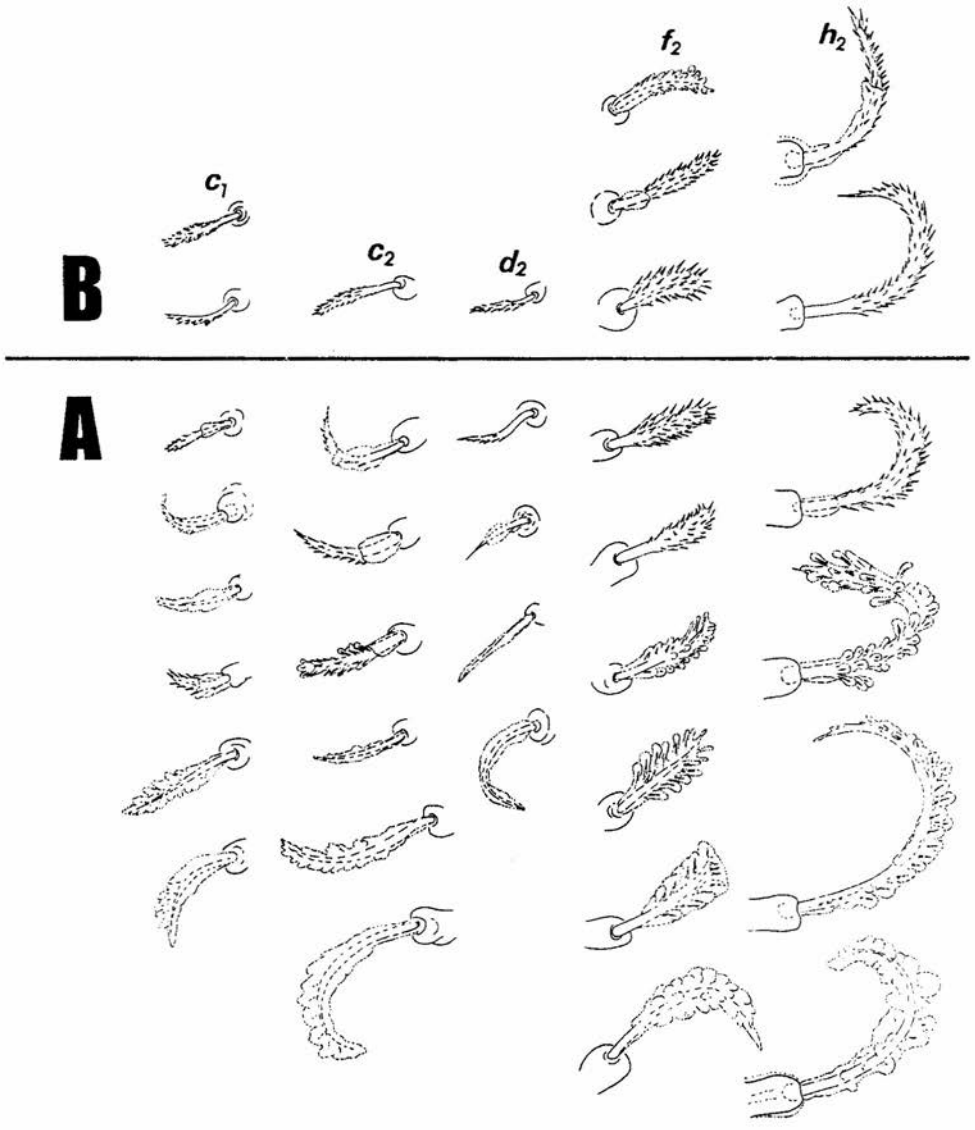


Fig. 48. *Camisia horrida* (HERMANN): notogastral setae *c1*, *c2*, *d2*, *f2* and *h2* of different specimens without (A) and with (B) additional pair of setae *f1* (explanation in text).

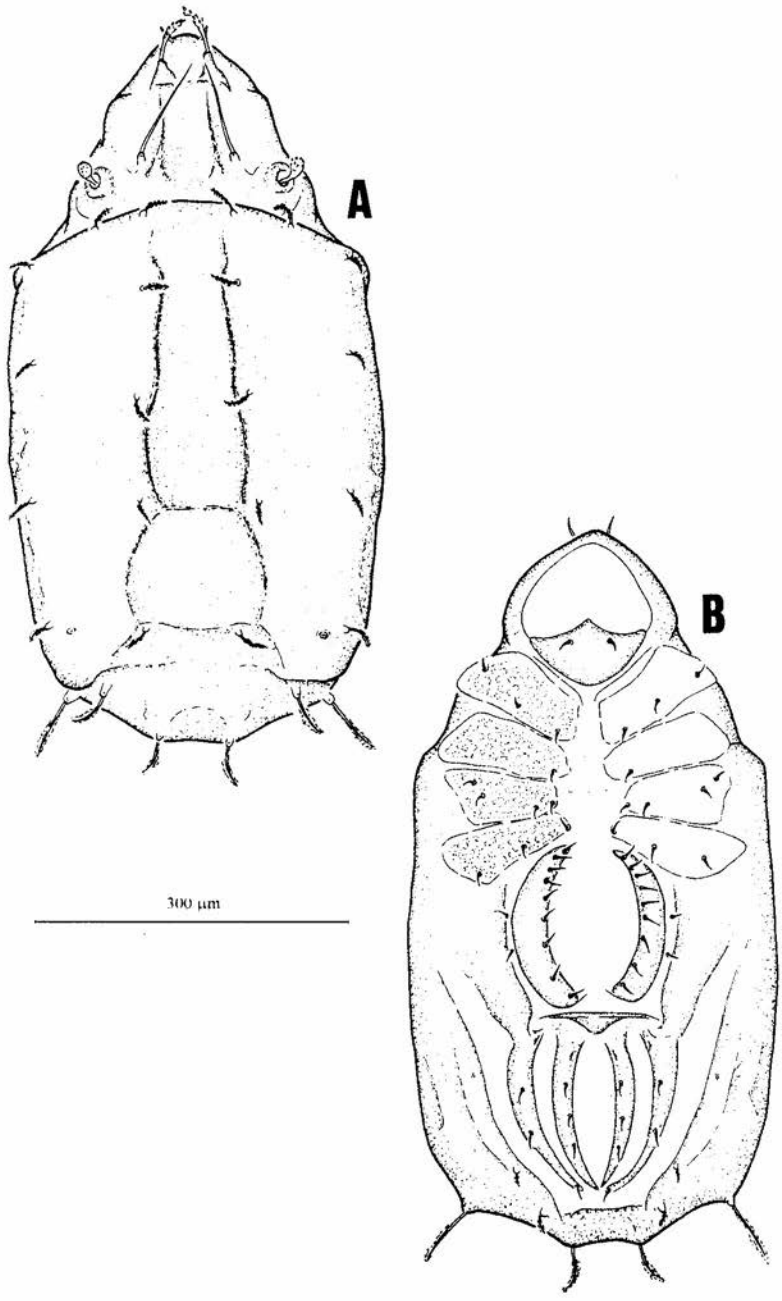


Fig. 49. *Camisia invenusta* (Michael): A - dorsal view; B - ventral view.

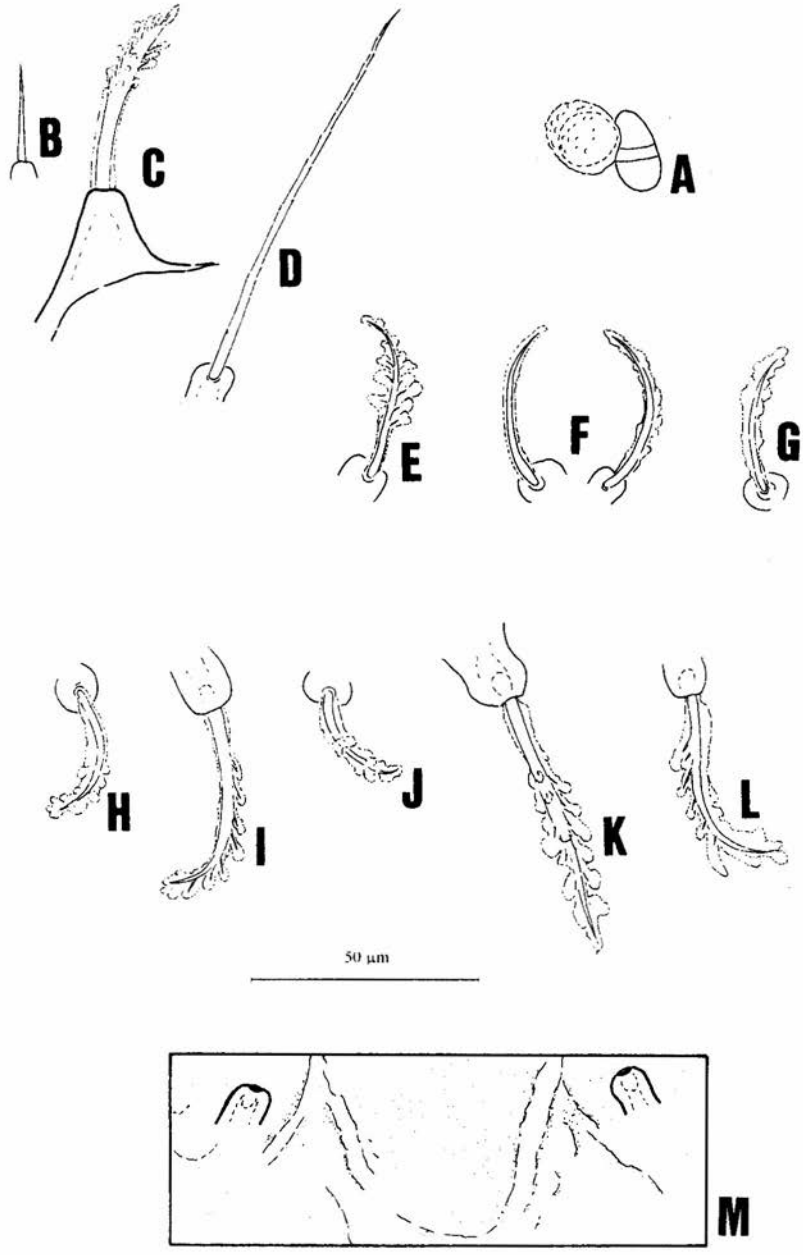


Fig. 50. *Camisia invenusta* (MICHAEL): A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *h2*; J - seta *h1*; K - seta *h3*; L - seta *p1*; M - microsculpture of prodorsum between setae *in*.

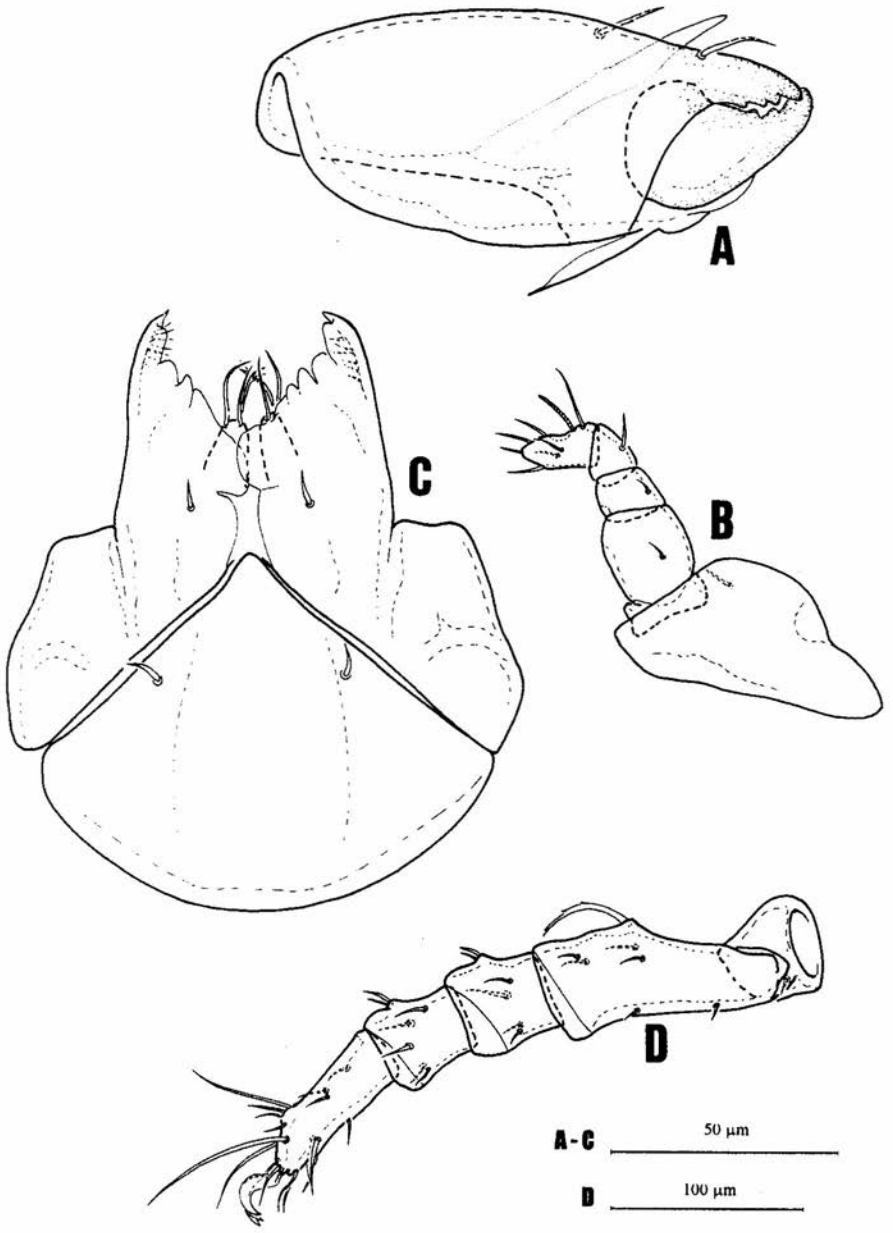


Fig. 51. *Camisia invenusta* (MICHAEL): A - chelicera, antiaxial view; B - pedipalp, antiaxial view; C - subcapitulum, ventral view; D - leg I, antiaxial view

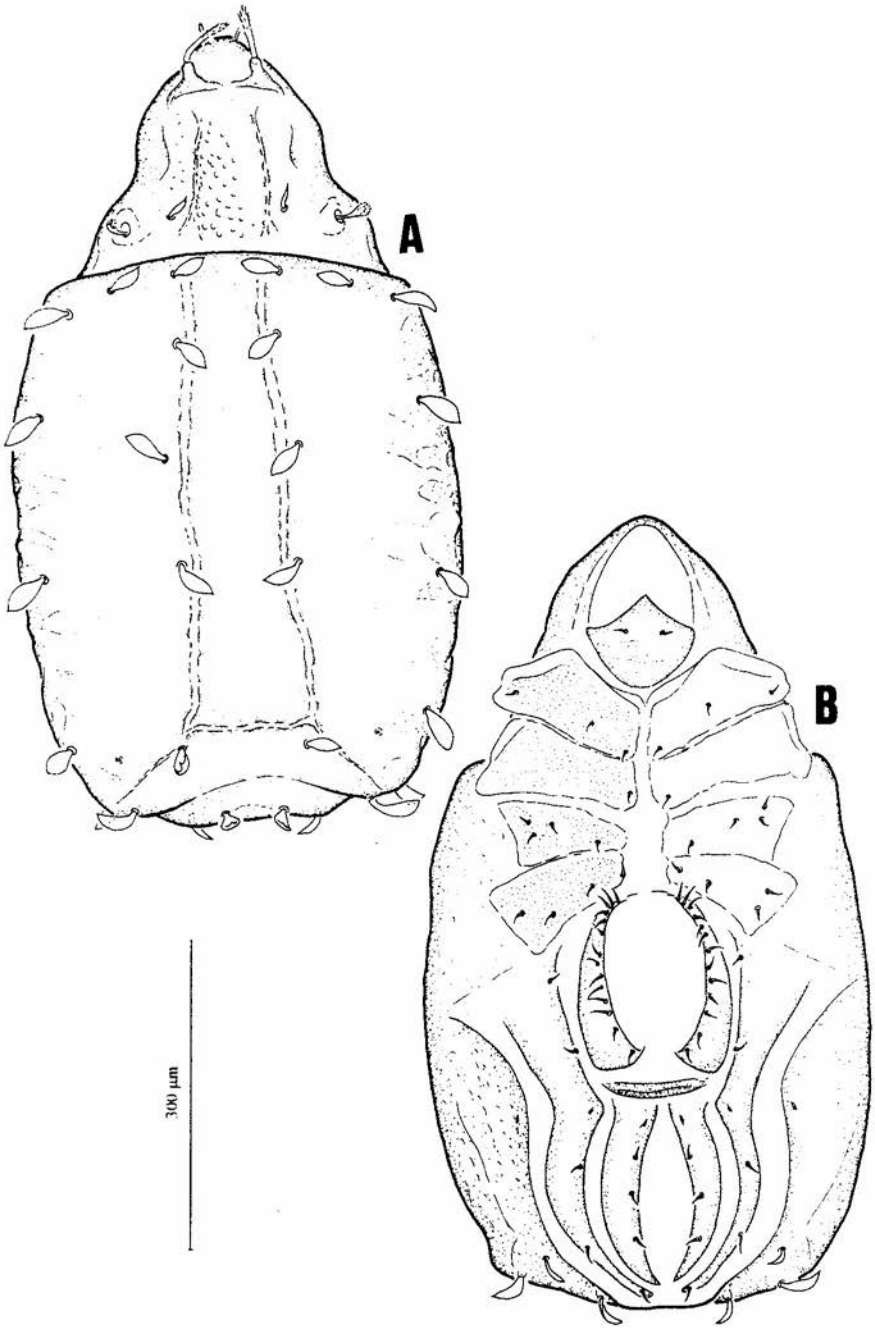


Fig. 52. *Camisia lapponica* (TRÄGÅRDH): A - dorsal view; B - ventral view.

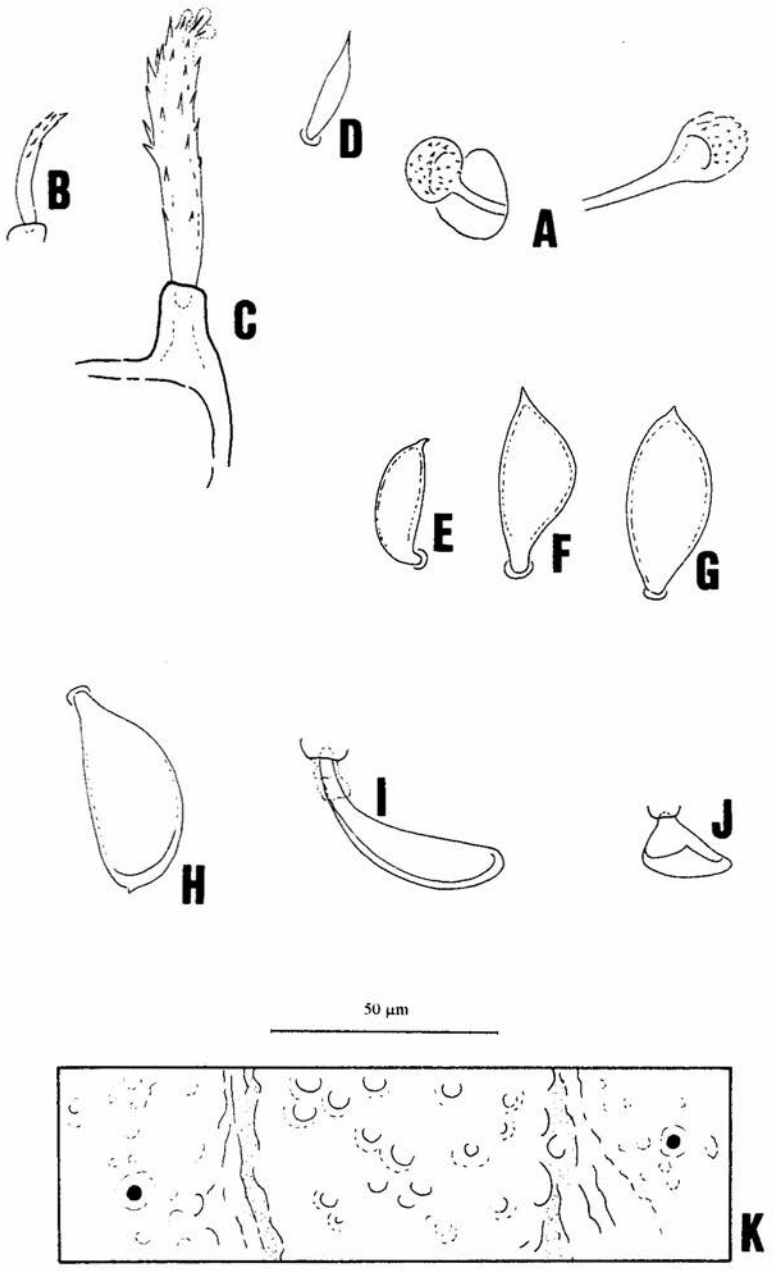


Fig. 53. *Camisia lapponica* (TRÄGÅRDH): A - sensilli; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *c3*; H - seta *f2*; I - seta *h2*; J - seta *p1*; K - microsculpture of prodorsum between setae *in*.

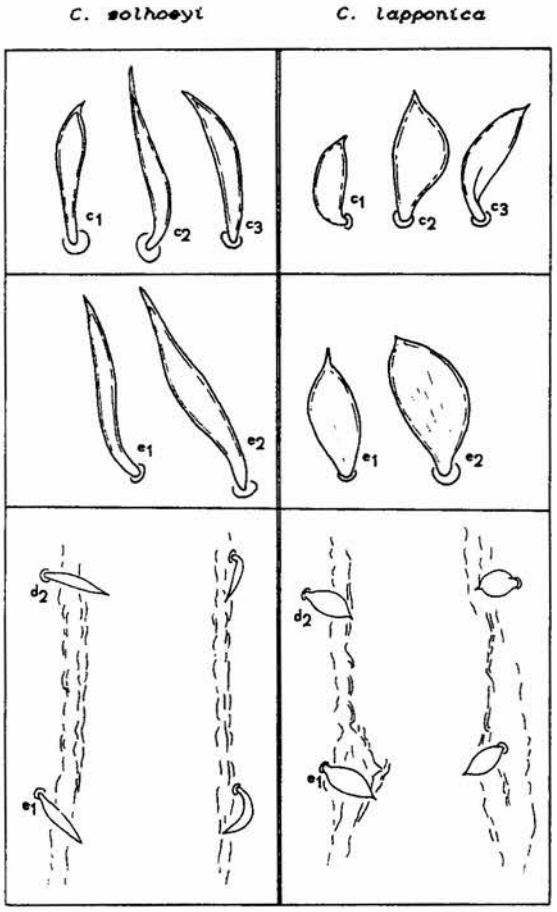


Fig. 54. Comparison of the shape of some notogastral setae of *Camisia lapponica* (TRÄGÅRDH) and *Camisia solhoeyi* COLLOFF.

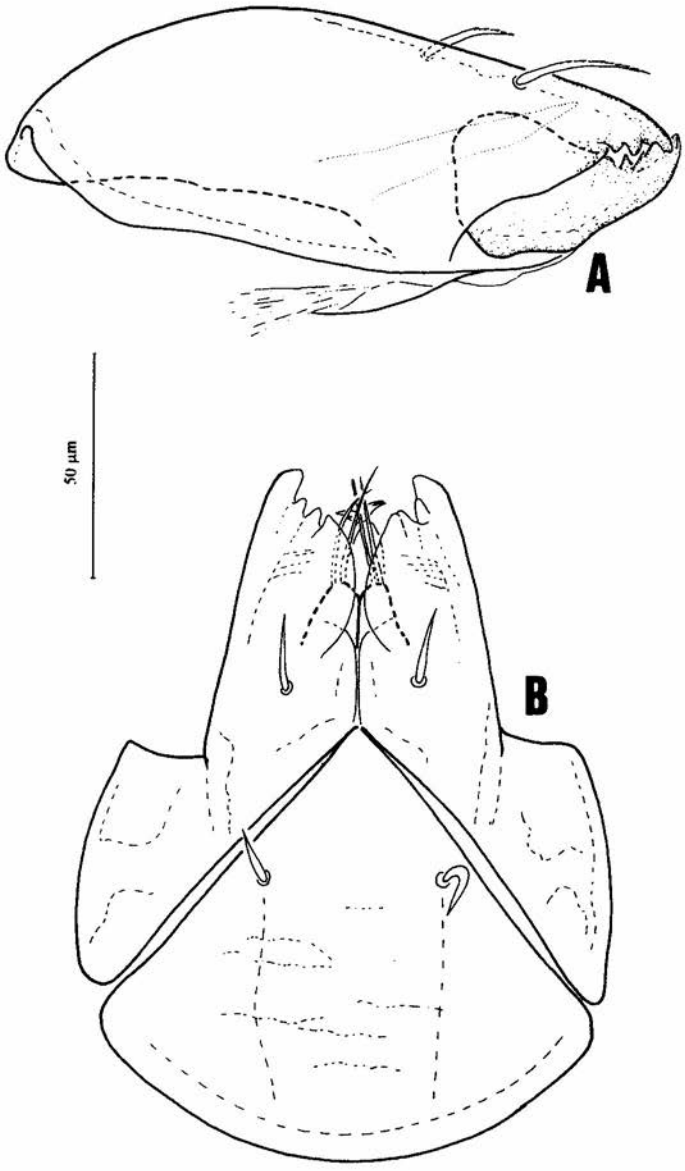


Fig. 55. *Camisia lapponica* (TRÄGÅRDH): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

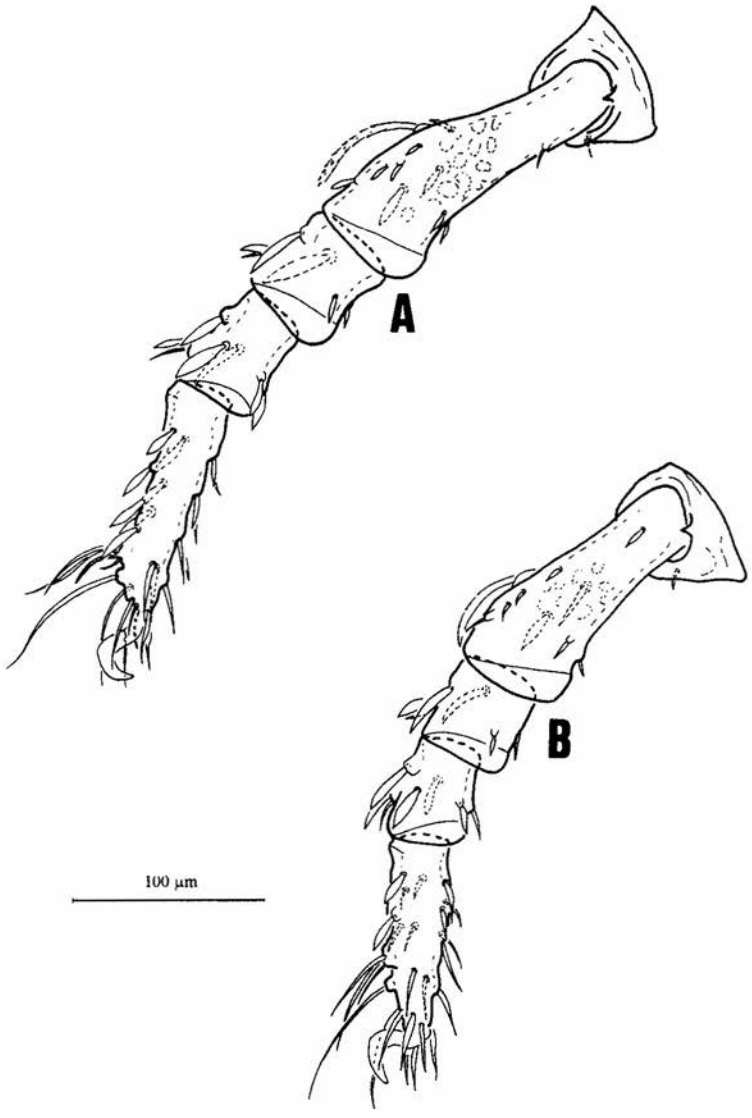


Fig. 56. *Camisia lapponica* (TRÄGÅRDH): A - leg I, antiaxial view; B - leg II, antiaxial view.

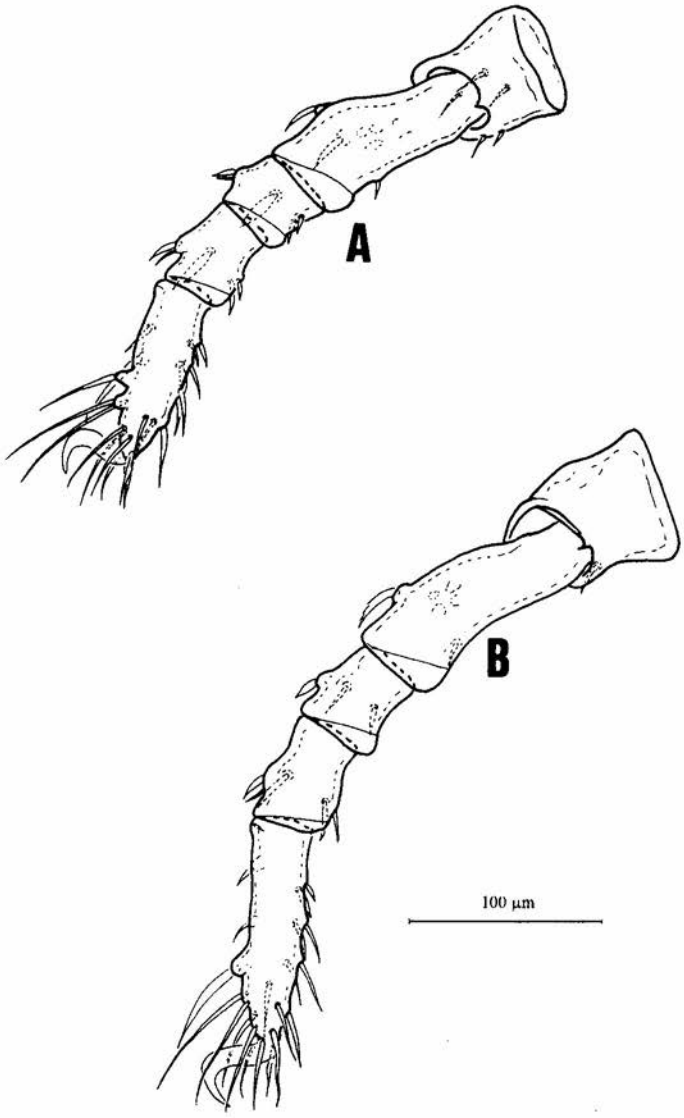


Fig. 57. *Camisia lapponica* (TRÄGARDH): A - leg III, paraxial view; B - leg IV, paraxial view.

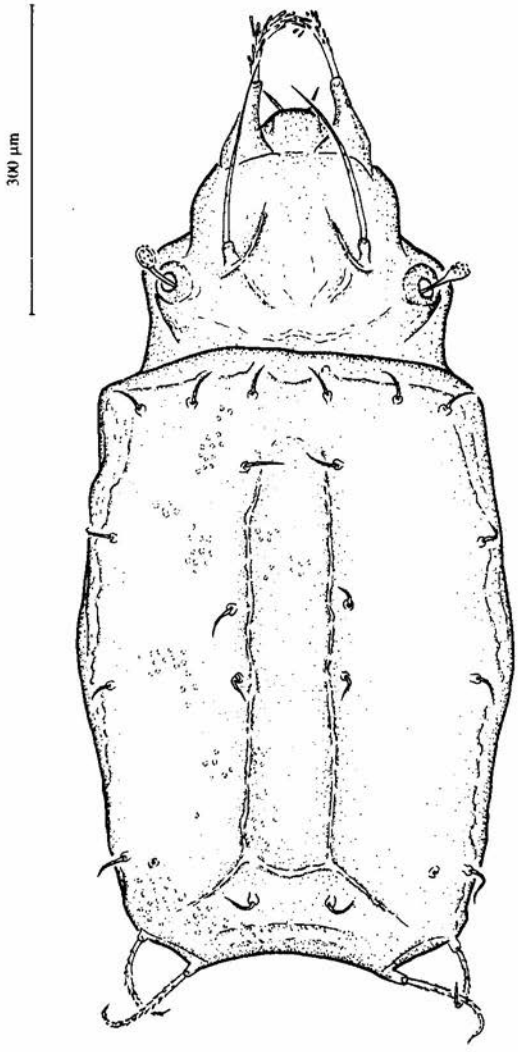


Fig. 58. *Camisia segnis* (HERMANN): dorsal view.

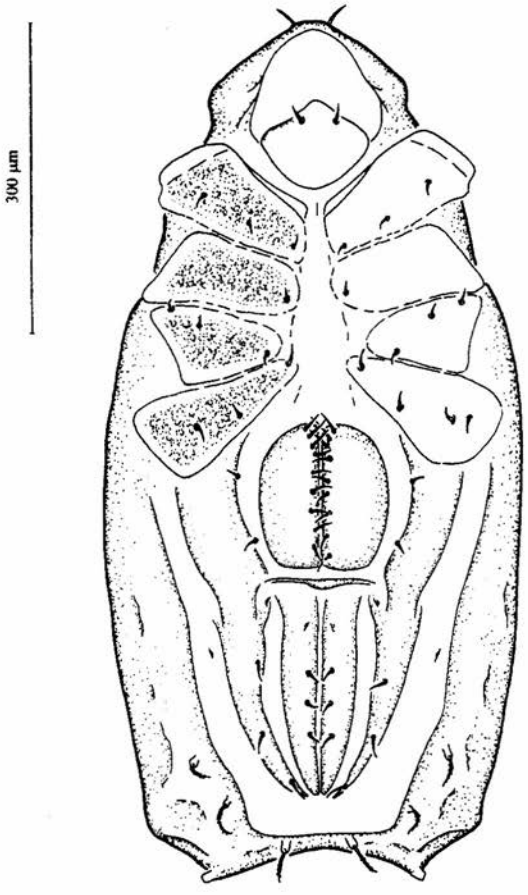


Fig. 59. *Camisia segnis* (HERMANN): ventral view.

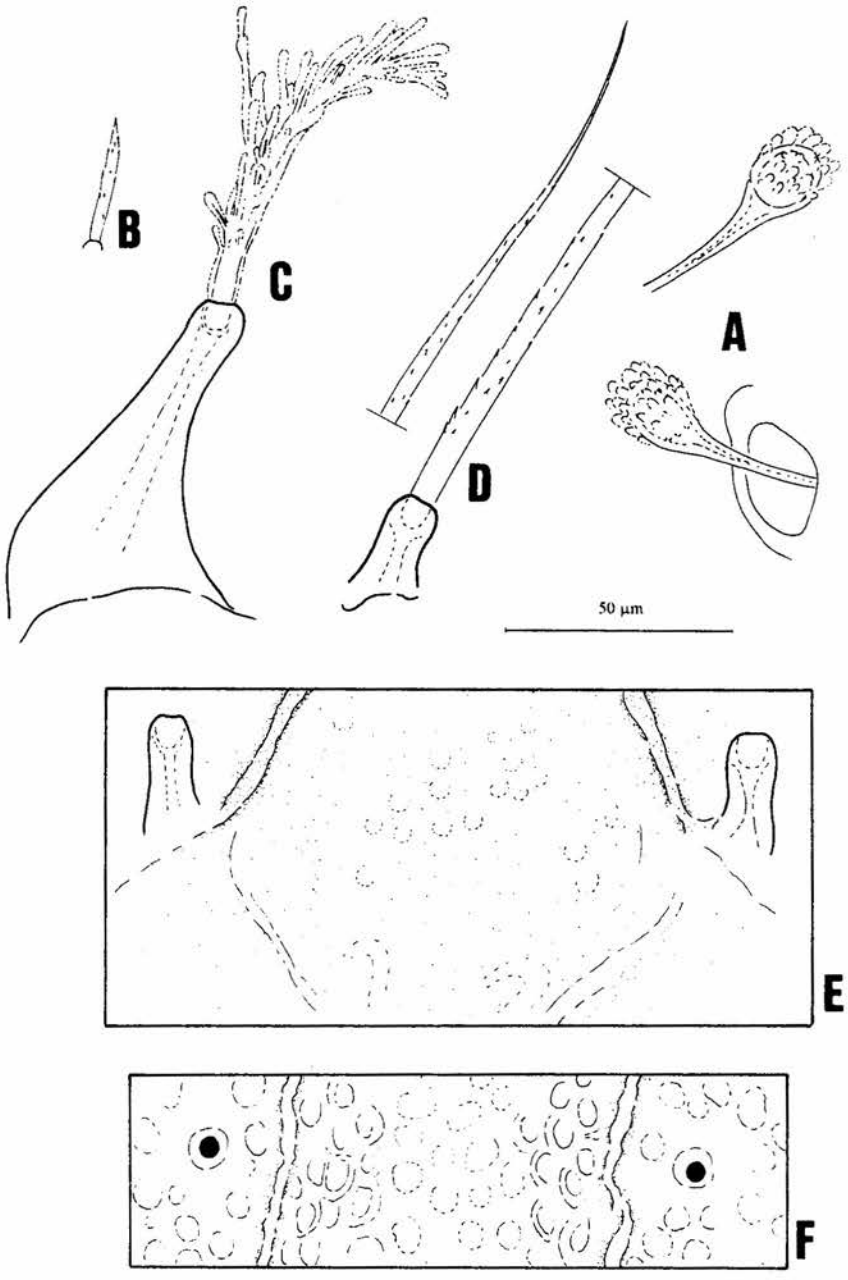


Fig. 60. *Camisia segnis* (HERMANN): A - sensilli; B - seta *ro*; C - seta *le*; D - seta *in*; E - microsculpture of prodorsum between setae *in*; F - microsculpture of notogaster between setae *d2*.

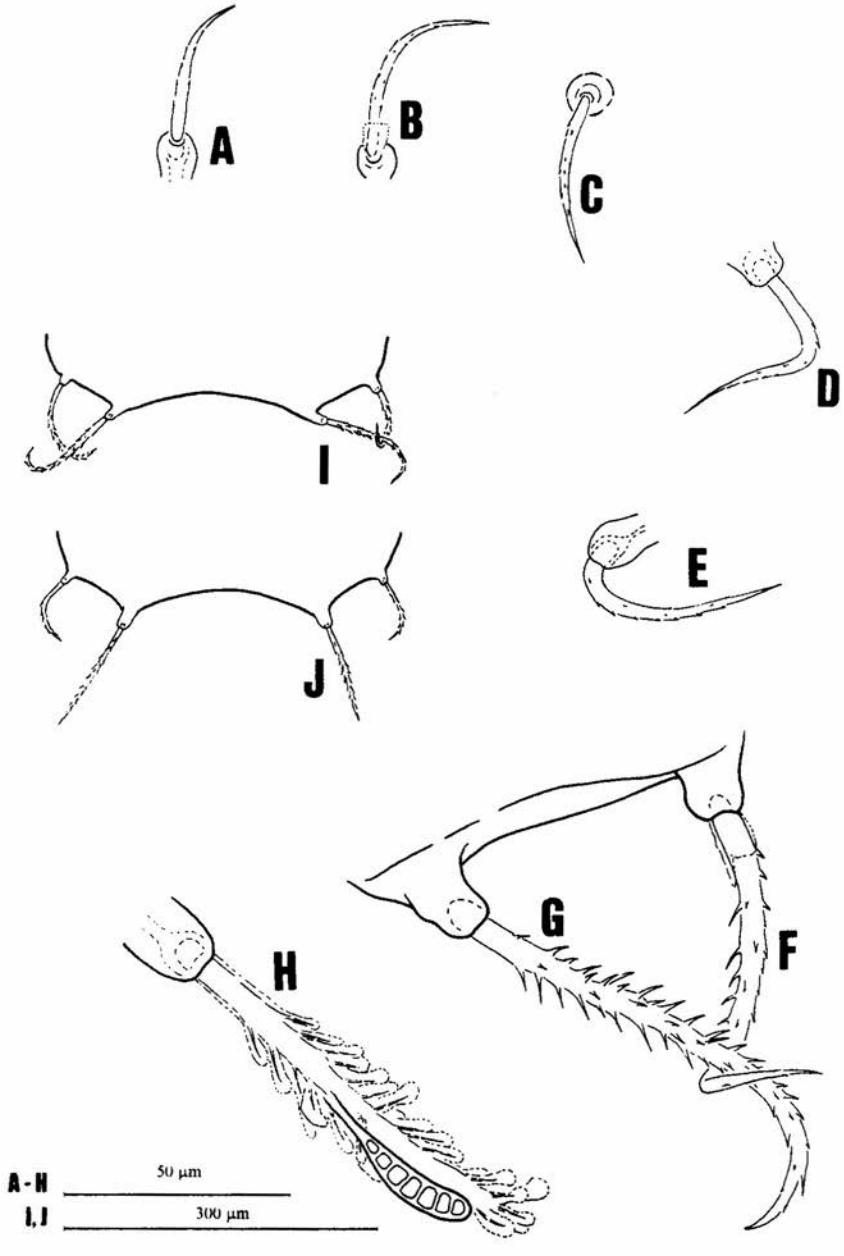


Fig. 61. *Camisia segnis* (HERMANN): A - seta *c1*; B - seta *c2*; C - seta *d2*; D - seta *f2*; E - seta *h1*; F - seta *h3*; G - seta *h2*; H - seta *h2* with preserved sheath of cerotegument and affixed fungial spores; I, J - examples of different orientation of setae *h2* and *h3*.

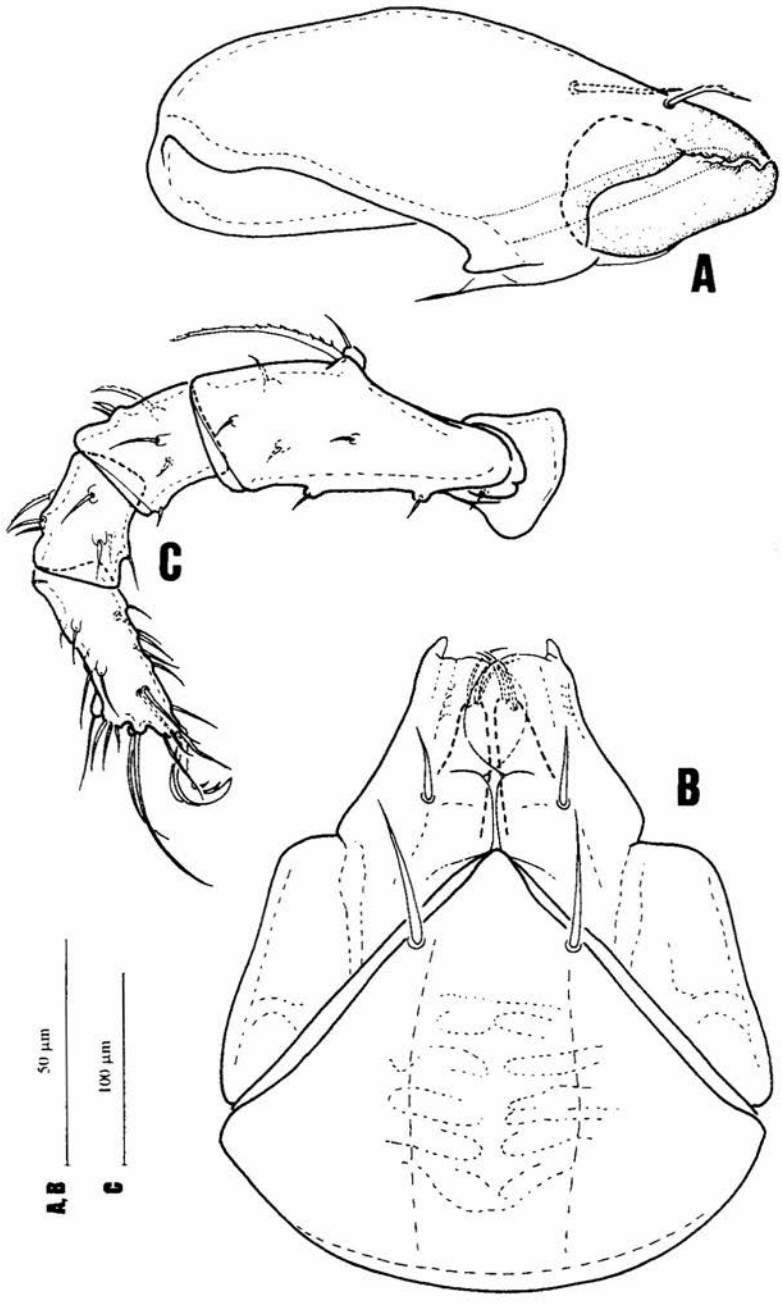


Fig. 62. *Camisia segnis* (HERMANN): A - chelicera, antiaxial view; B - subcapitulum, ventral view; C - leg I, antiaxial view.

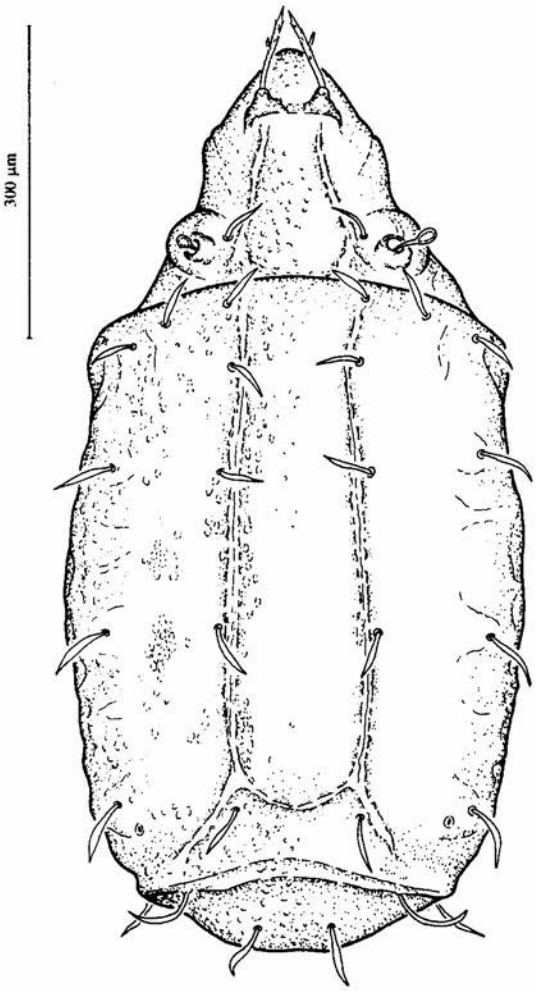


Fig. 63. *Camisia solhoeyi* COLLOFF: dorsal view.

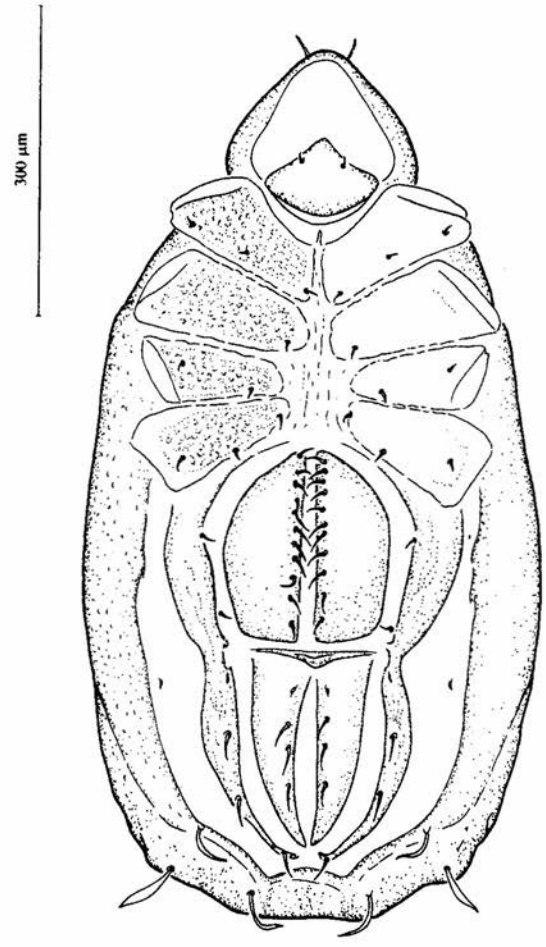


Fig. 64. *Camisia solhoeyi* COLLOFF: ventral view.

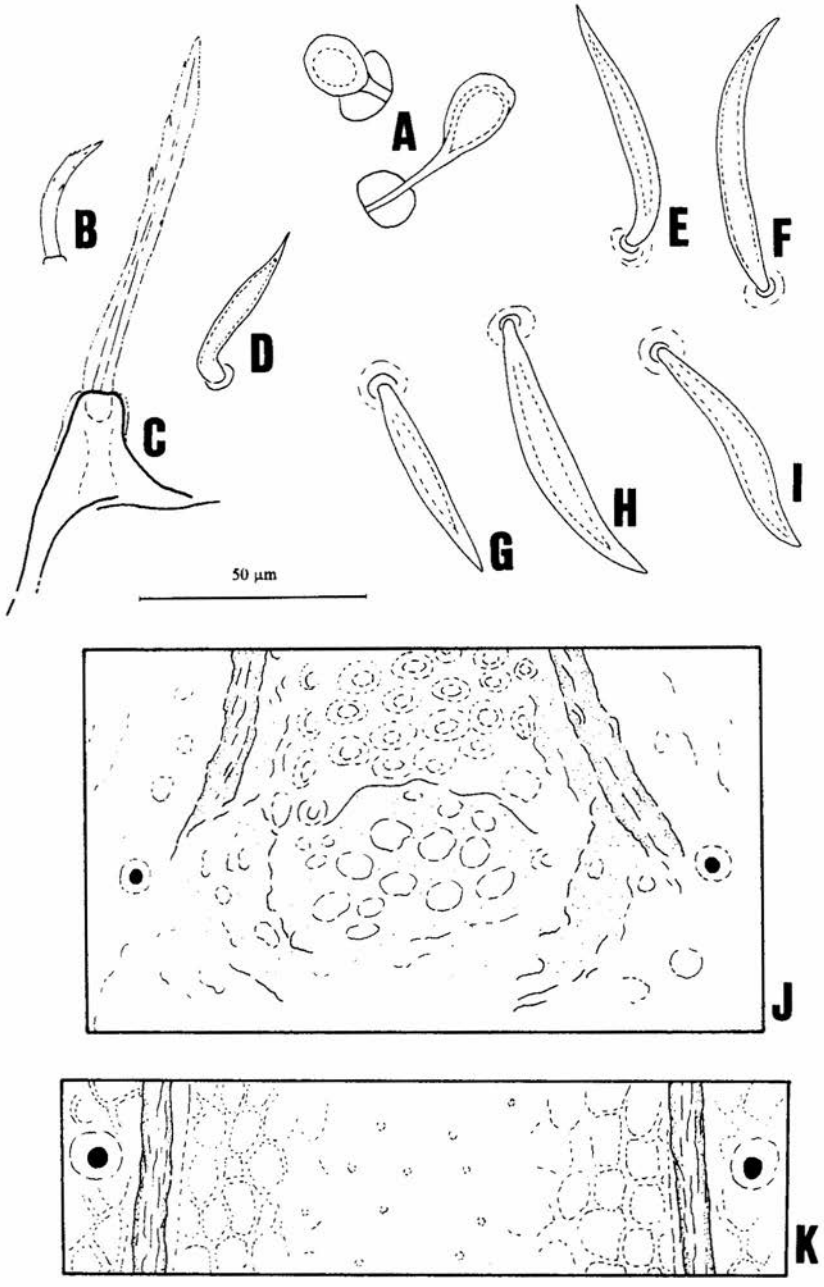


Fig. 65. *Camisia solhoeyi* Colloff: A - sensilli; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *f2*; I - seta *p1*; J - microsculpture of prodorsum between setae *in*; K - microsculpture of notogaster between setae *d2*.

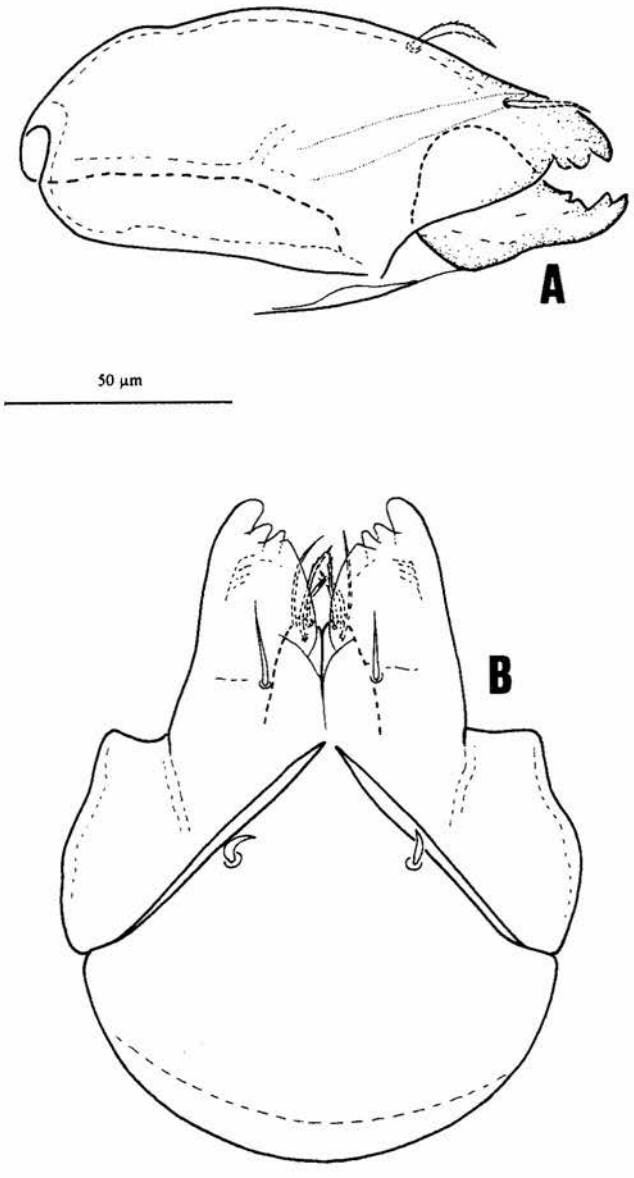


Fig. 66. *Camisia solhoeyi* Colloff: A - chelicera, antiaxial view; B - subcapitulum, ventral view.

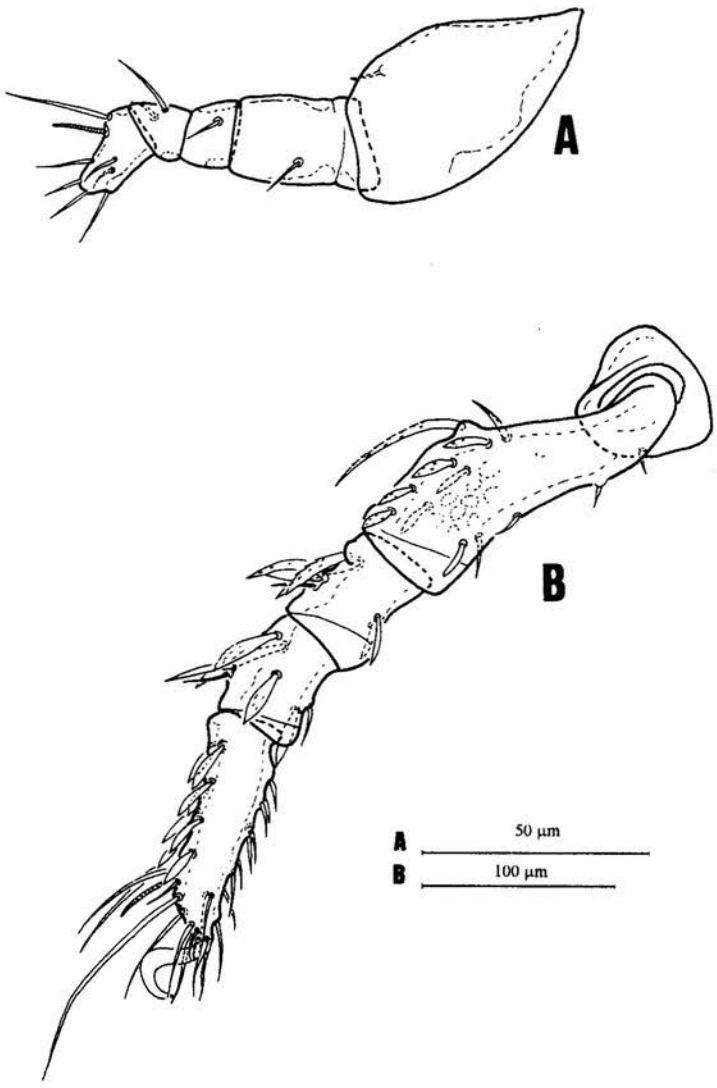


Fig. 67. *Camisia solhoeyi* Colloff: A - pedipalp, antiaxial view; B - leg I, antiaxial view.

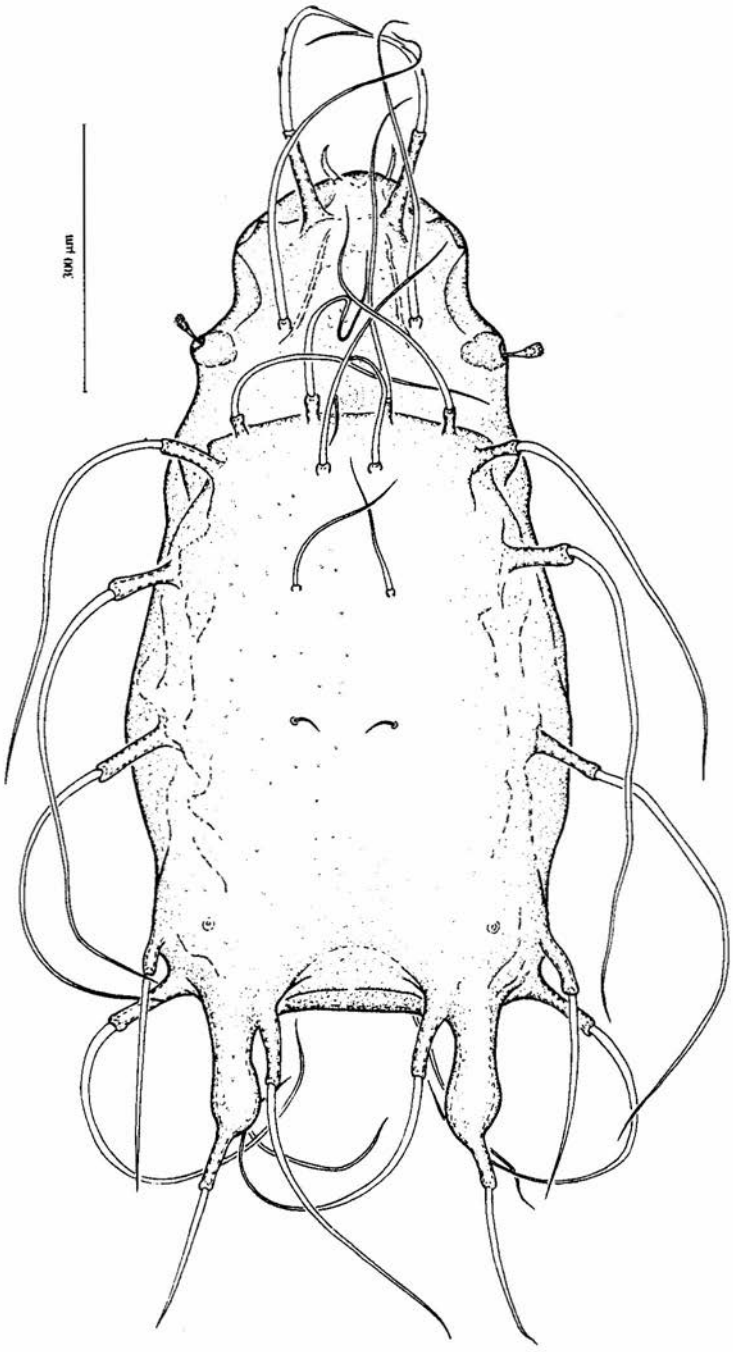


Fig. 68. *Camisia spinifer* (C.L. Koch): dorsal view.

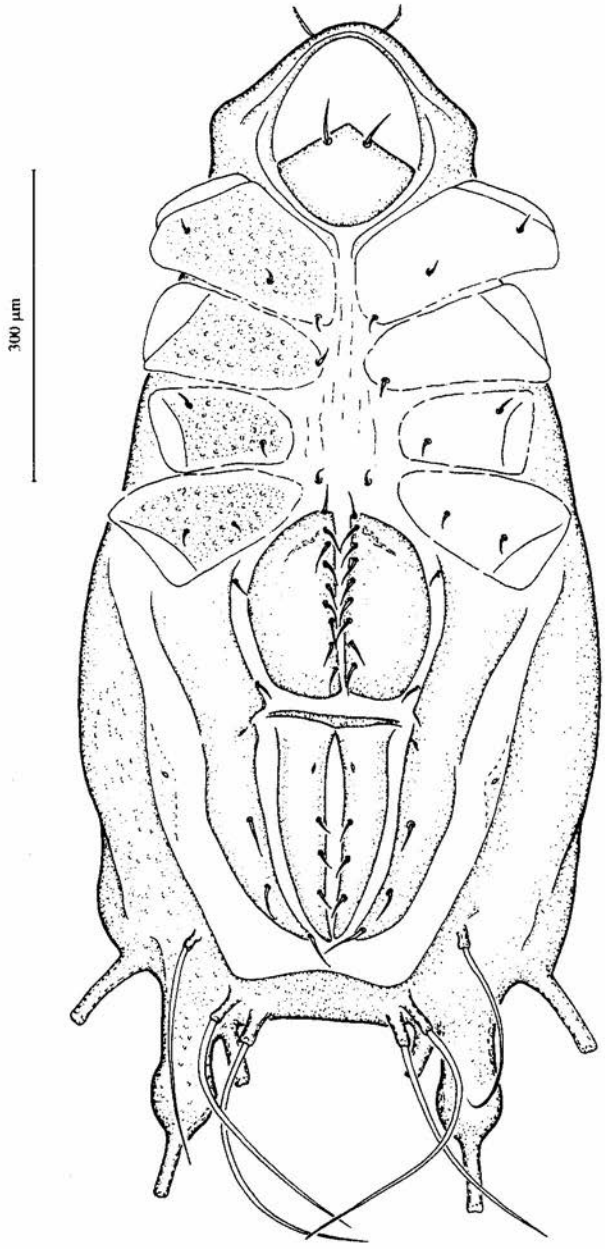


Fig. 69. *Camisia spinifer* (C.L. Koch): ventral view.

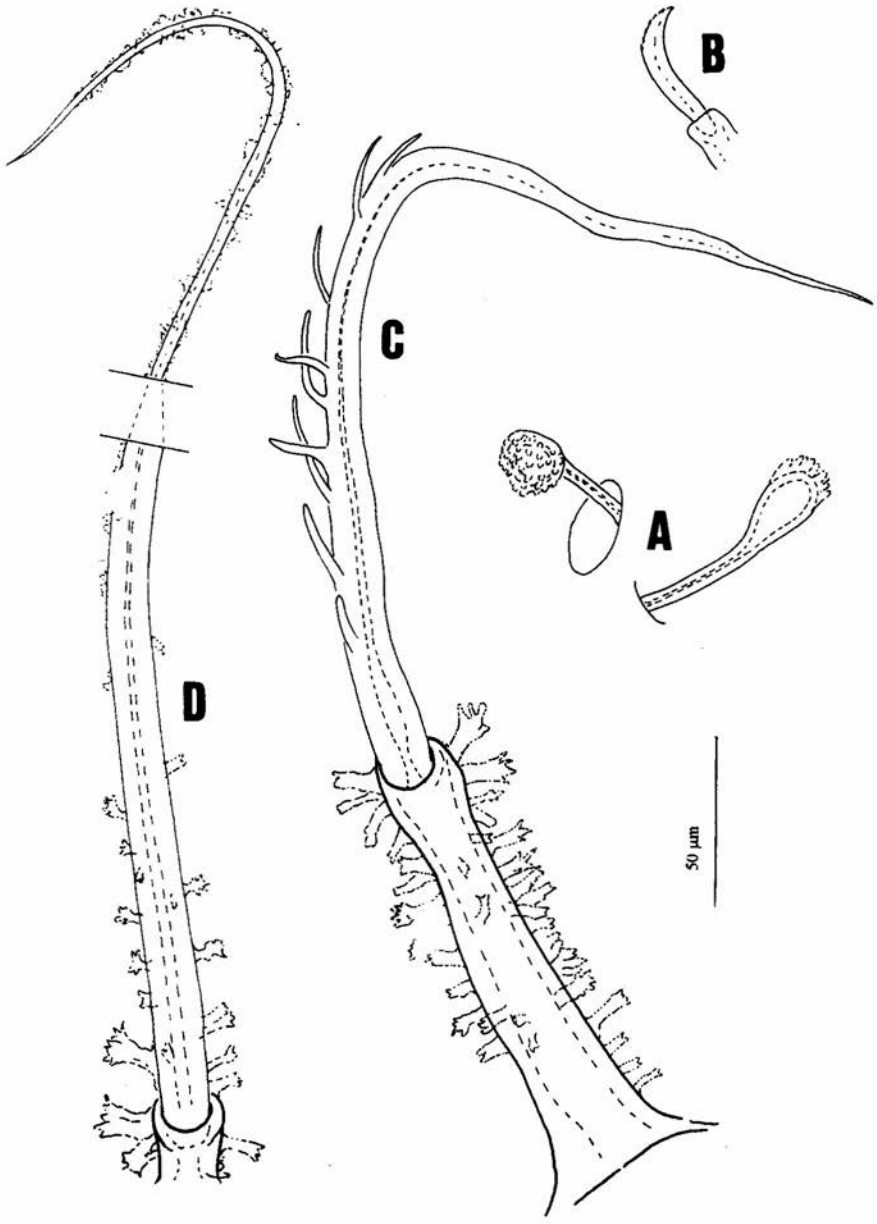


Fig. 70. *Camisia spinifer* (C.L. Koch): A - sensilli; B - seta *ro*; C - seta *le*; D - seta *in*.

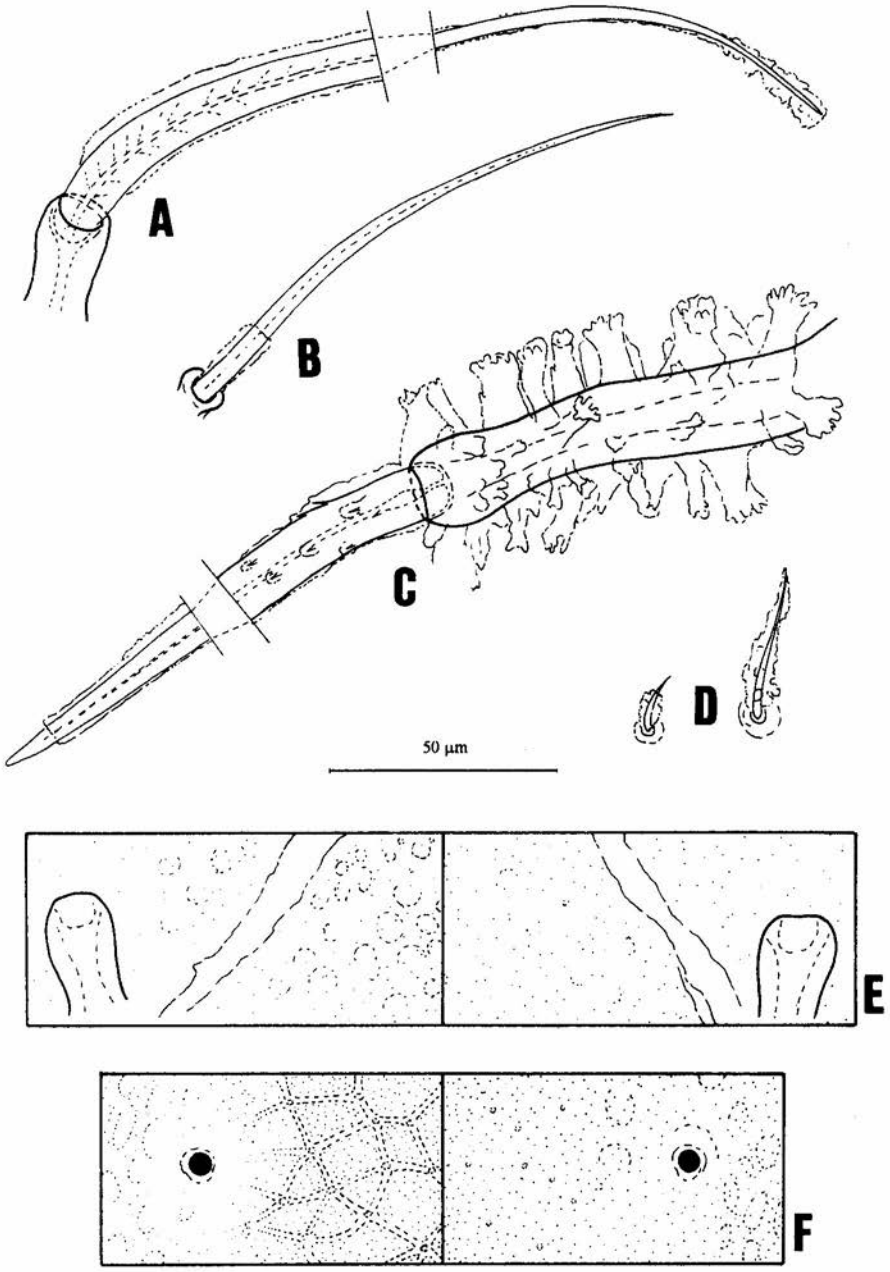


Fig. 71. *Camisia spinifer* (C.L. Koch): A - seta *c2*; B - seta *d2*; C - seta *f2*; D - setae *e1*; E - microsculpture of prodorsum between setae *in* (left - less sclerotized specimen); F - microsculpture of notogaster between setae *d2* (left - less sclerotized specimen).

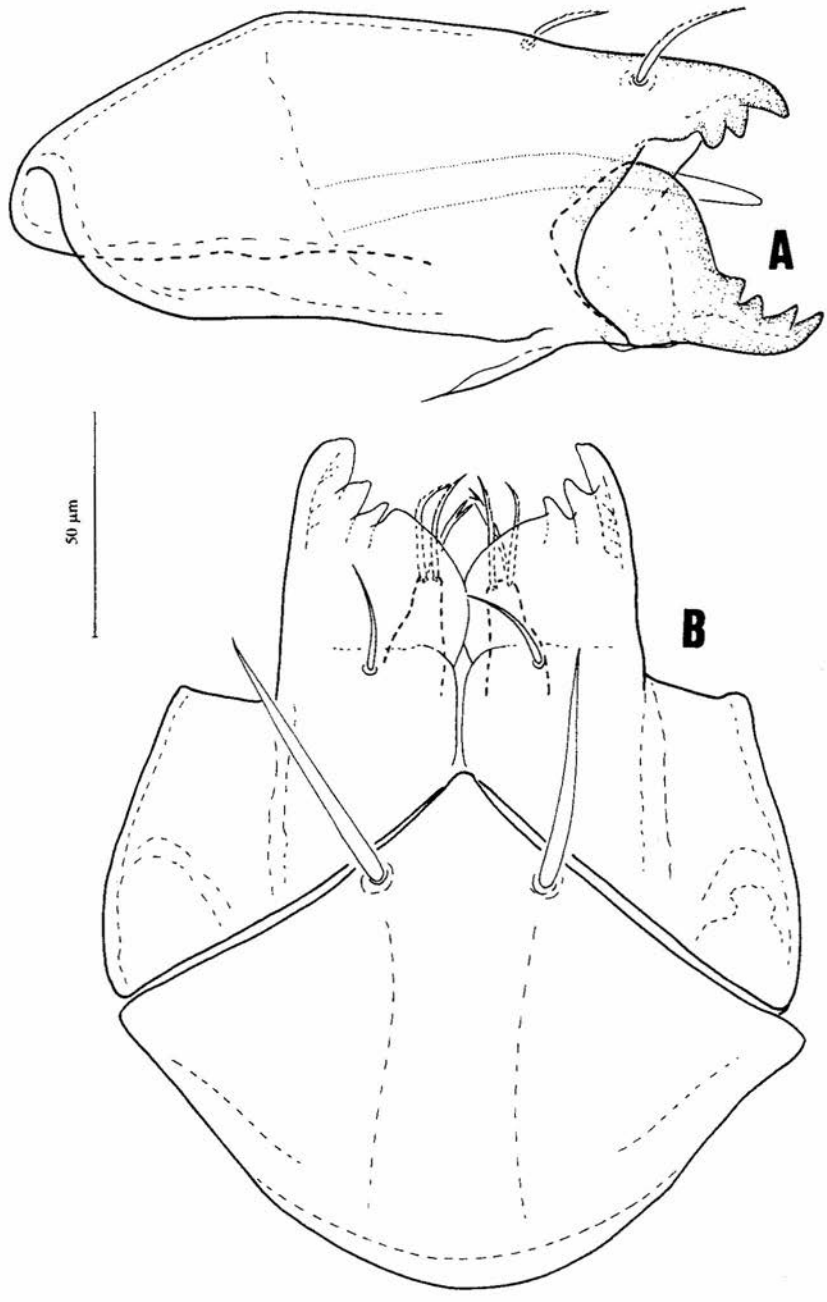


Fig. 72. *Camisia spinifer* (C.L. Koch): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

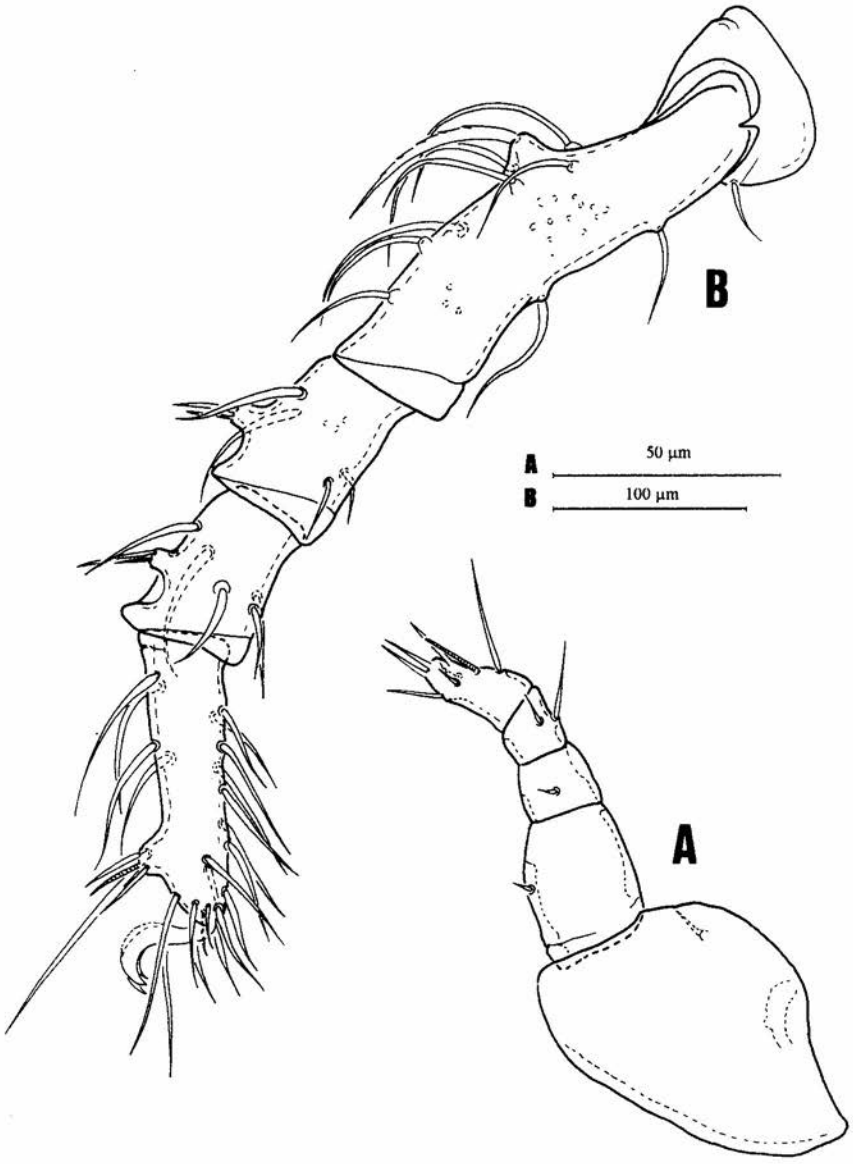


Fig. 73. *Camisia spinifer* (C.L. Koch): A - pedipalp, antiaxial view; B - leg I, antiaxial view.

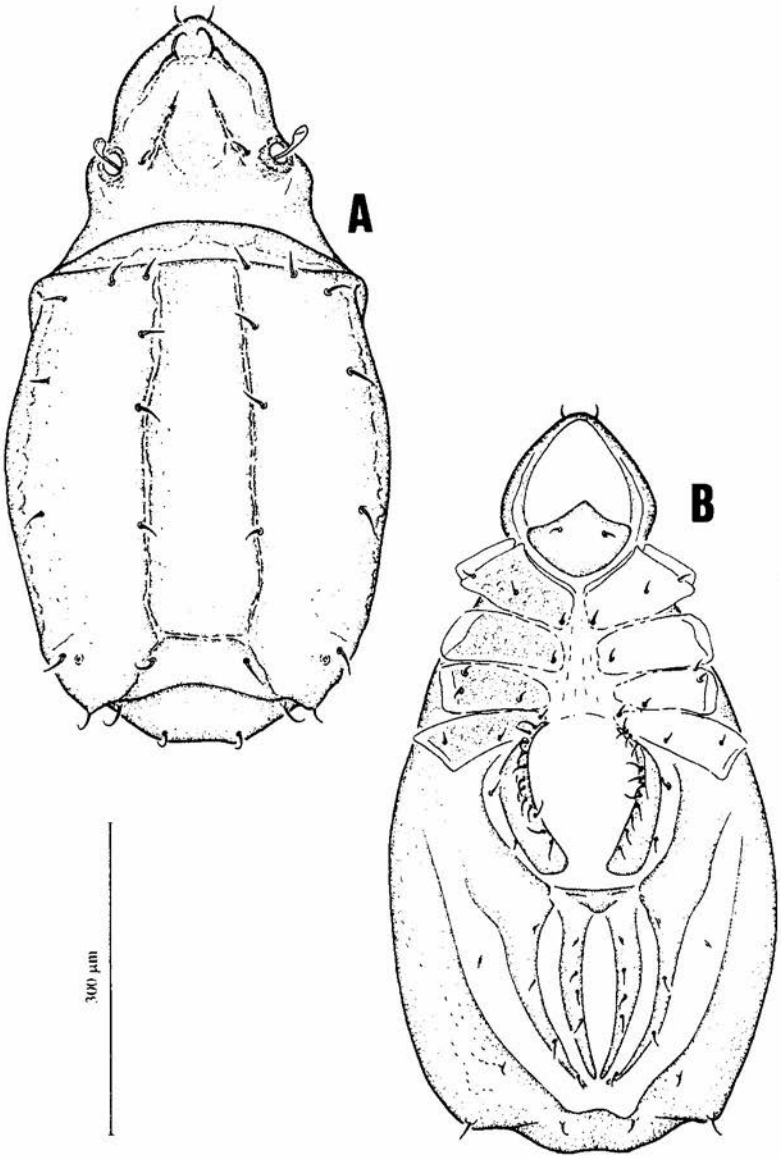


Fig. 74. *Camisia tatrica* Olszanowski: A - dorsal view; B - ventral view.

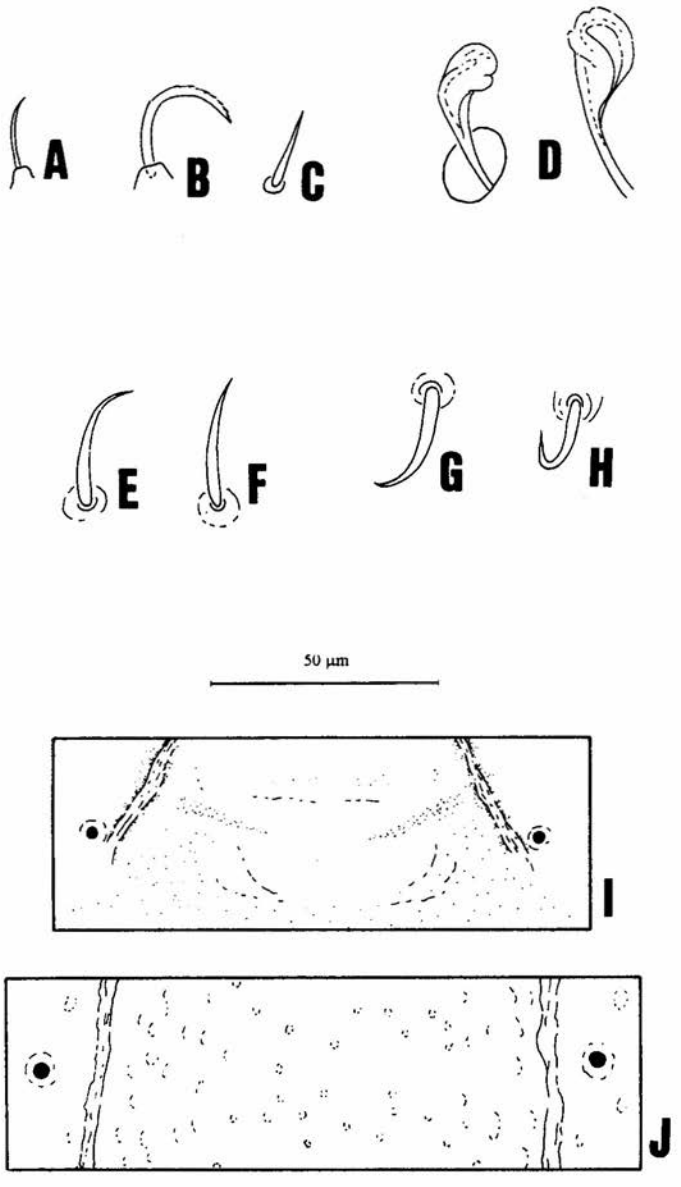


Fig. 75. *Camisia tatrica* Olszanowski: A - seta *ro*; B - seta *le*; C - seta *in*; D - sensilli; E - seta *c2*; F - seta *d2*; H - seta *p1*; I - microsculpture of prodorsum between setae *in*; J - microsculpture of notogaster between setae *d2*.

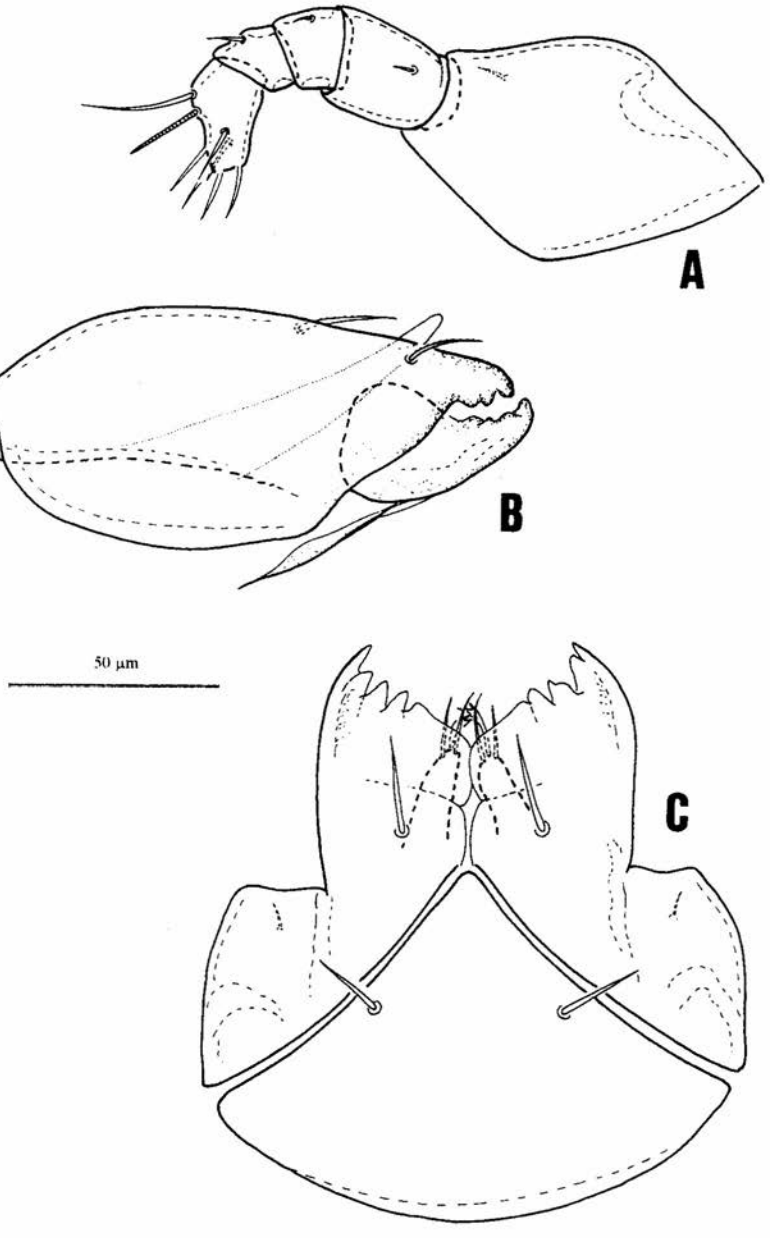


Fig. 76. *Camisia tatrica* Olszanowski: A - pedipalp, antiaxial view; B - chelicera, antiaxial view; C - subcapitulum, ventral view.

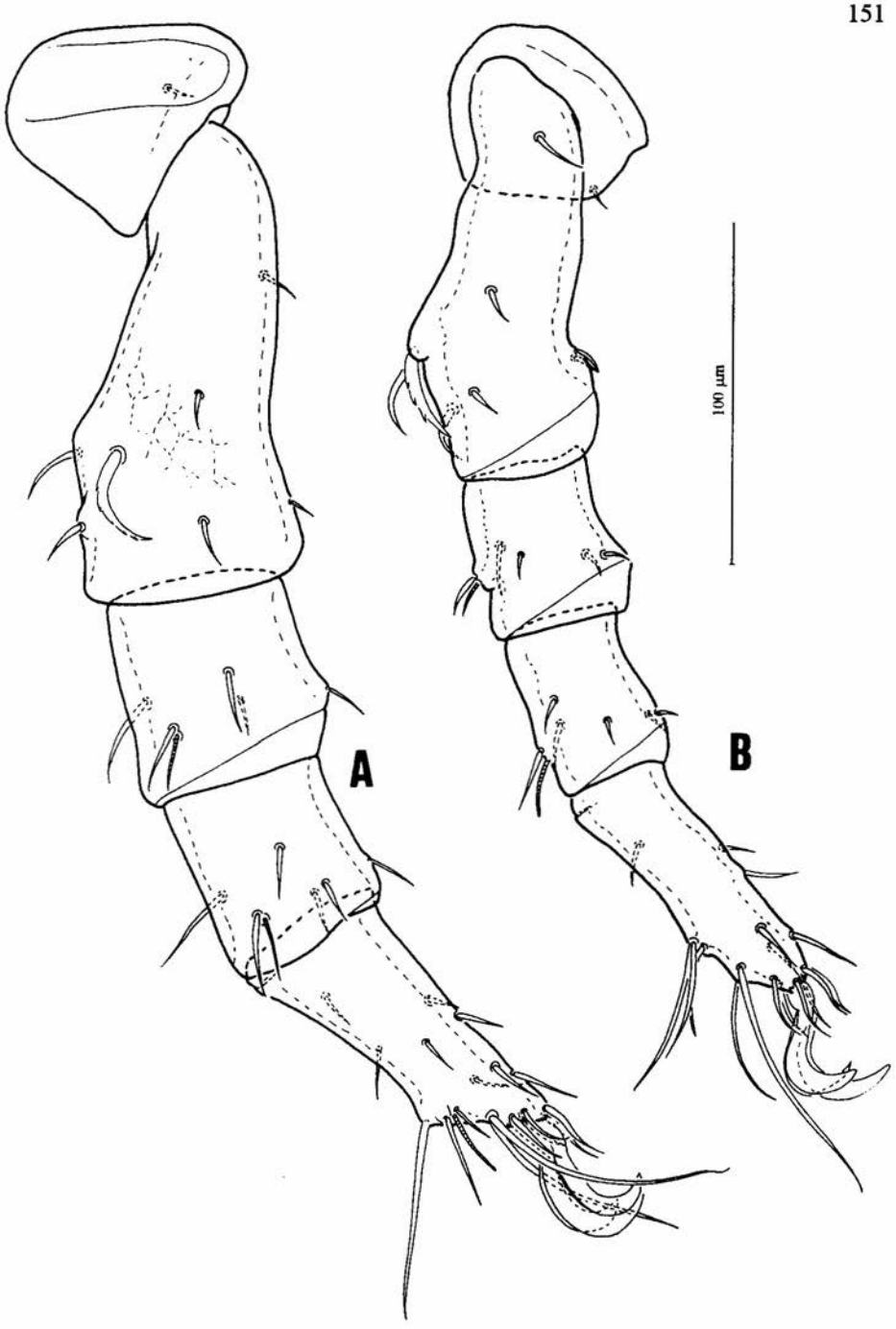


Fig. 77. *Camisia tatrica* Olszanowski: A - leg I, antiaxial view; B - leg I - tarsus, antiaxial view; C - leg II, antiaxial view.

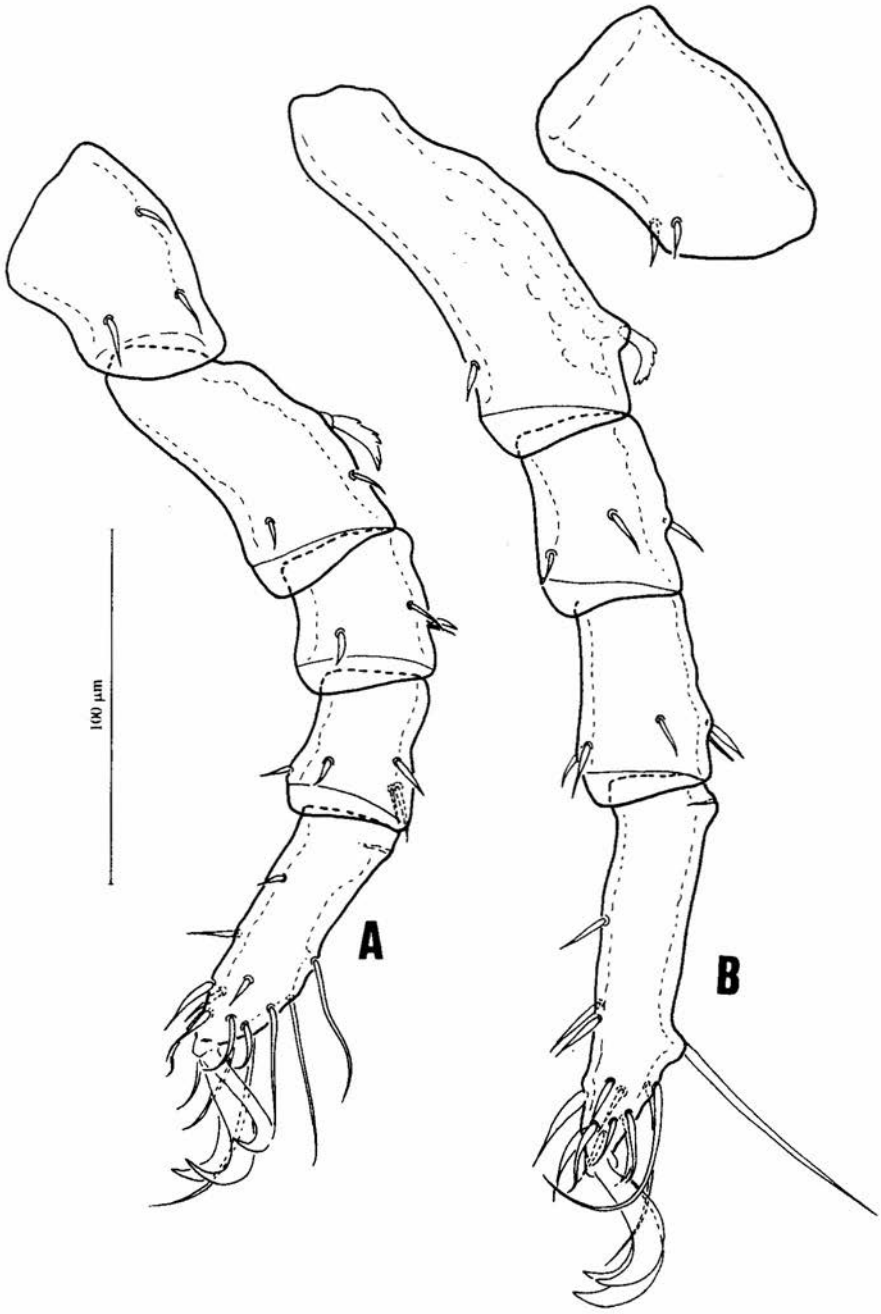


Fig. 78. *Camisia tatrica* Olszanowski: A - leg III, antiaxial view; B - leg IV, antiaxial view.

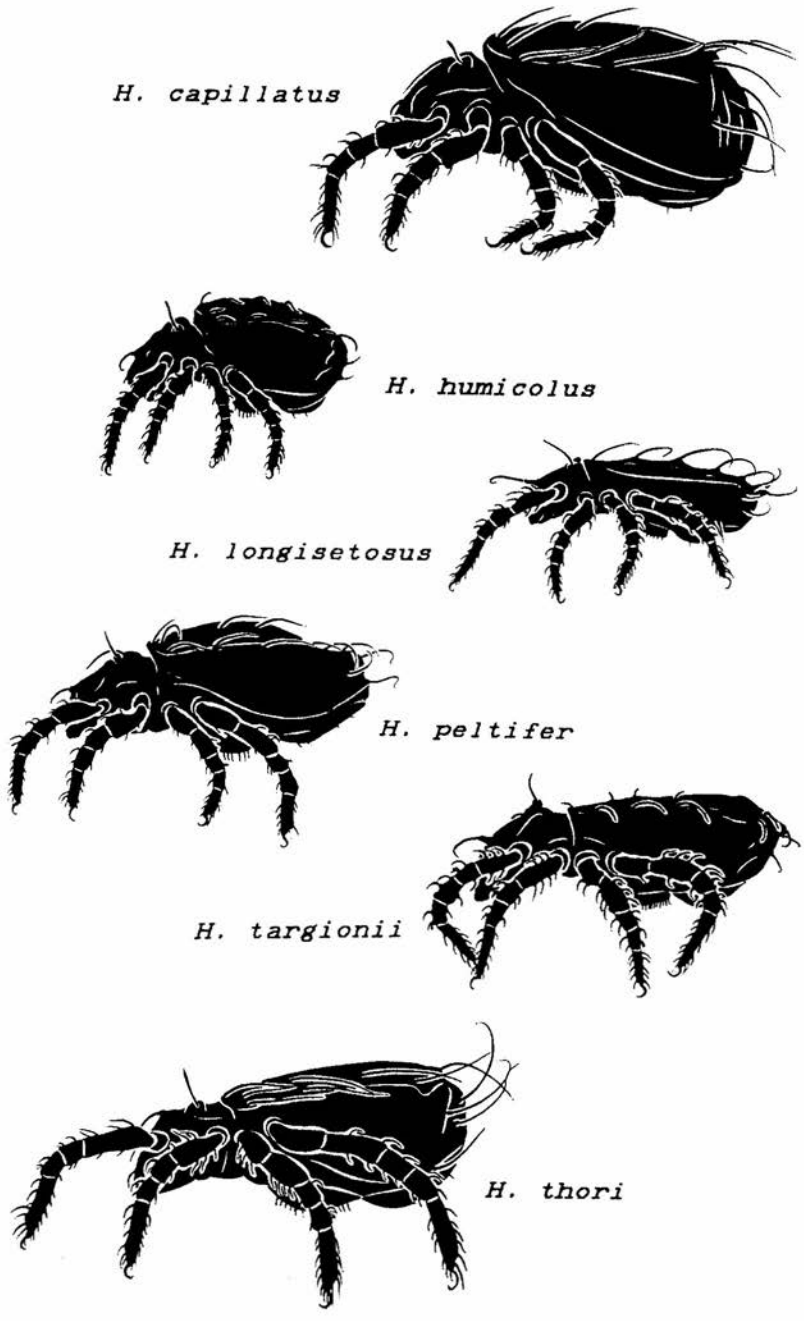


Fig. 79. The body shape in species of the genus *Heminothrus*, lateral view.

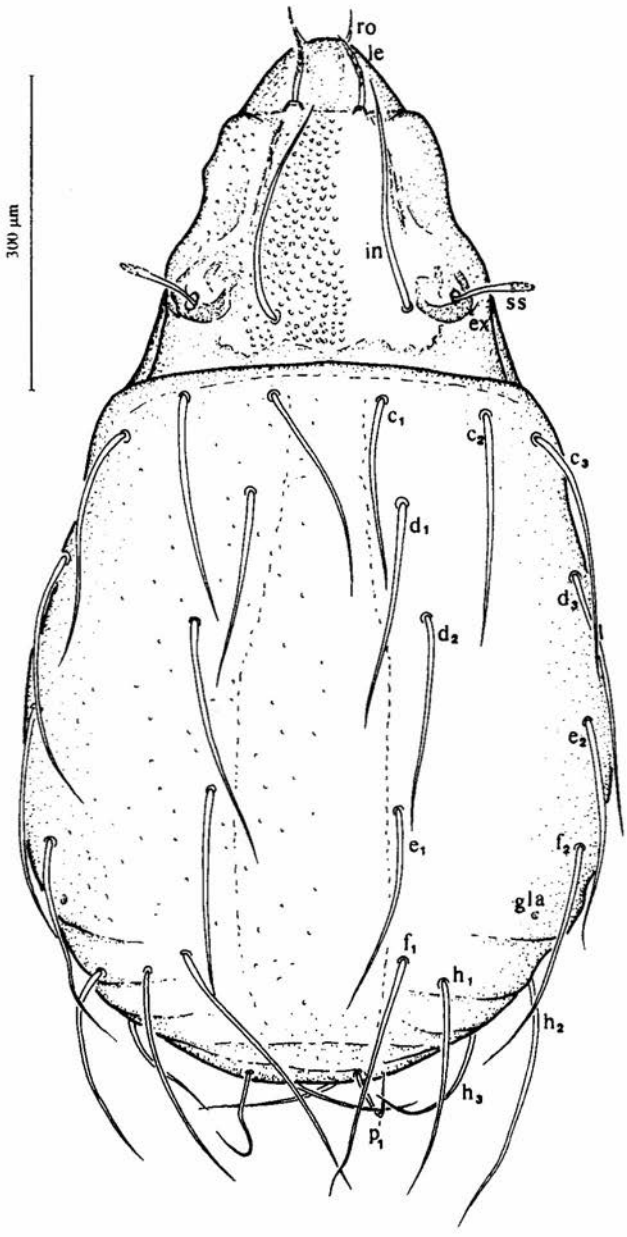


Fig. 80. *Heminothrus capillatus* (Berlese): dorsal view.

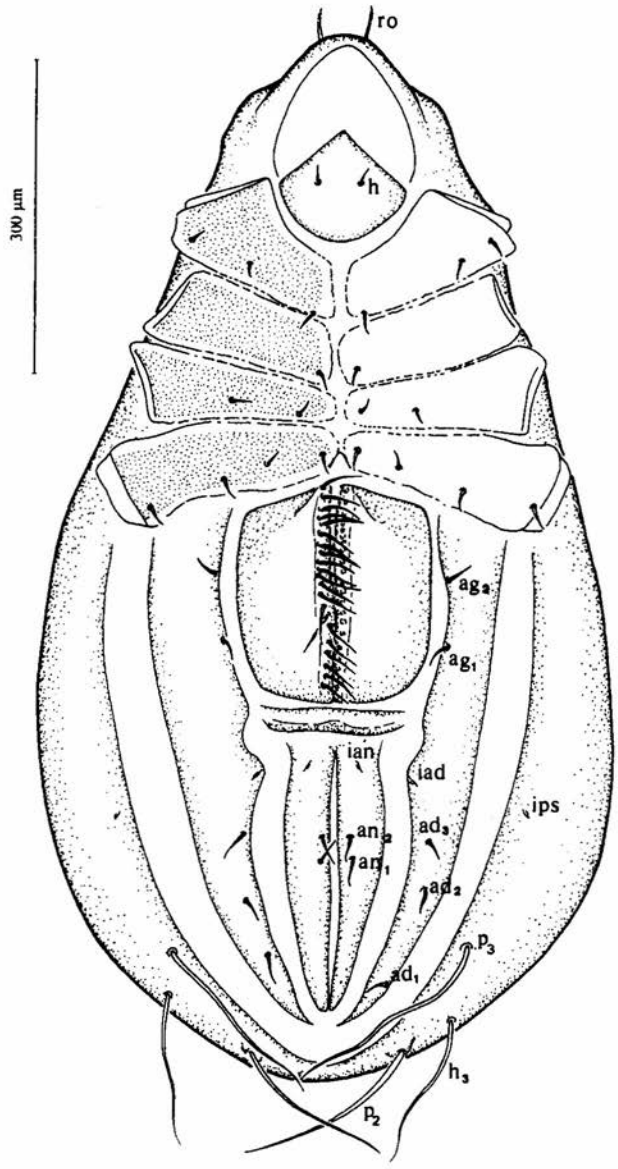


Fig. 81. *Heminothrus capillatus* (BERLESE): ventral view.

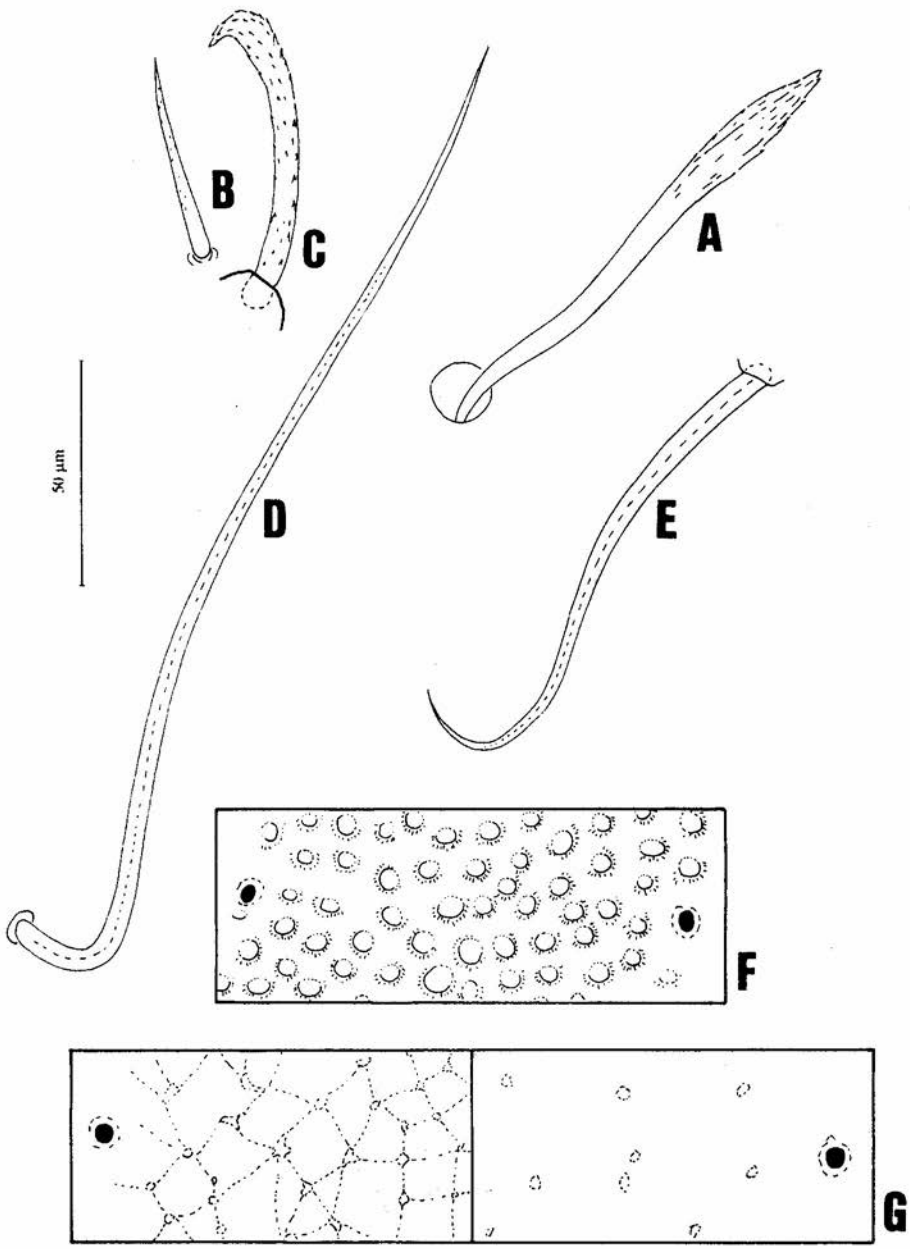


Fig. 82. *Heminothrus capillatus* (Berlese): A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *p1*; F - microsculpture of prodorsum between setae *in*; G - microsculpture of notogaster between setae *d2* (left - less sclerotized specimen).

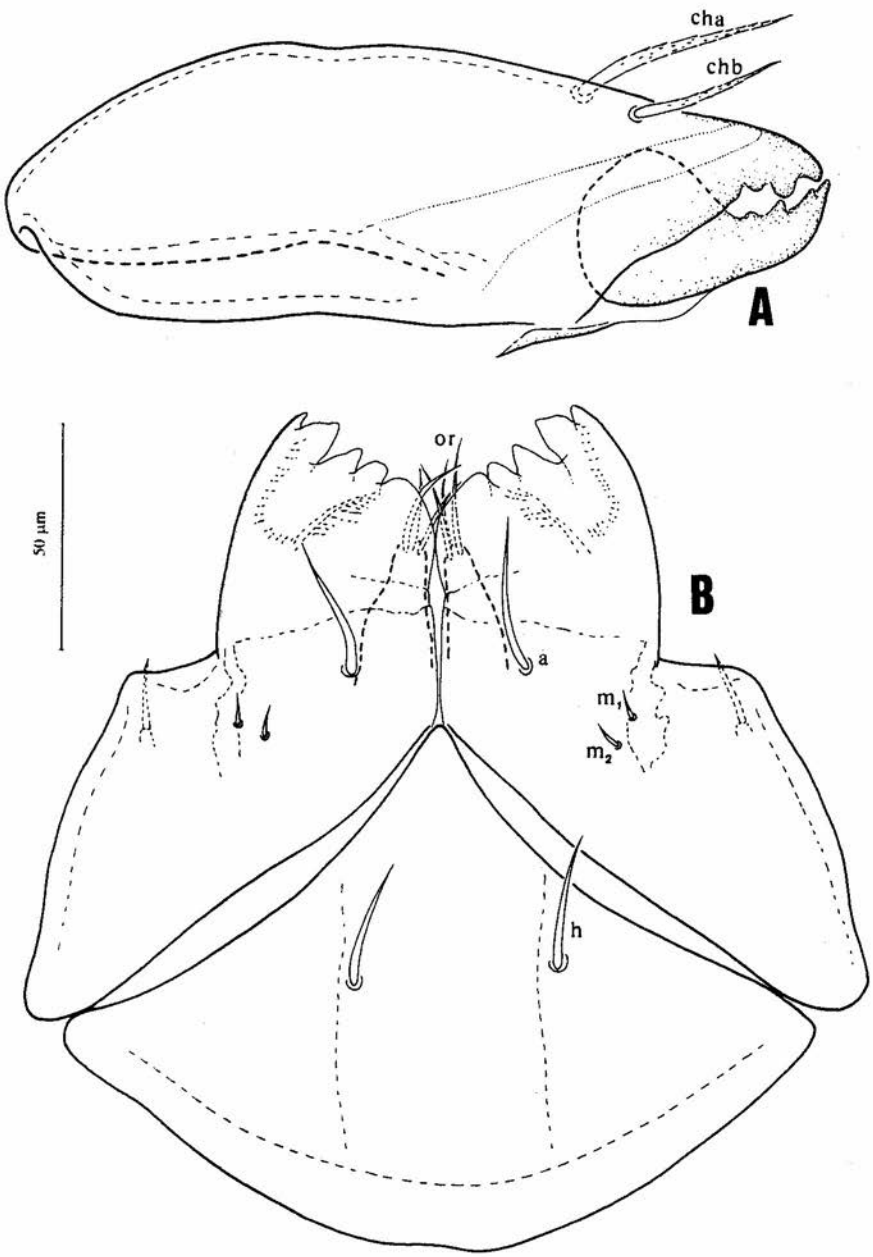


Fig. 83. *Heminothrus capillatus* (Berlese): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

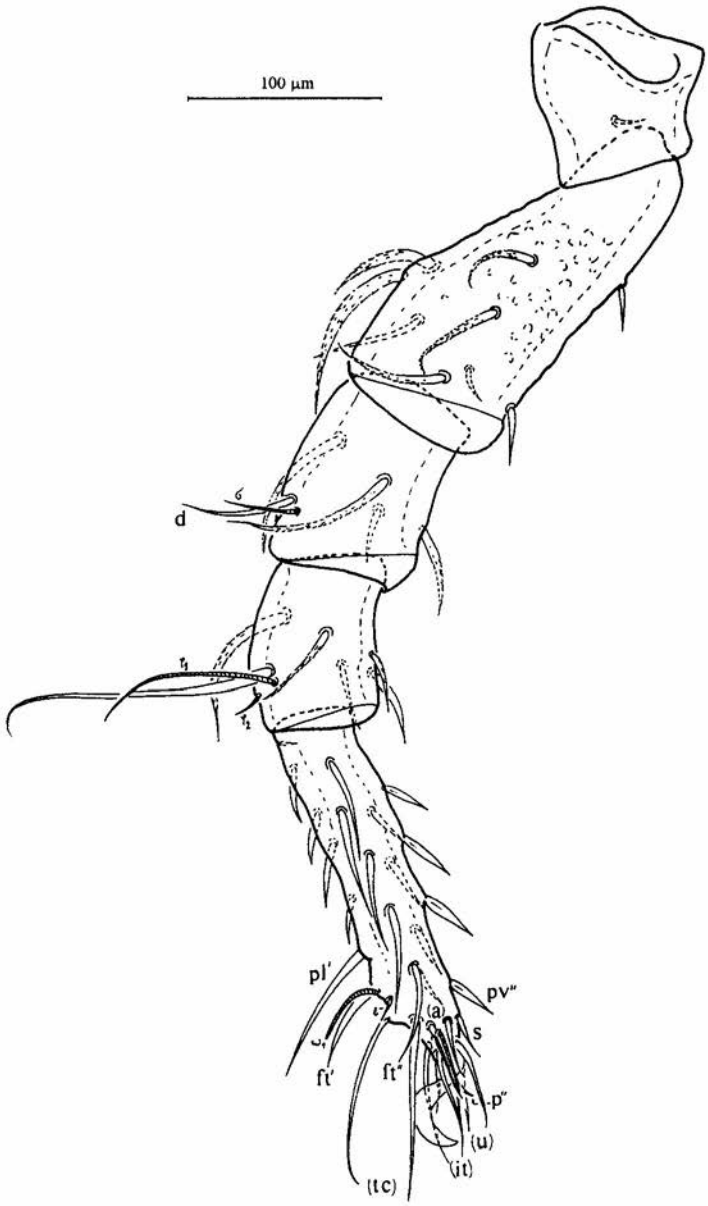


Fig. 84. *Heminothrus capillatus* (BERLESE): leg I, antiaxial view.

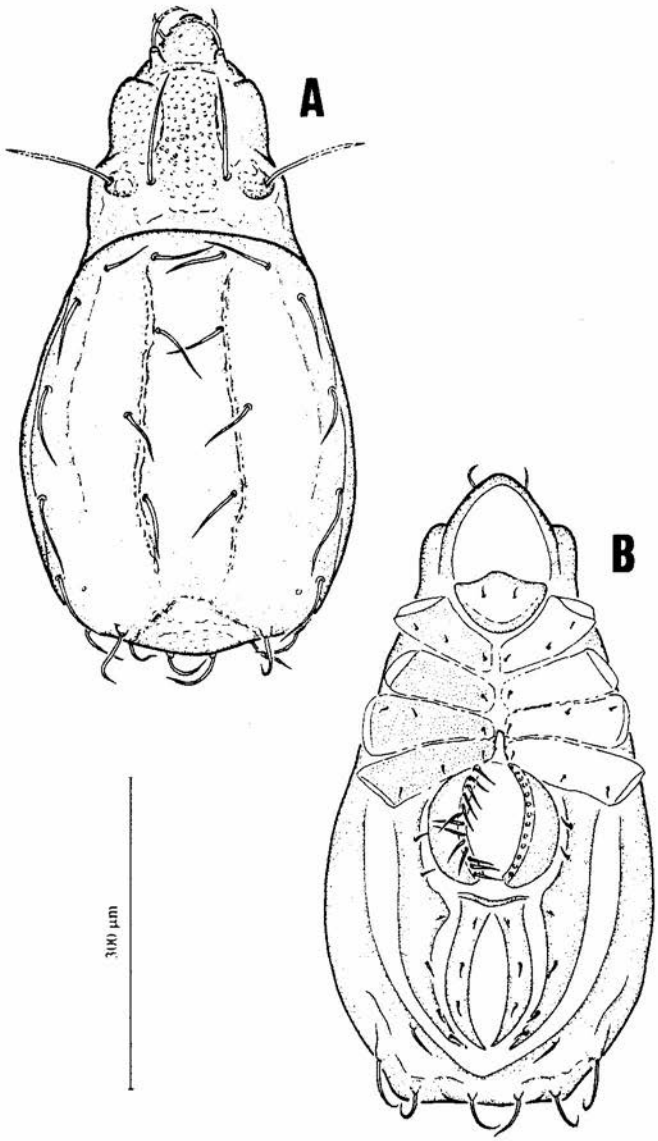


Fig. 85. *Heminothrus humicolus* (Forsslund): A - dorsal view; B - ventral view.

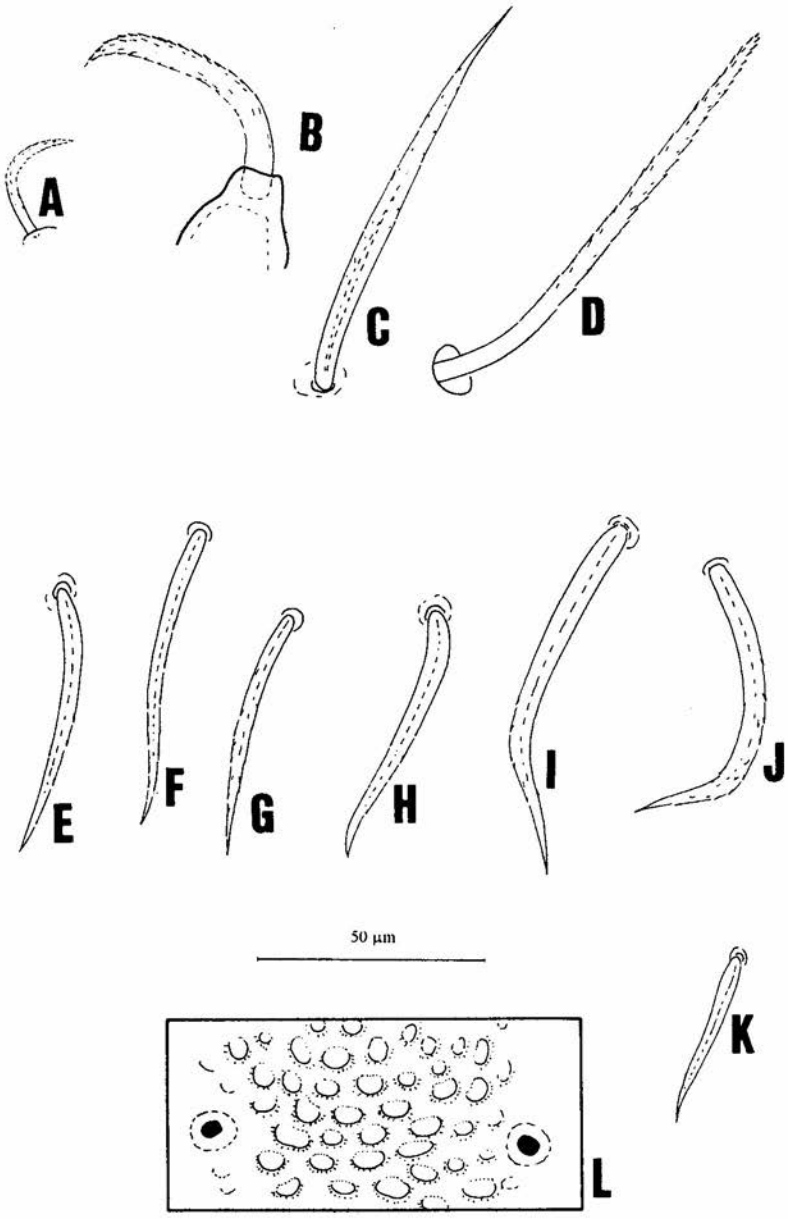


Fig. 86. *Heminothrus humicolus* (Forsslund): A - seta *ro*; B - seta *le*; C - seta *in*; D - sensillus; E - seta *c1*; F - seta *c2*; G - seta *d2*; H - seta *e1*; I - seta *f2*; J - seta *p1*; K - genital seta; L - microsculpture of prodorsum between setae *in*.

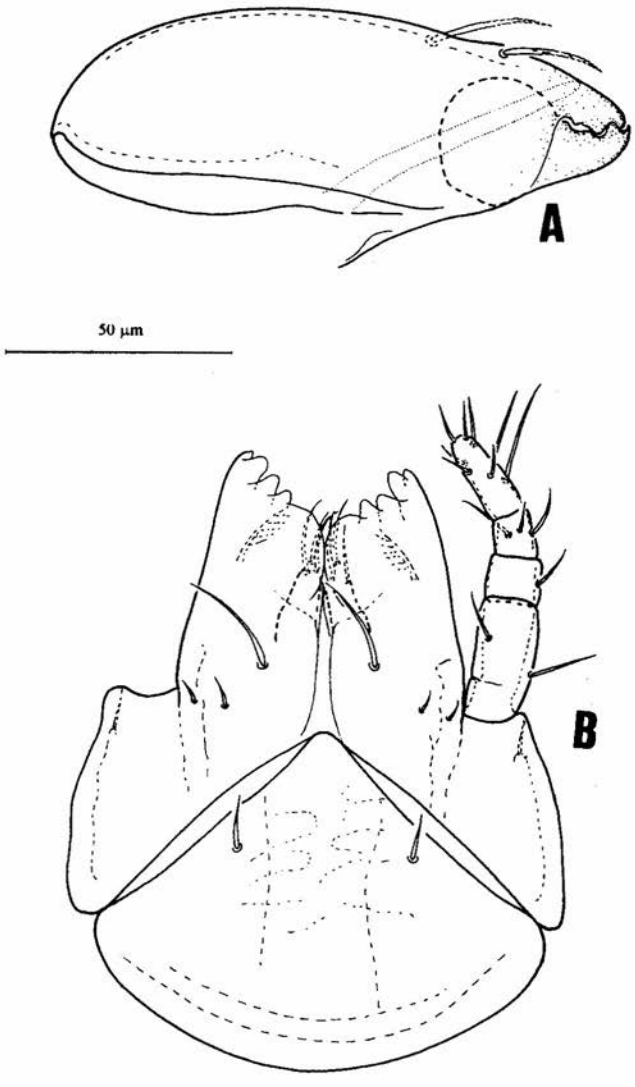


Fig. 87. *Heminothrus humicolus* (FORSSLUND): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

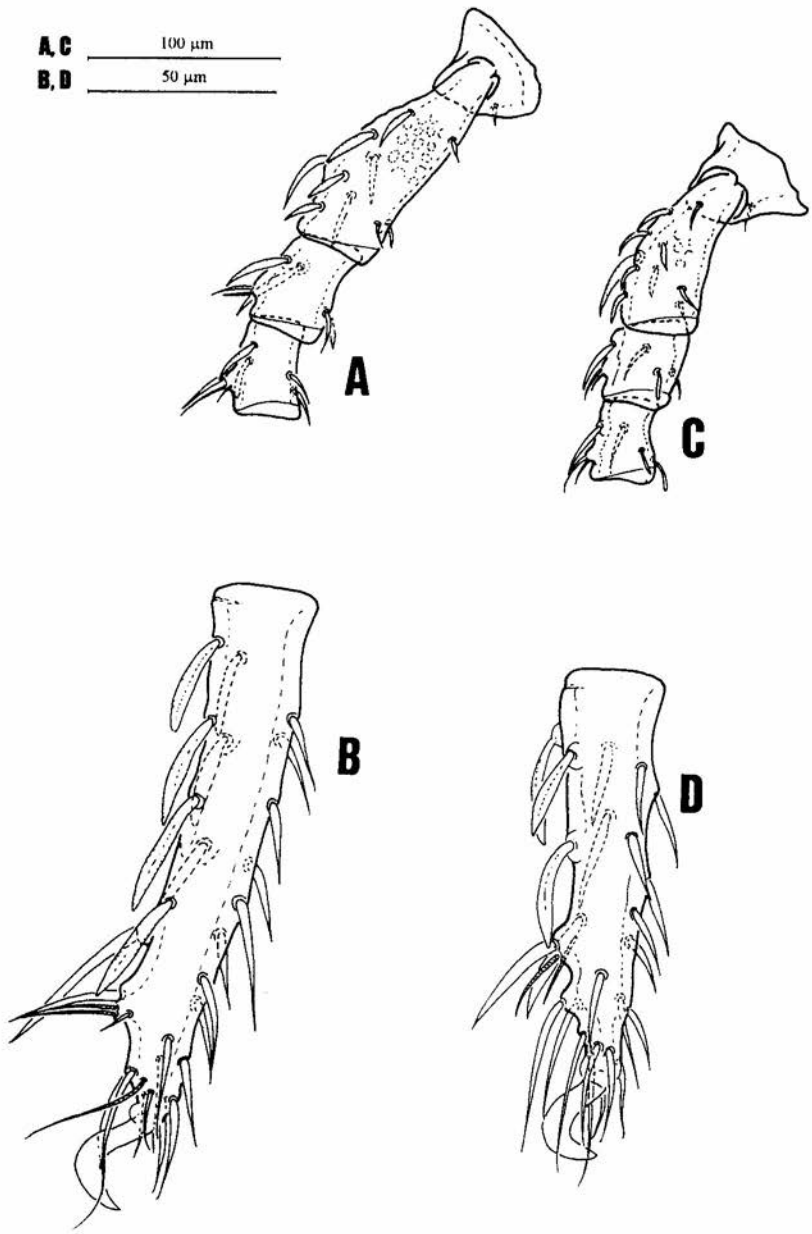


Fig. 88. *Heminothrus humicolus* (Forsslund): A - leg I, trochanter to tibia, antiaxial view; B - leg I, tarsus, antiaxial view; C - leg II, trochanter to tibia, antiaxial view; D - leg II, tarsus, antiaxial view.

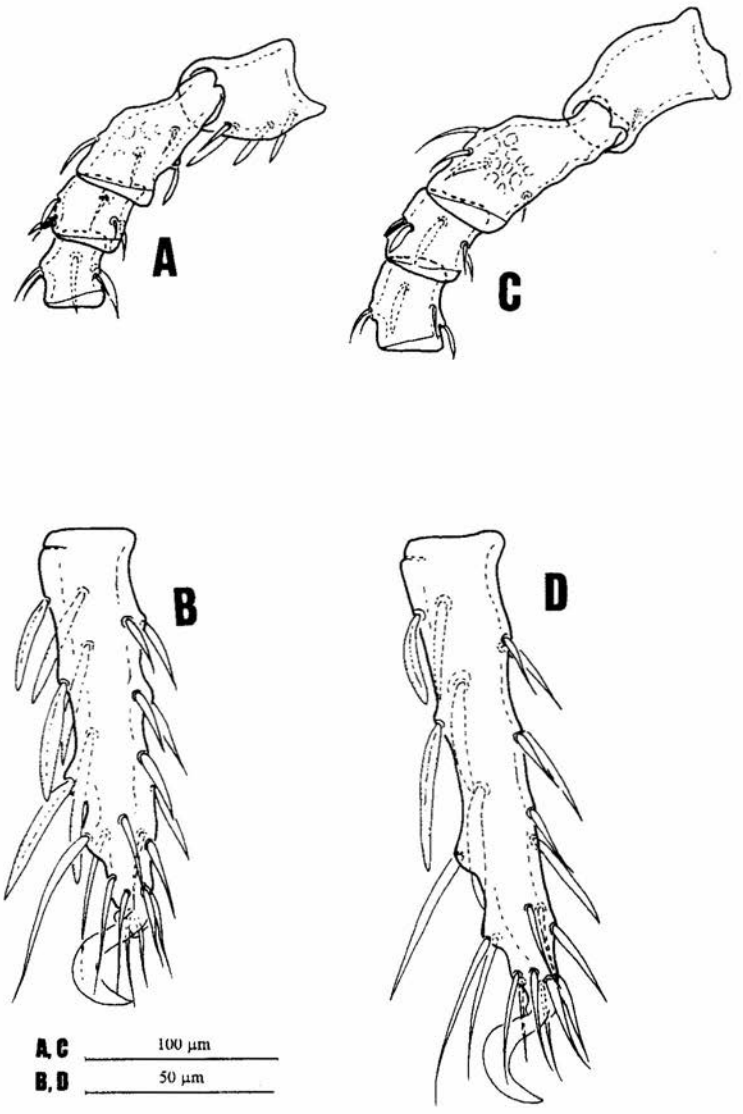


Fig. 89. *Heminothrus humicolus* (Forsslund): A - leg III, trochanter to tibia, paraxial view; B - leg III, tarsus, paraxial view; C - leg IV, trochanter to tibia, paraxial view; D - leg IV, tarsus, paraxial view.

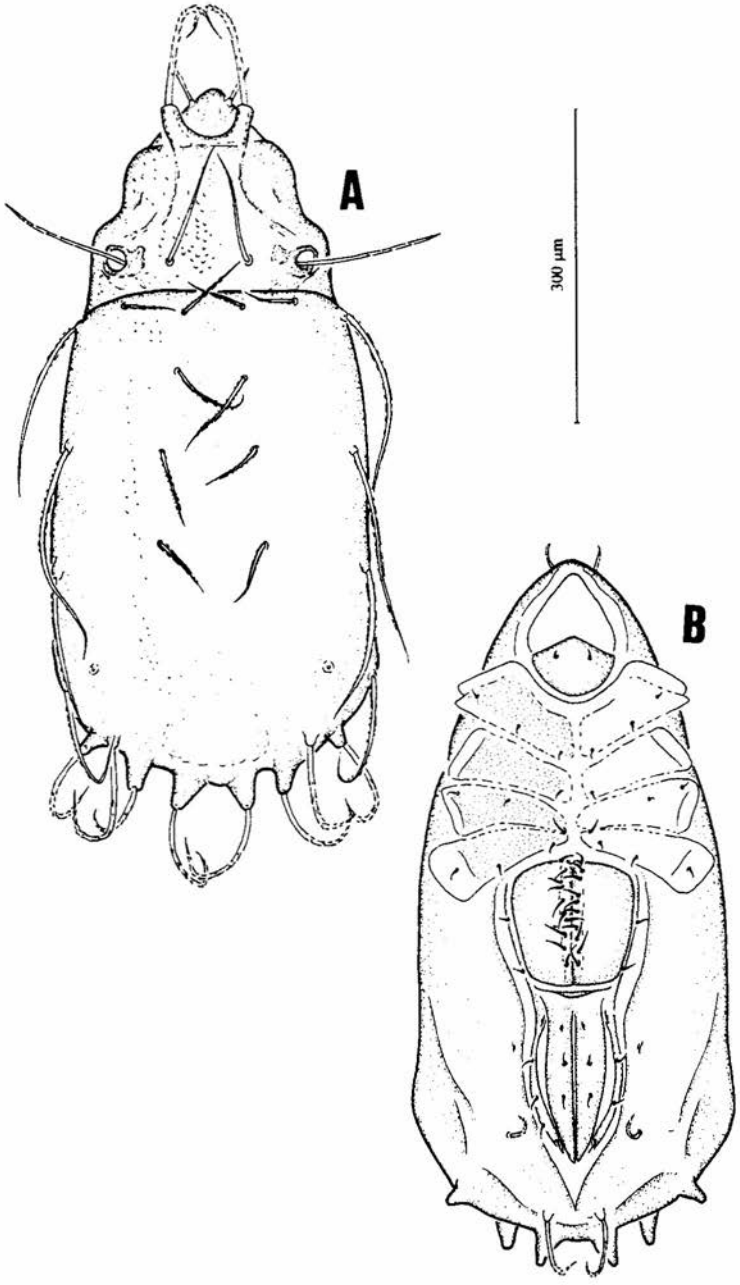


Fig. 90. *Heminothrus longisetosus* WILLMANN: A - dorsal view; B - ventral view.

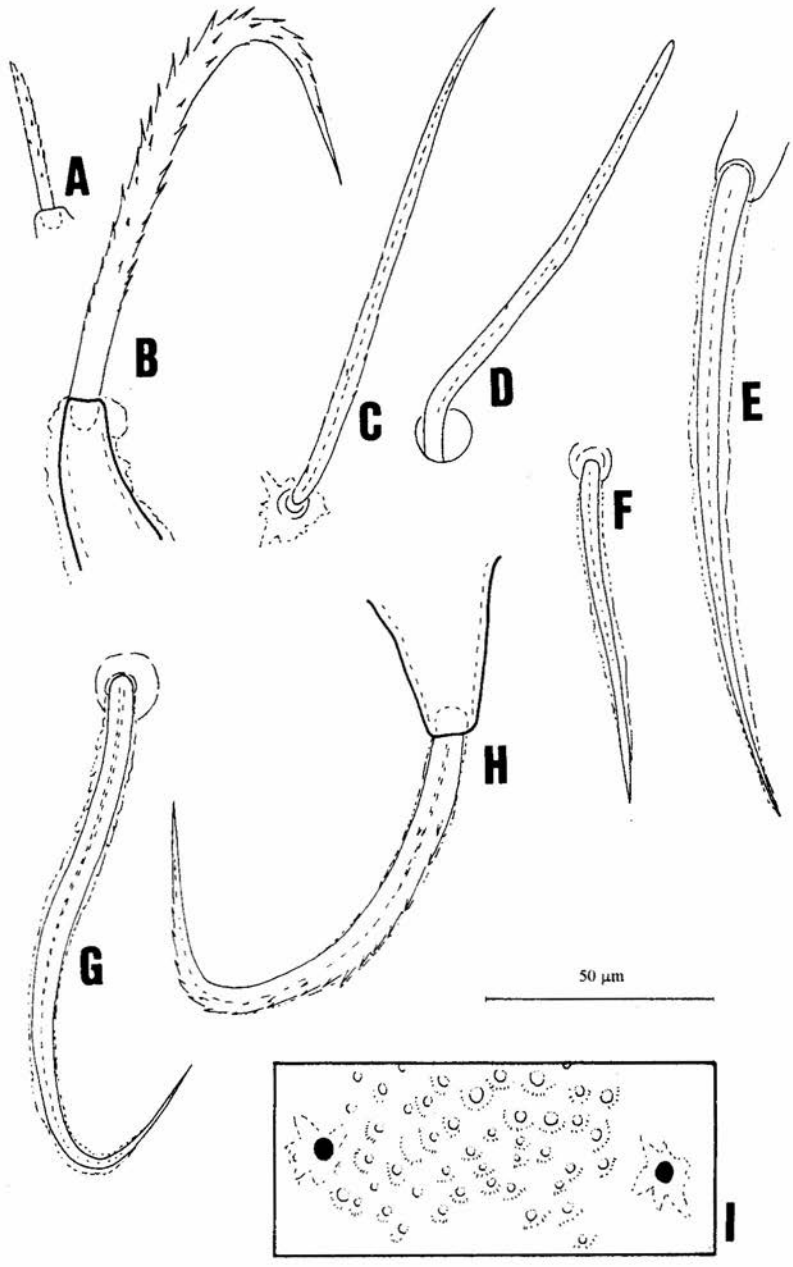


Fig. 91. *Heminothrus longisetosus* WILLMANN: A - seta *ro*; B - seta *le*; C - seta *in*; D - sensillus; E - seta *e2*; F - seta *d2*; G - seta *f2*; H - seta *p1*; I - microsculpture of prodorsum between setae in.

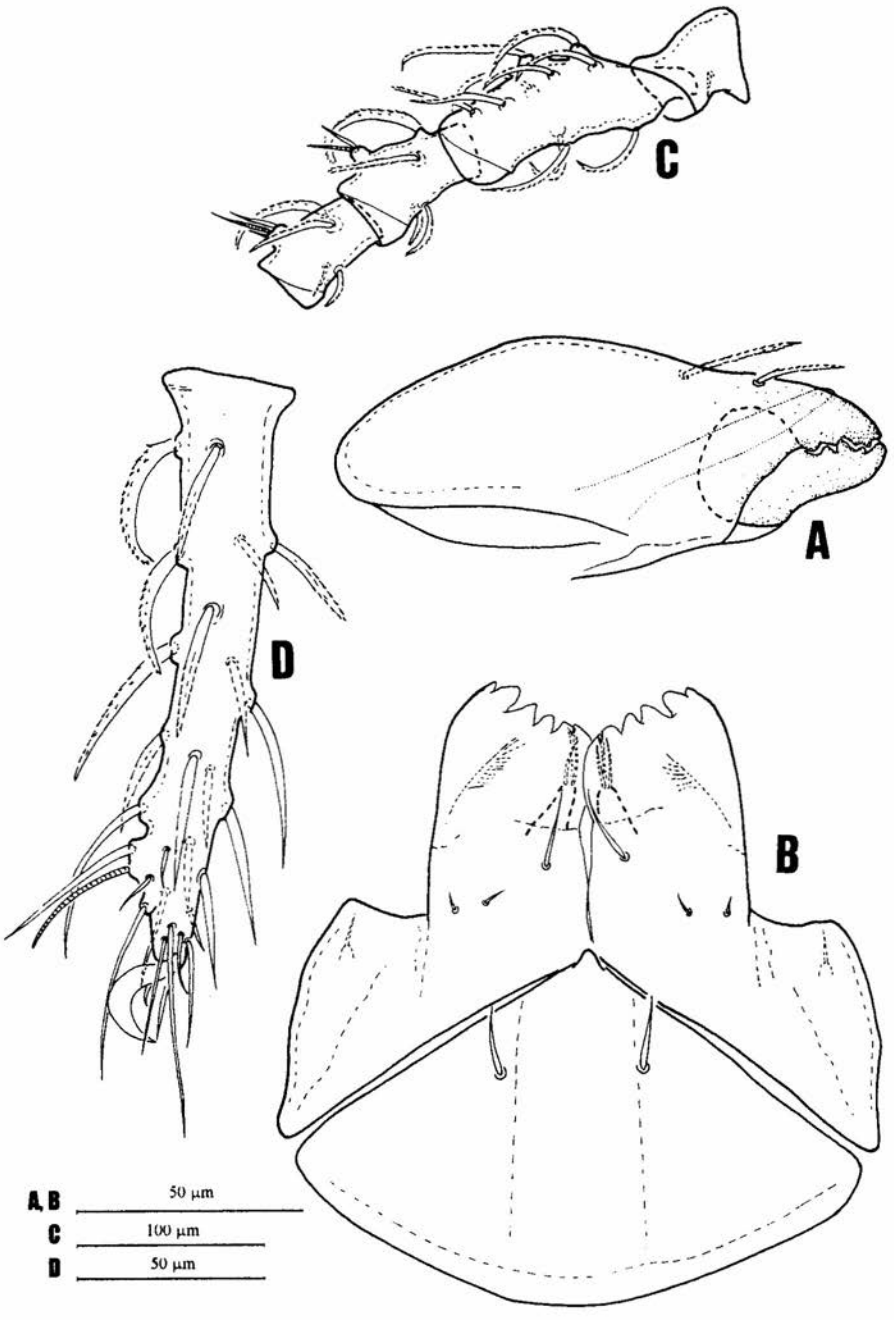


Fig. 92. *Heminothrus longisetosus* WILLMANN: A - chelicera, antiaxial view; B - subcapitulum, ventral view; C - leg I, trochanter to tibia, antiaxial view; D - leg I, tarsus, antiaxial view.

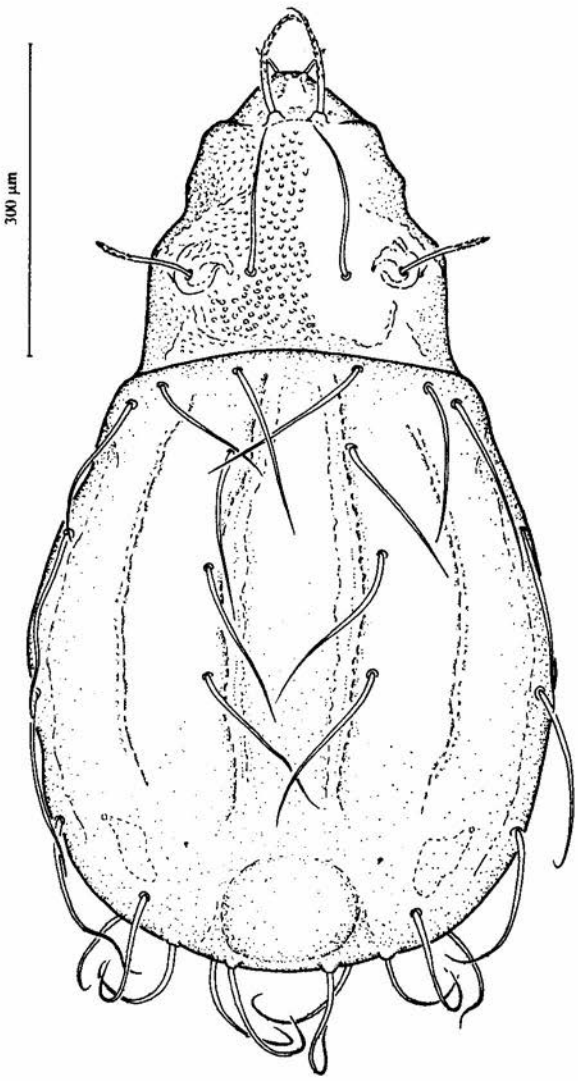


Fig. 93. *Heminothrus peltifer* (C.L. Koch): dorsal view.

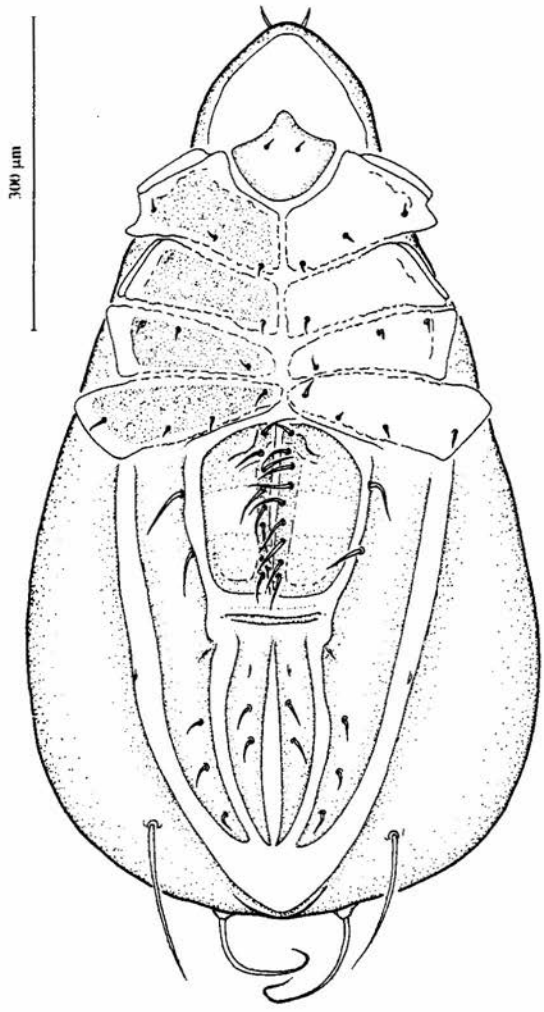


Fig. 94. *Heminothrus peltifer* (C.L. Koch): ventral view.

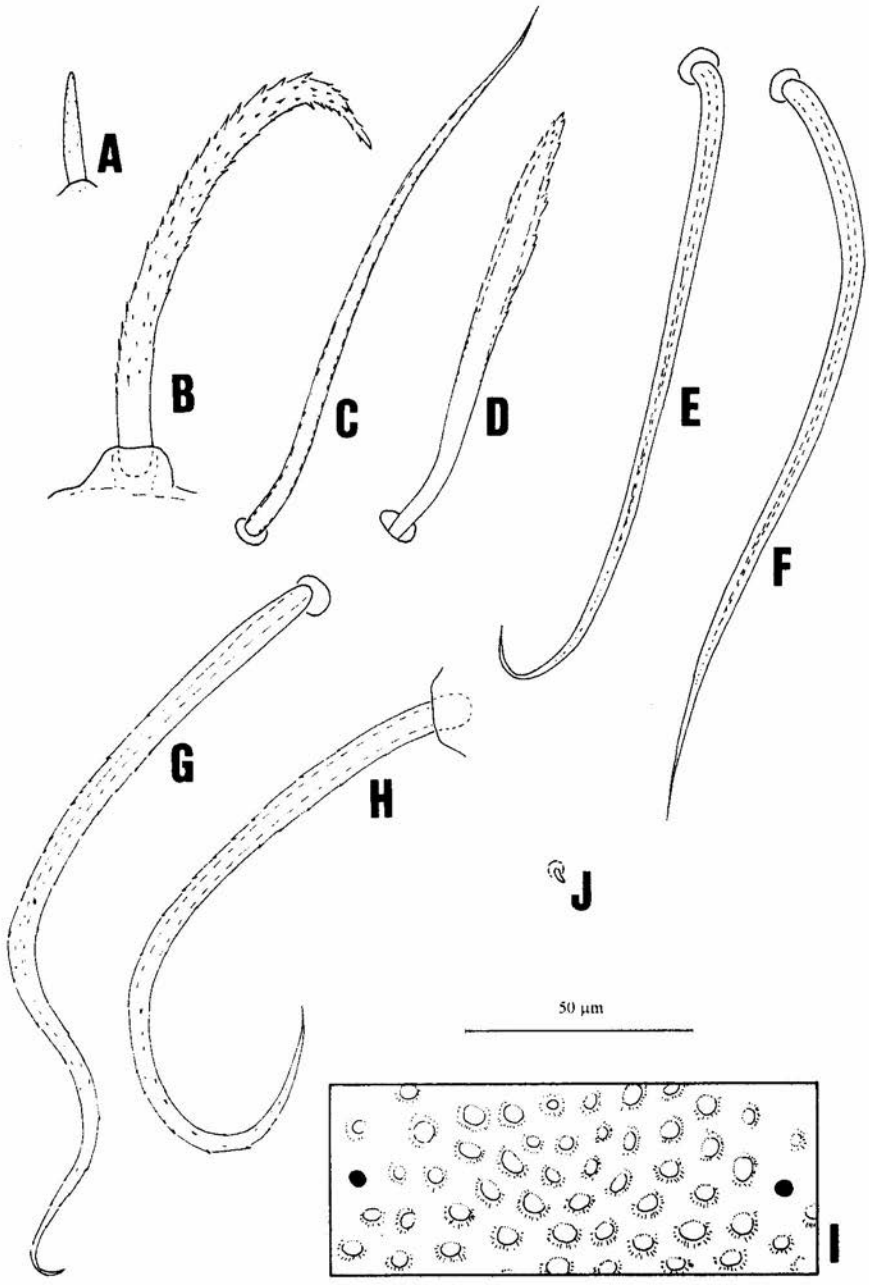


Fig. 95. *Heminothrus peltifer* (C.L. Koch): A - seta *ro*; B - seta *le*; C - seta *in*; D - sensillus; E - seta *c2*; F - seta *d2*; G - seta *f2*; H - seta *p1*; I - microsculpture of prodorsum between setae *in*; J - reduced deta *f1*.

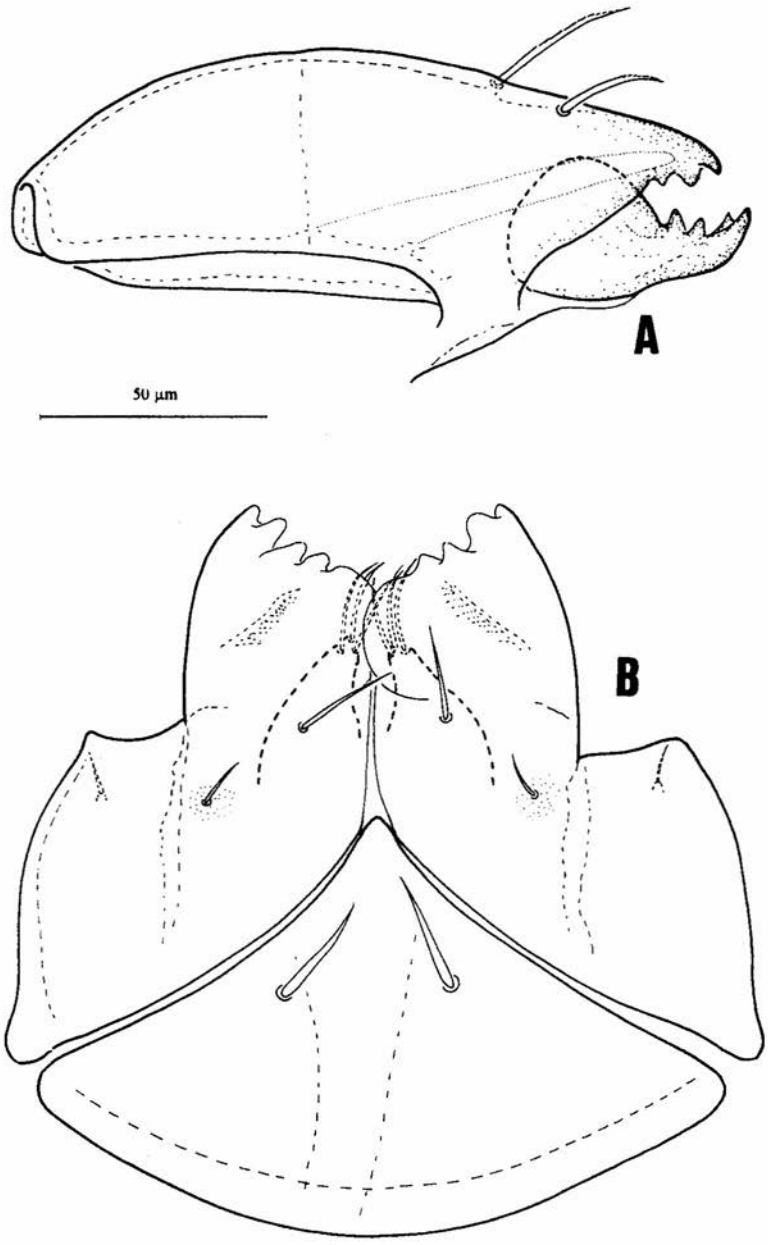


Fig. 96. *Heminothrus peltifer* (C.L. Koch): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

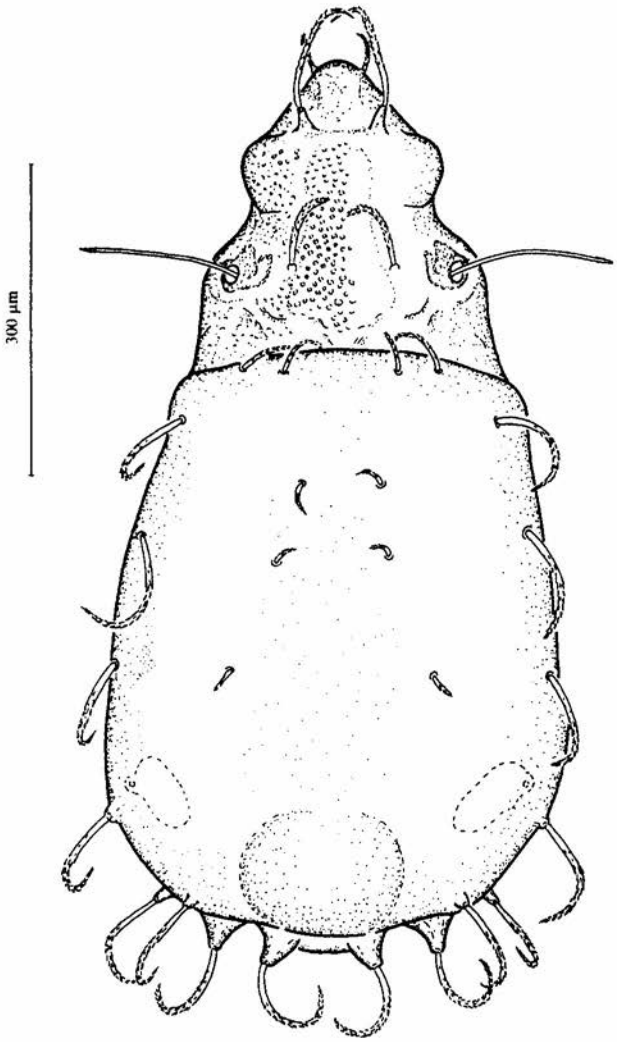


Fig. 97. *Heminothrus targionii* (Berlese): dorsal view.

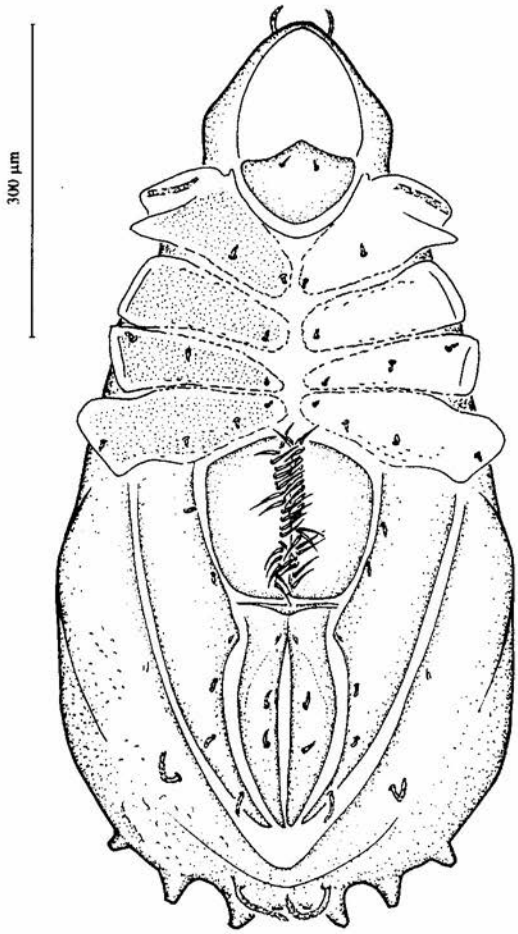


Fig. 98. *Heminothrus targionii* (Berlese): ventral view.

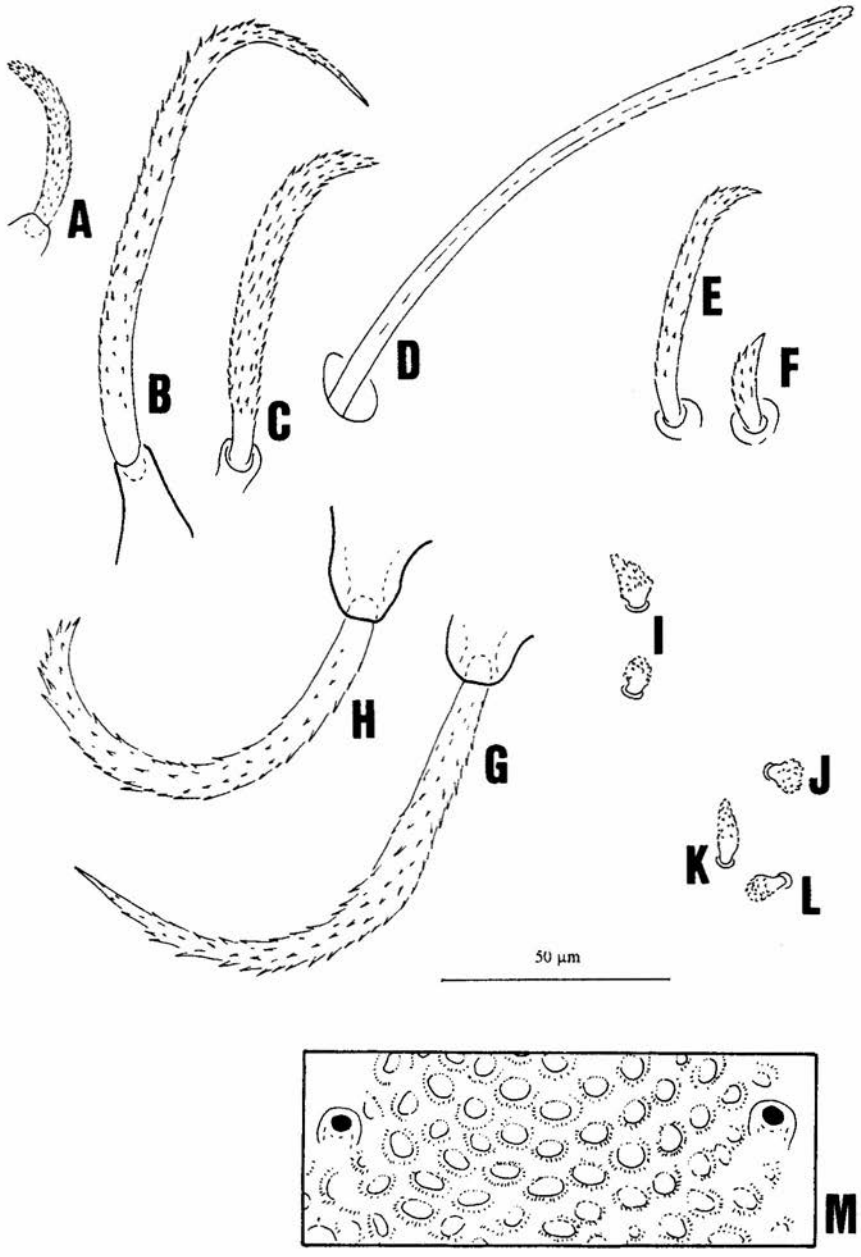


Fig. 99. *Heminothrus targionii* (Berlese): A - seta *ro*; B - seta *le*; C - seta *in*; D - sensillus; E - seta *c2*; F- seta *d2*; G - seta *f2*; H - seta *p1*; I - epimeral setae; J - aggenital seta; K -anal seta; L - adanal seta; M - microsculpture of prodorsum between setae *in*.

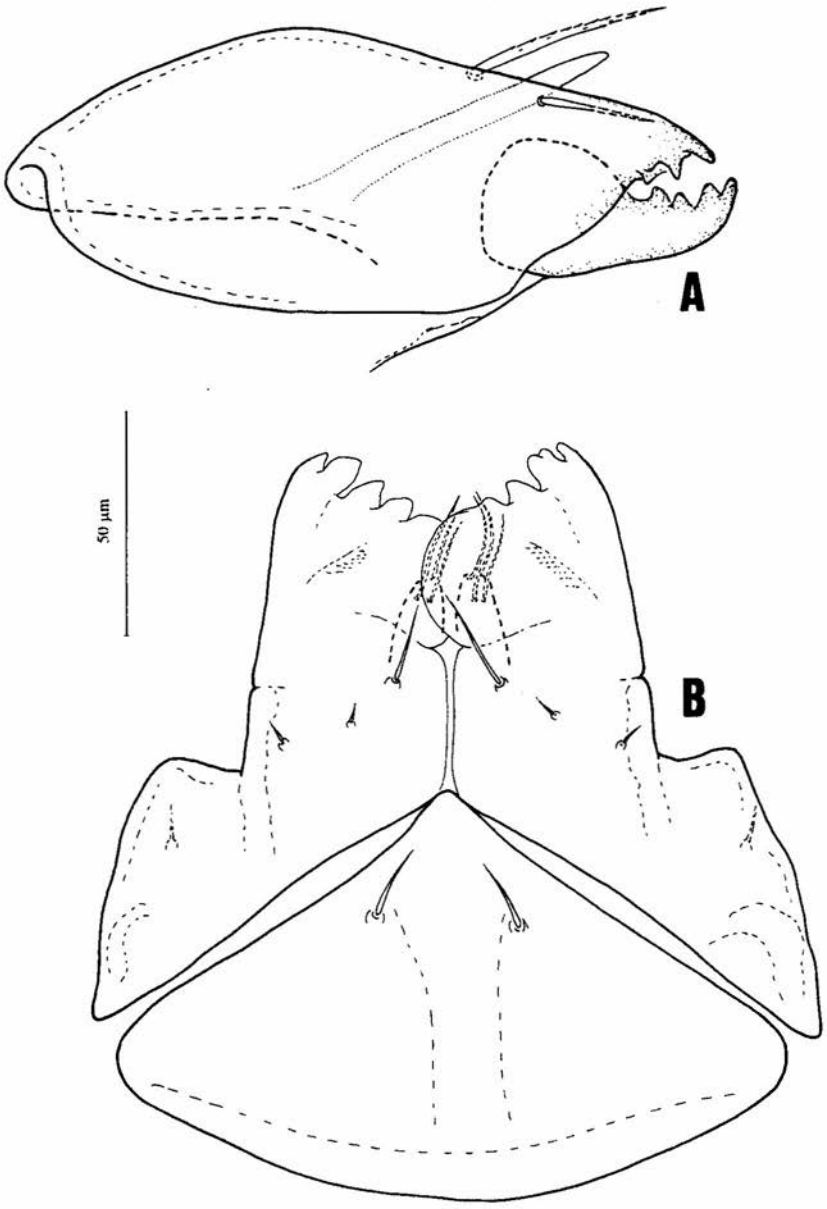


Fig. 100. *Heminothrus targionii* (Berlese): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

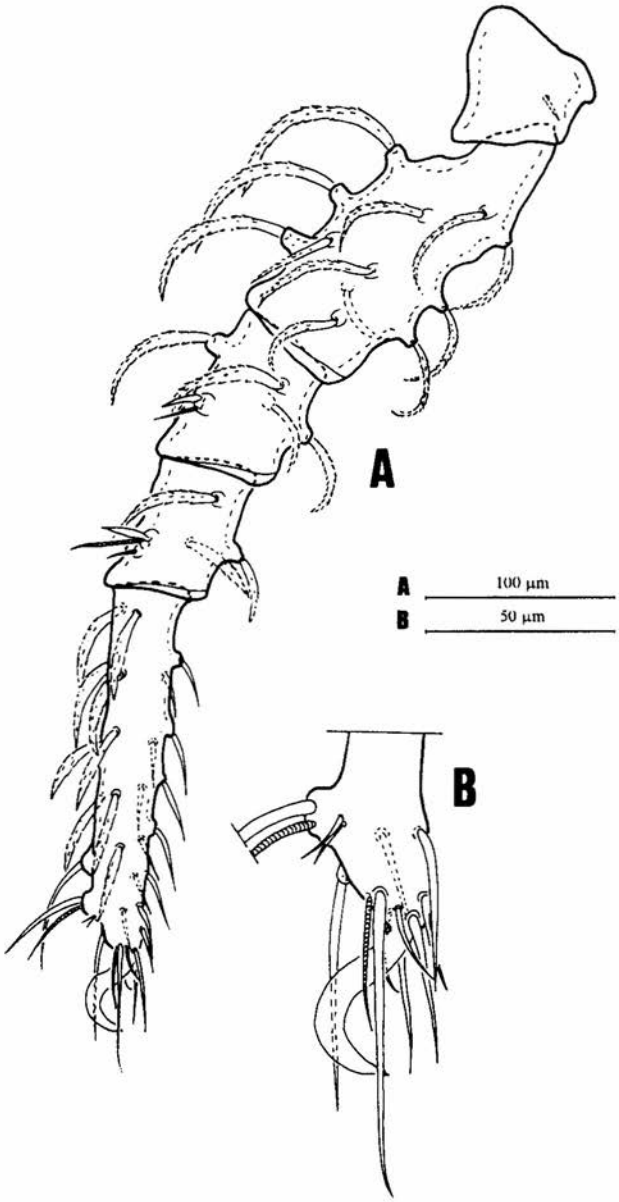


Fig. 101. *Heminothrus targionii* (Berlese): A - leg I, antiaxial view; B - enlargement ending of tarsus I, antiaxial view.

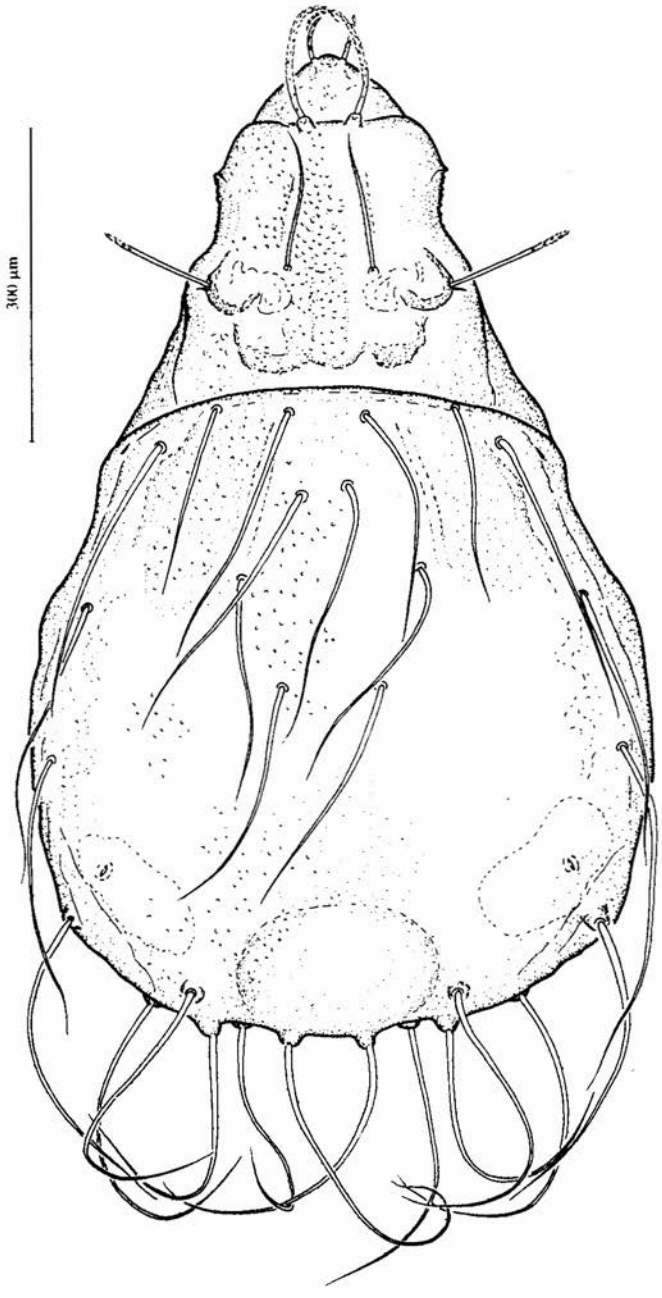


Fig. 102. *Heminothrus thori* (Berlese): dorsal view.

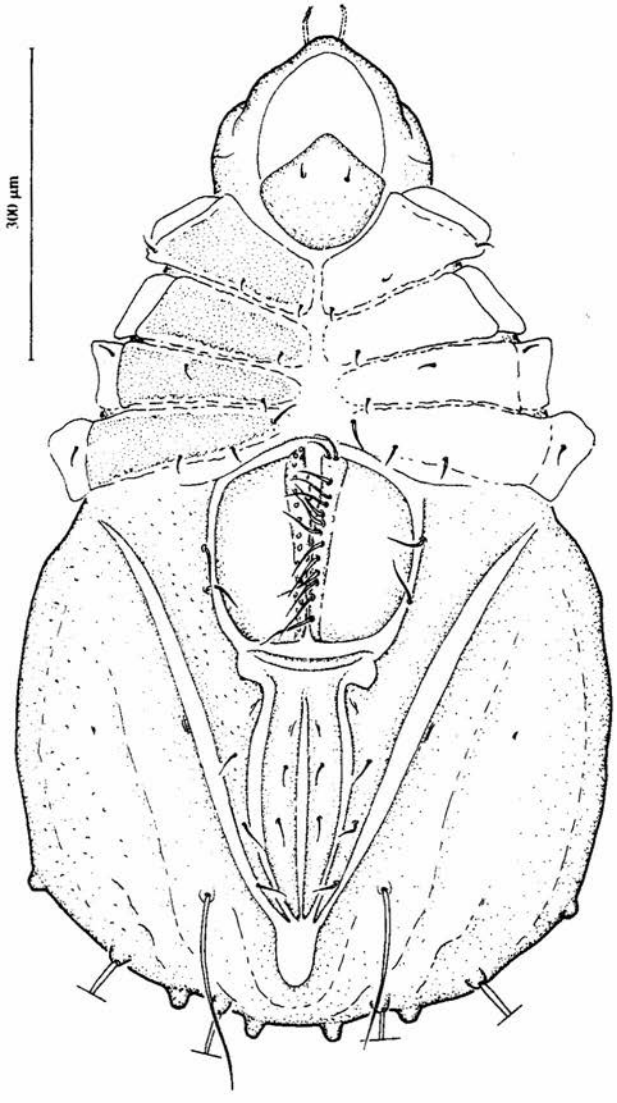


Fig. 103. *Heminothrus thori* (BERLESE): ventral view.

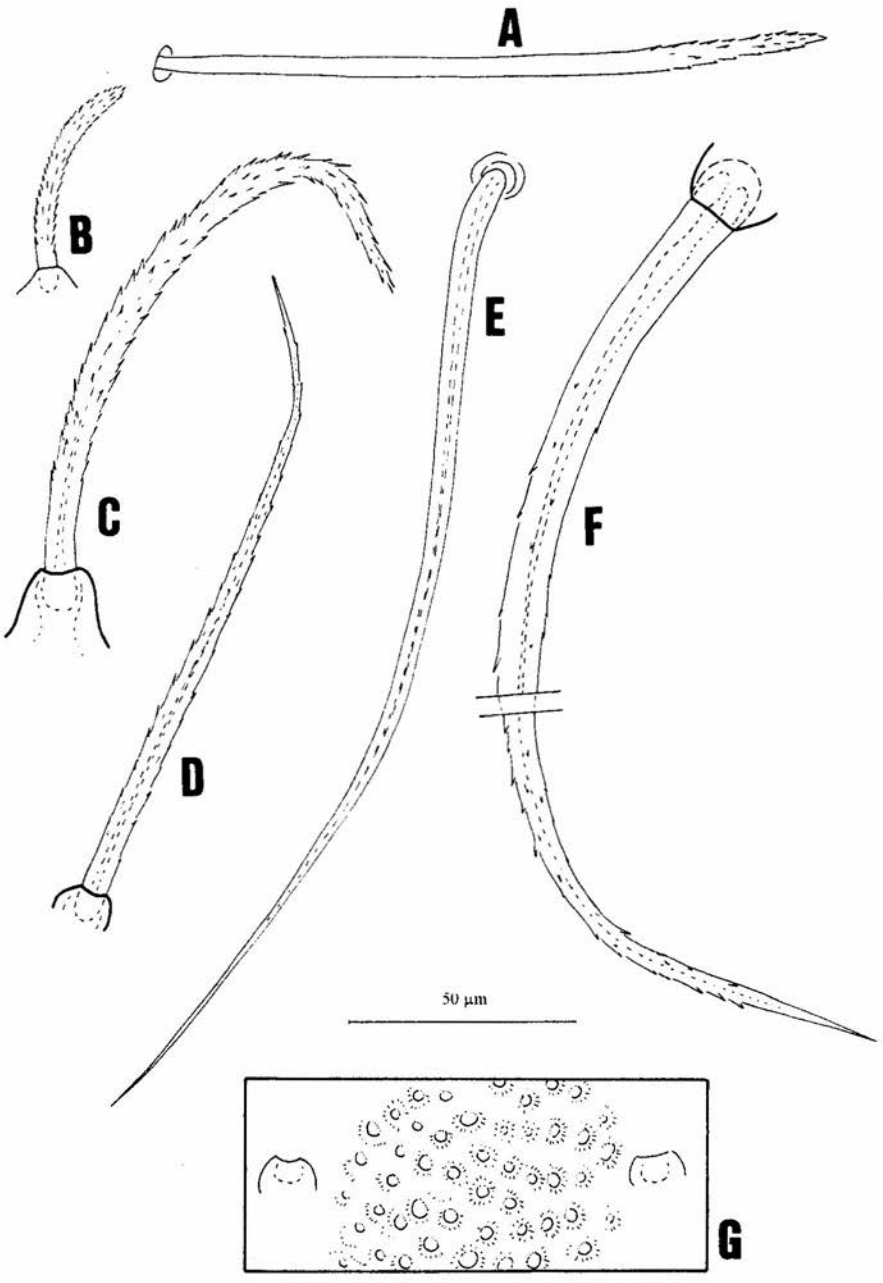


Fig. 104. *Heminothrus thori* (BERLESE): A - sensillus; B - seta *ro*; C - seta *le*; D - seta *in*; E - seta *d2*; F - seta *f2*; G - microsculpture of prodorsum between setae *in*.

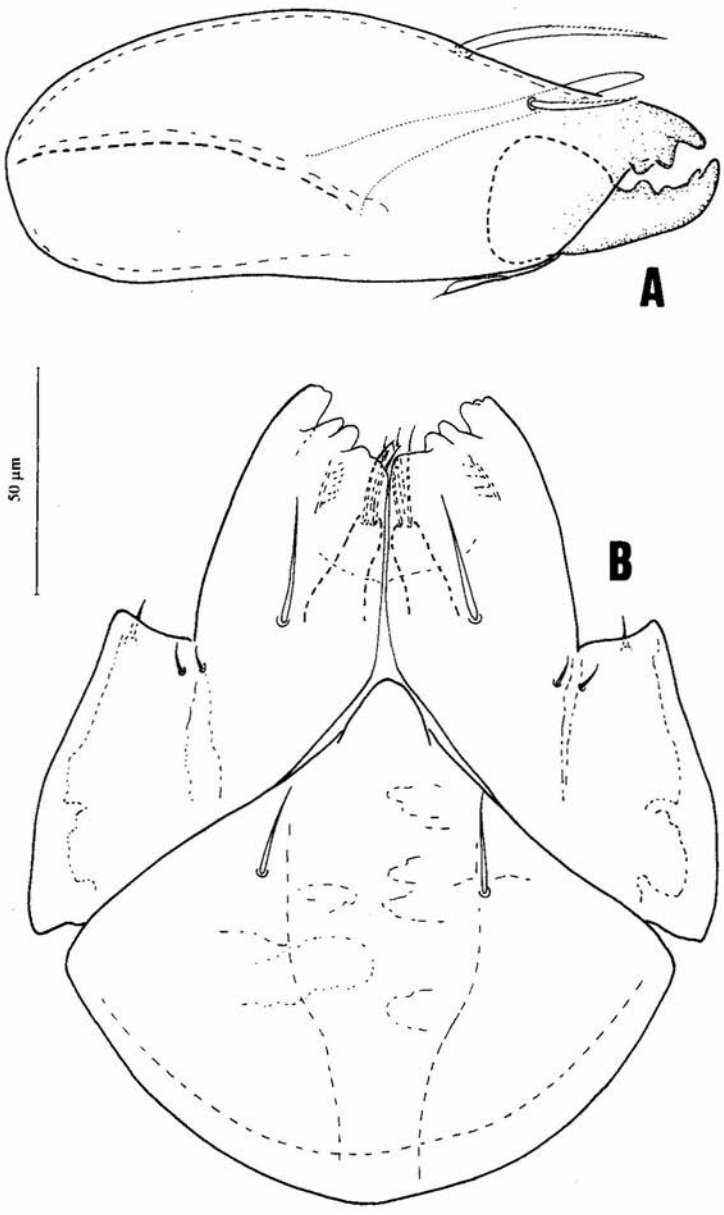


Fig. 105. *Heminothrus thori* (Berlese): A - chelicera, antiaxial view; B - subcapitulum, ventral view.

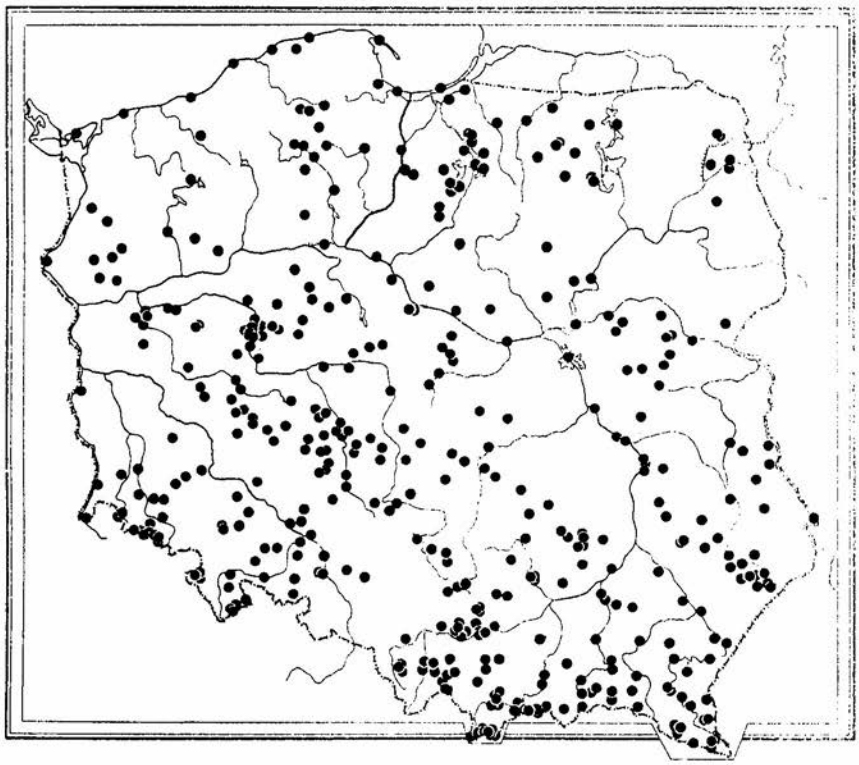


Fig. 106. Distribution of the studied localities in Poland.

Nothrus anauniensis CANESTRINI et FANZAGO, 1876

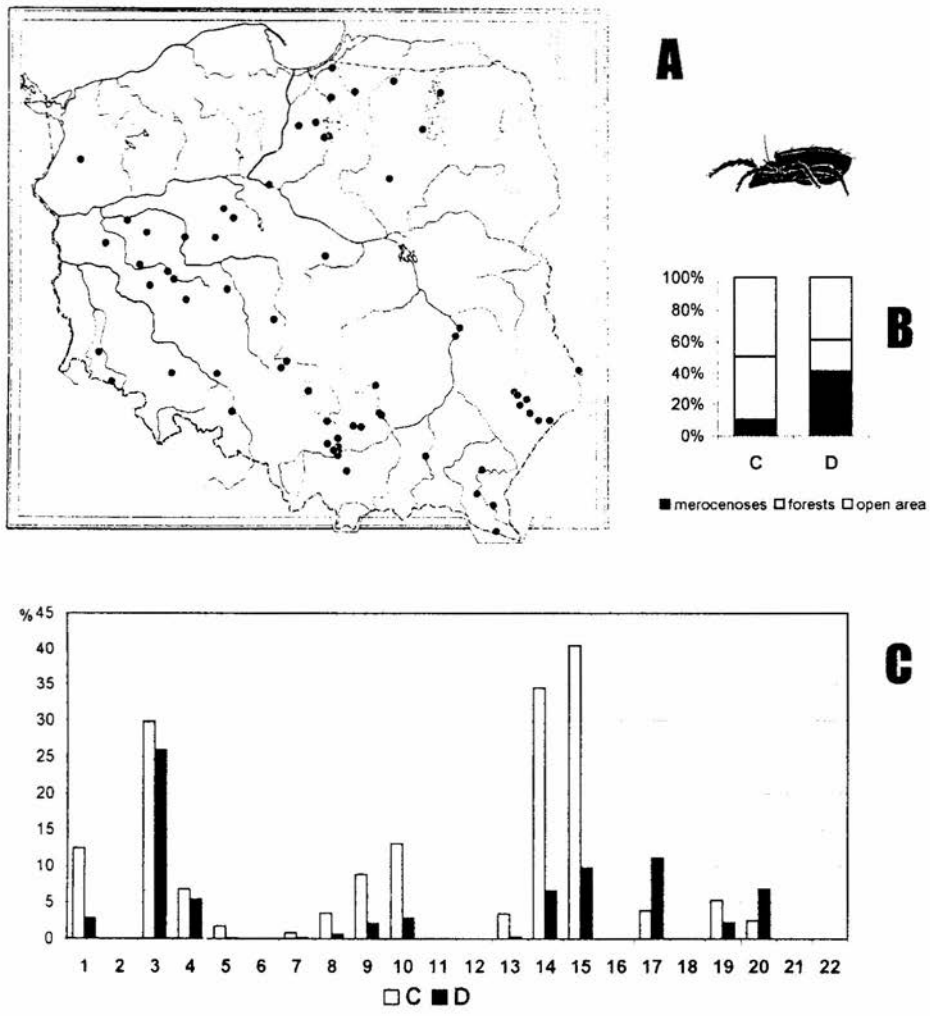


Fig. 107. *Nothrus anauniensis* CANESTRINI et FANZAGO: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats (1 - xerothermic grasses, 2 - grasses on decalcified basement soil, 3 - grasses on rich in limestone basement soil, 4 - meadows, 5 - peat-bogs, 6 - other unforested habitats, 7 - lowland coniferous forests, 8 - mixed forests (lowland and upland), 9 - deciduous forests (lowland and upland), 10 - marshy forests and alder forests, 11 - alpine coniferous forests, 12 - mountain coniferous and deciduous forests, 13 - dwarf pine forests, 14 - brushwoods, 15 - parks, 16 - ant-hills, 17 - mole nests, 18 - other mammal nests, 19 - bird nests, 20 - mouldered trunks, 21 - hollows scooped in a tree trunks, 22 - other merocenoses).

Nothrus borussicus SELLNICK, 1928

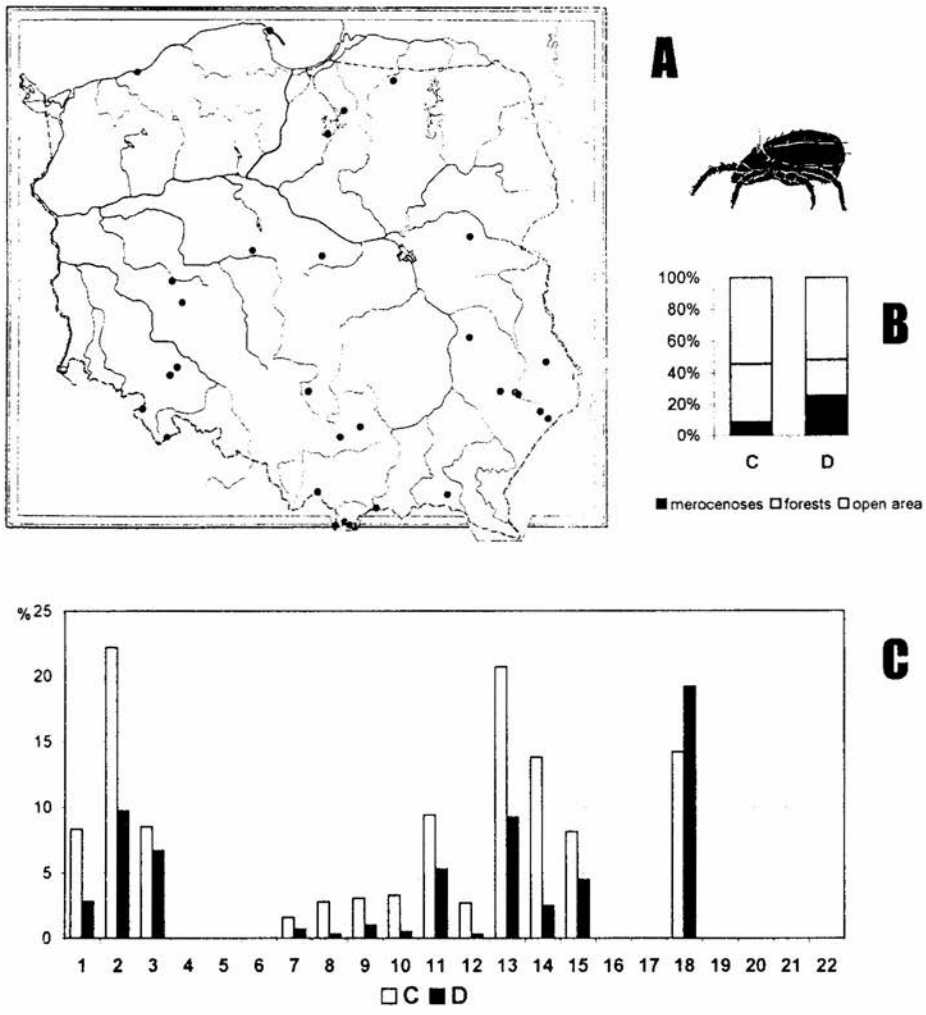


Fig. 108. *Nothrus borussicus* SELLNICK: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Nothrus palustris C.L. KOCH, 1839

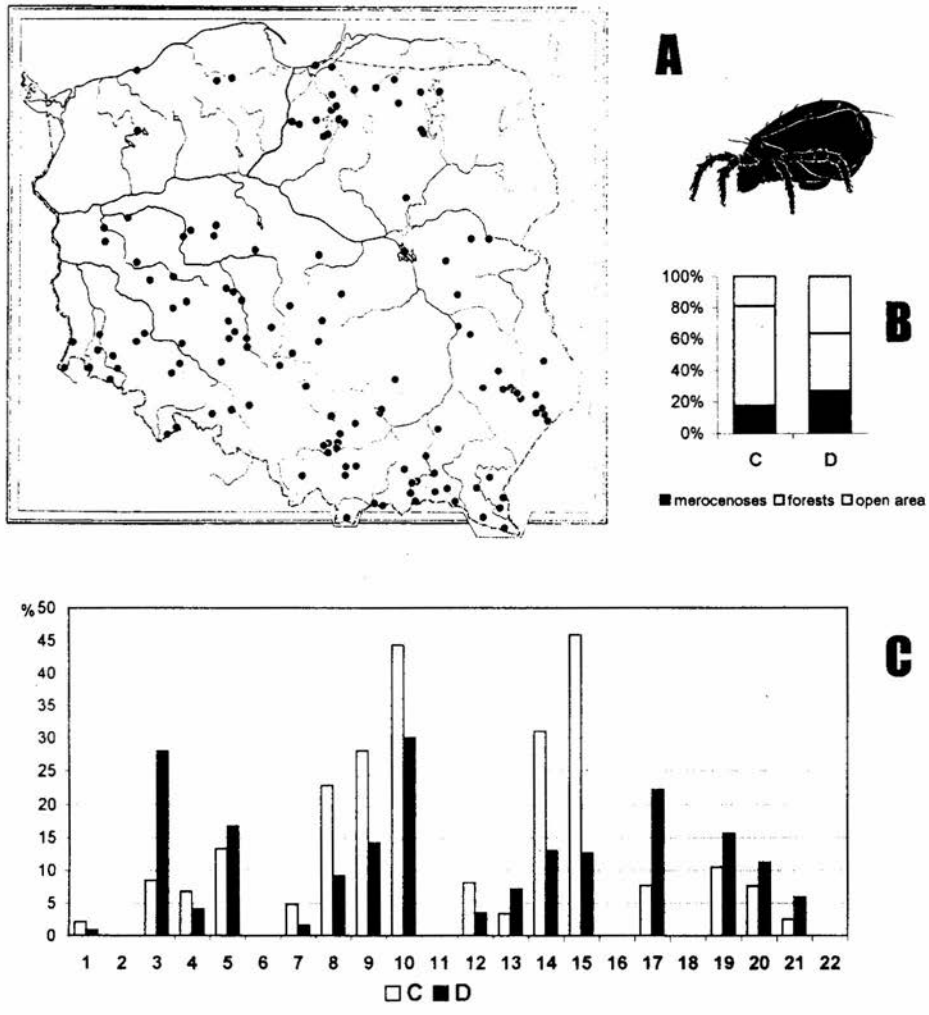


Fig. 109. *Nothrus palustris* C.L. KOCH: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Nothrus pratensis SELLNICK, 1928

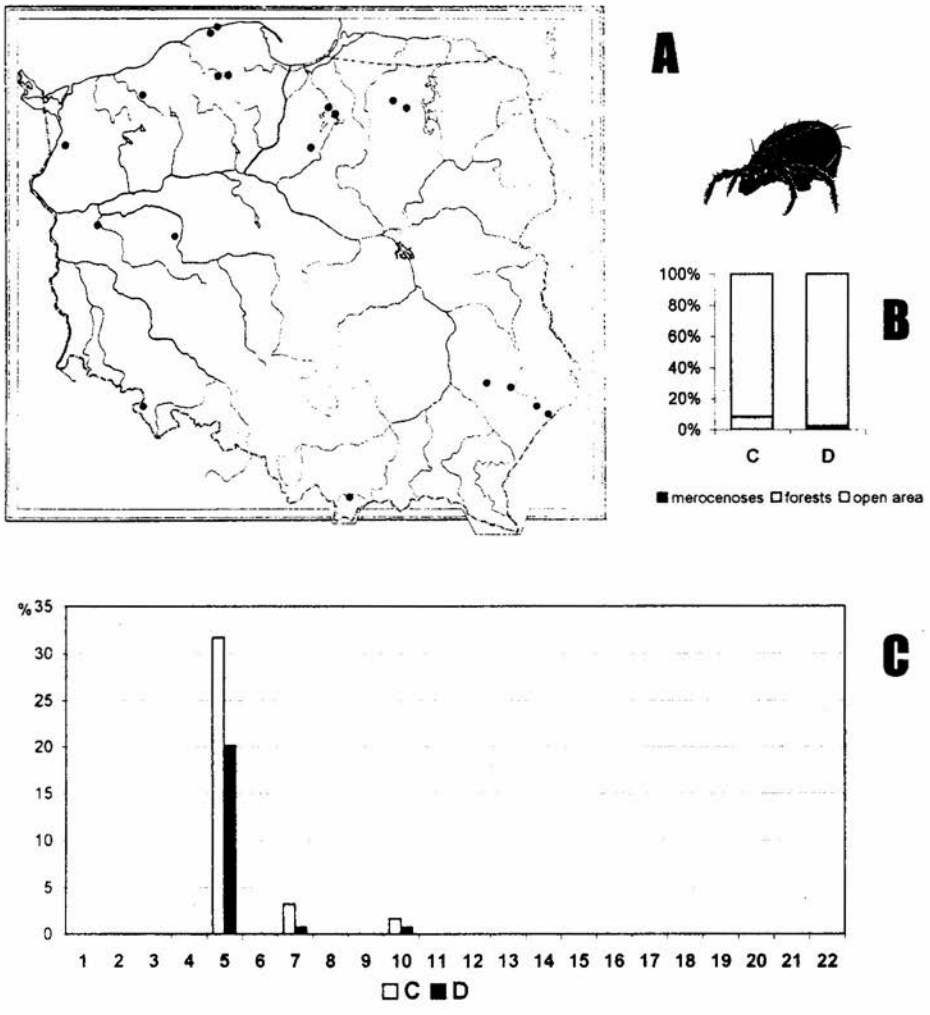


Fig. 110. *Nothrus pratensis* SELLNICK: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Nothrus silvestris NICOLET, 1855

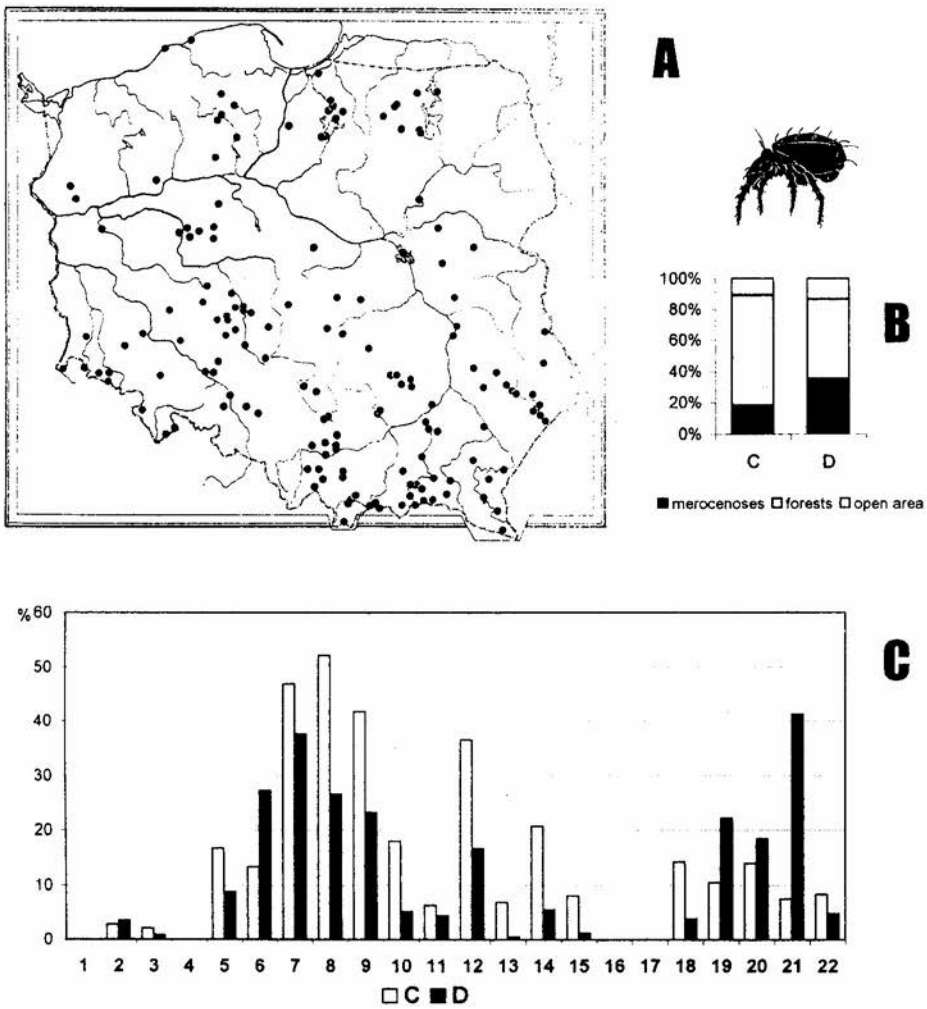


Fig. 111. *Nothrus silvestris* NICOLET: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Camisia biurus (C.L. Koch, 1839)

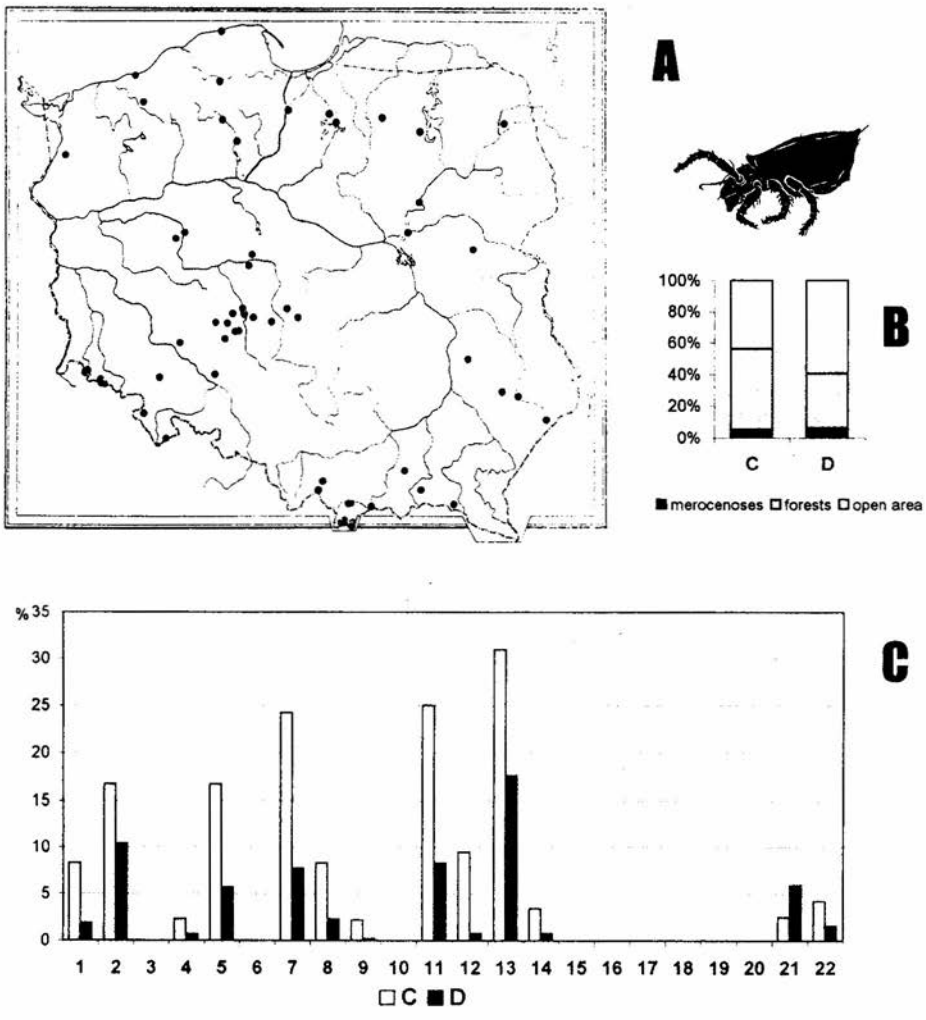


Fig. 112. *Camisia biurus* (C.L. Koch): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Camisia biverrucata (C.L. Koch, 1839)

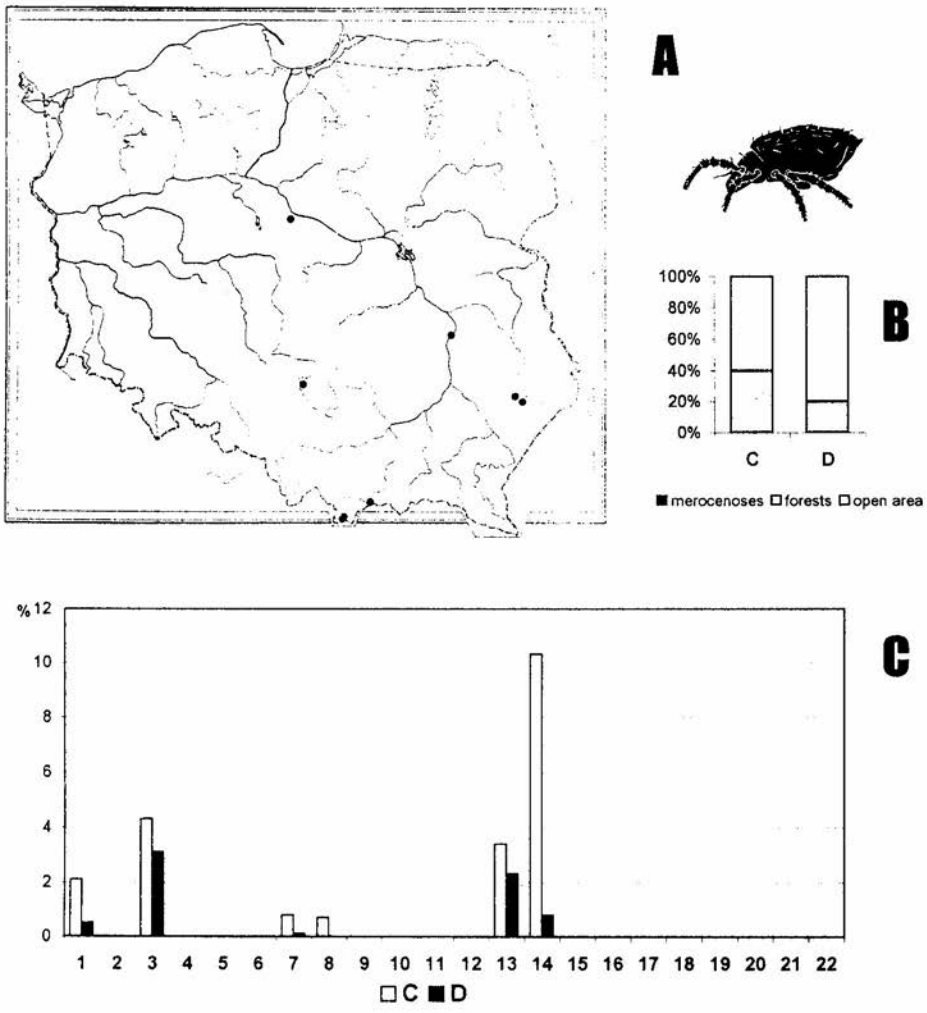


Fig. 113. *Camisia biverrucata* (C.L. Koch): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Camisia horrida (HERMANN, 1804)

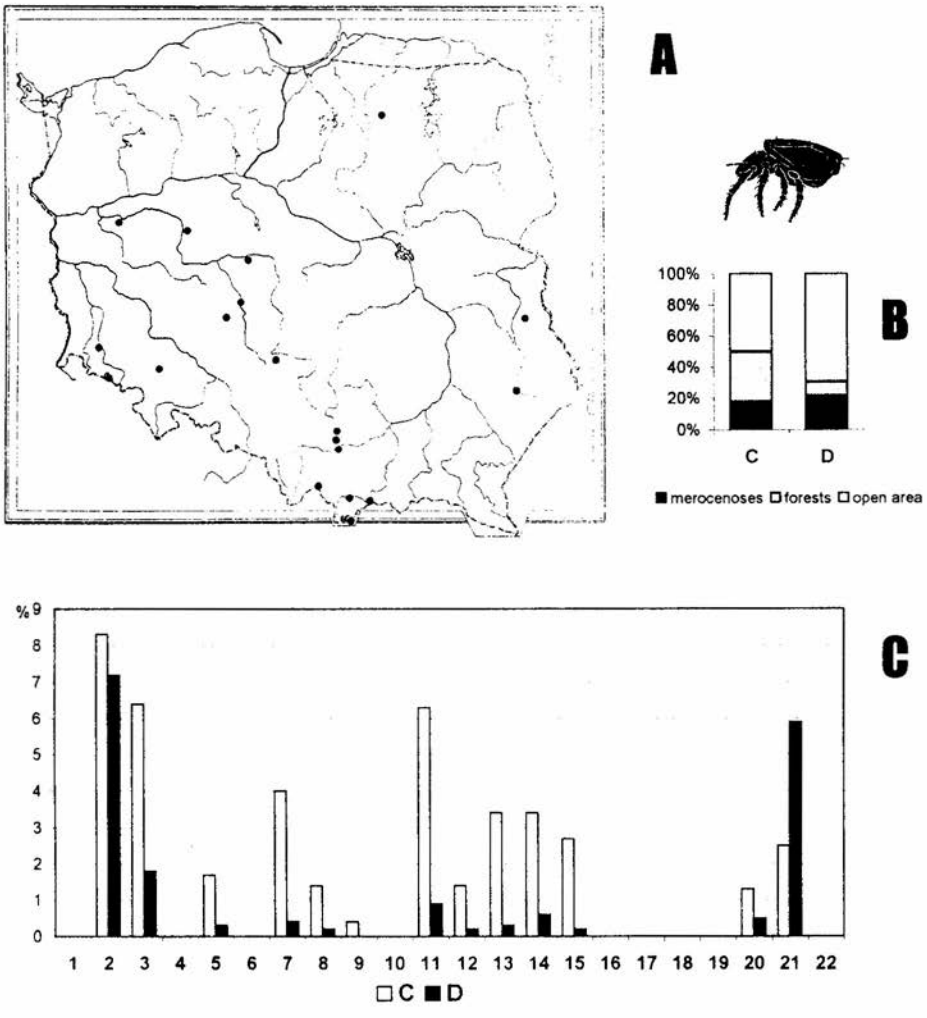


Fig. 114. *Camisia horrida* (HERMANN): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Camisia invenusta (MICHAEL, 1888)
Camisia lapponica (TRÄAGÄARDH, 1910)
Camisia tatrica OLSZANOWSKI, 1994

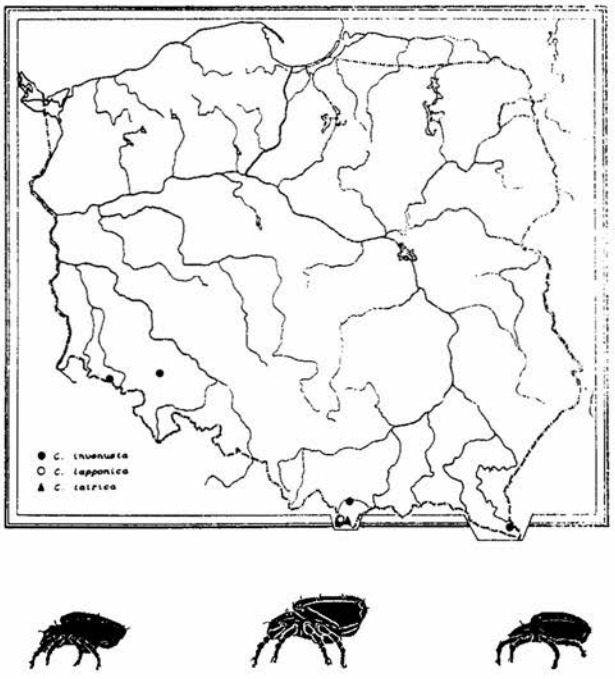


Fig. 115. Camisia *invenusta* (MICHAEL), *C. lapponica* (TRÄGÄRDH) and *C. tatrica* OLSZANOWSKI - distribution in Poland.

Camisia segnis (HERMANN, 1804)

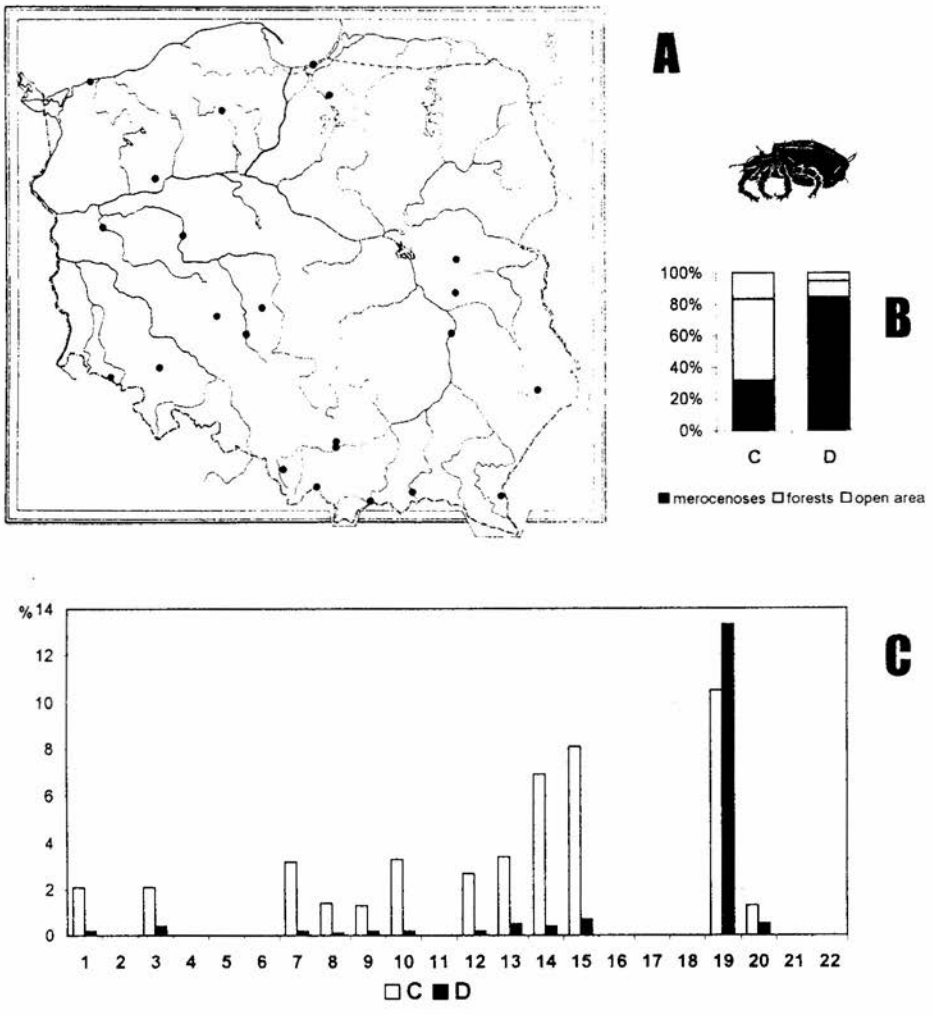


Fig. 116. *Camisia segnis* (HERMANN): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Camisia solhoeyi COLLOFF, 1993

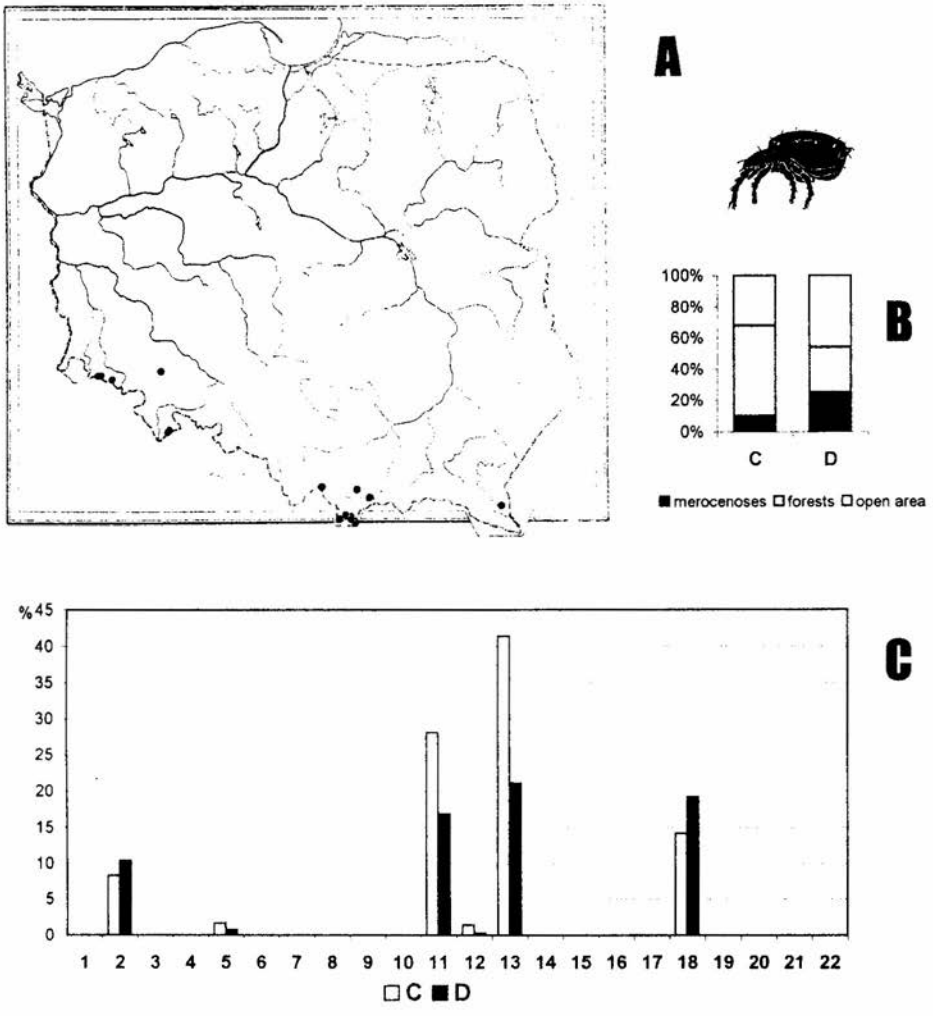


Fig. 117. *Camisia solhoeyi* COLLOFF: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Camisia spinifer (C.L. Koch, 1835)

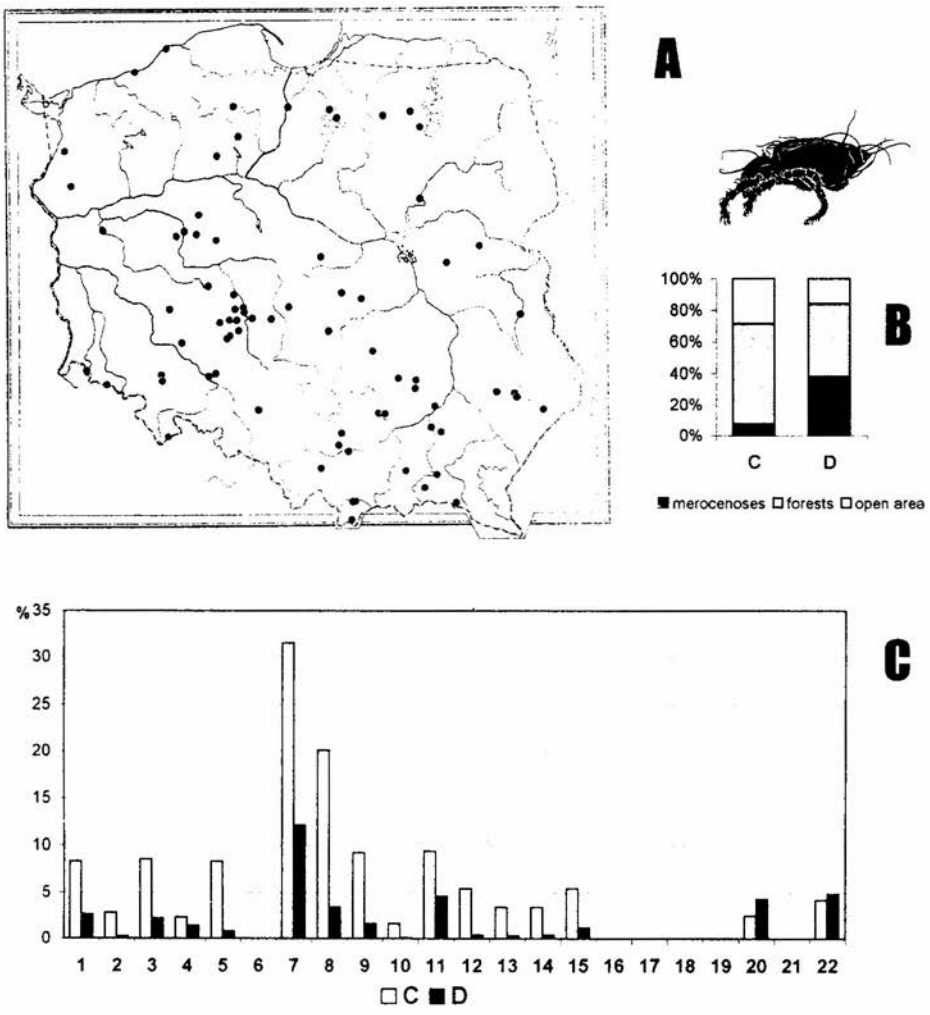


Fig. 118. *Camisia spinifer* (C.L. Koch): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Heminothrus capillatus (BERLESE, 1914)

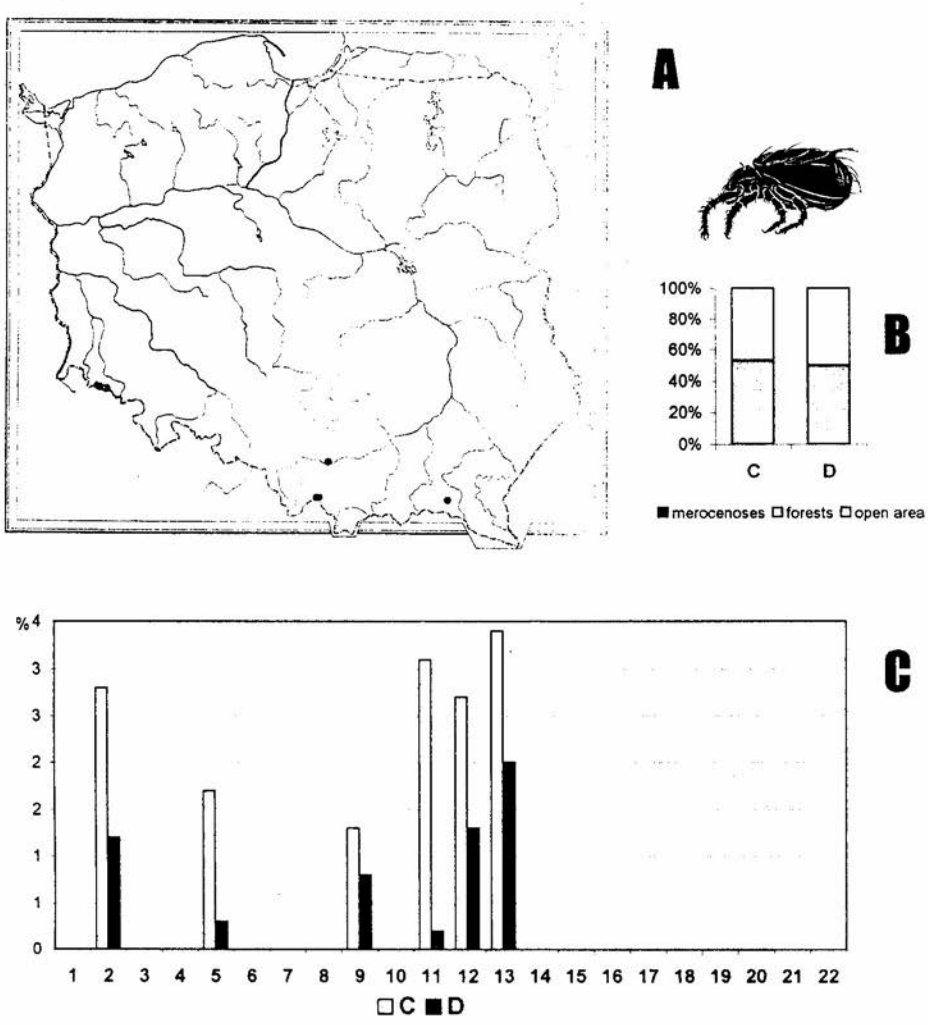


Fig. 119. *Heminothrus capillatus* (BERLESE): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Heminothrus humicolus (FORSSLUND, 1955)

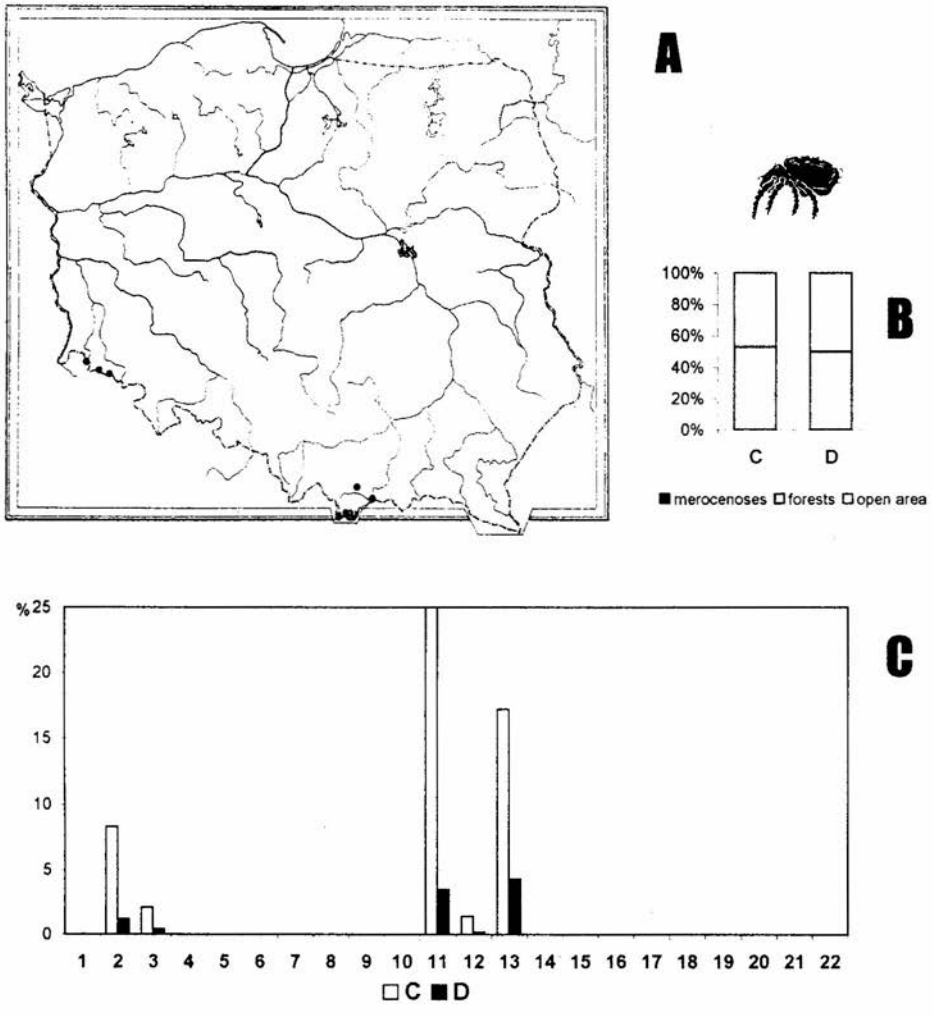


Fig. 120. *Heminothrus humicolus* (FORSSLUND): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Heminothrus longisetosus WILLMANN, 1925

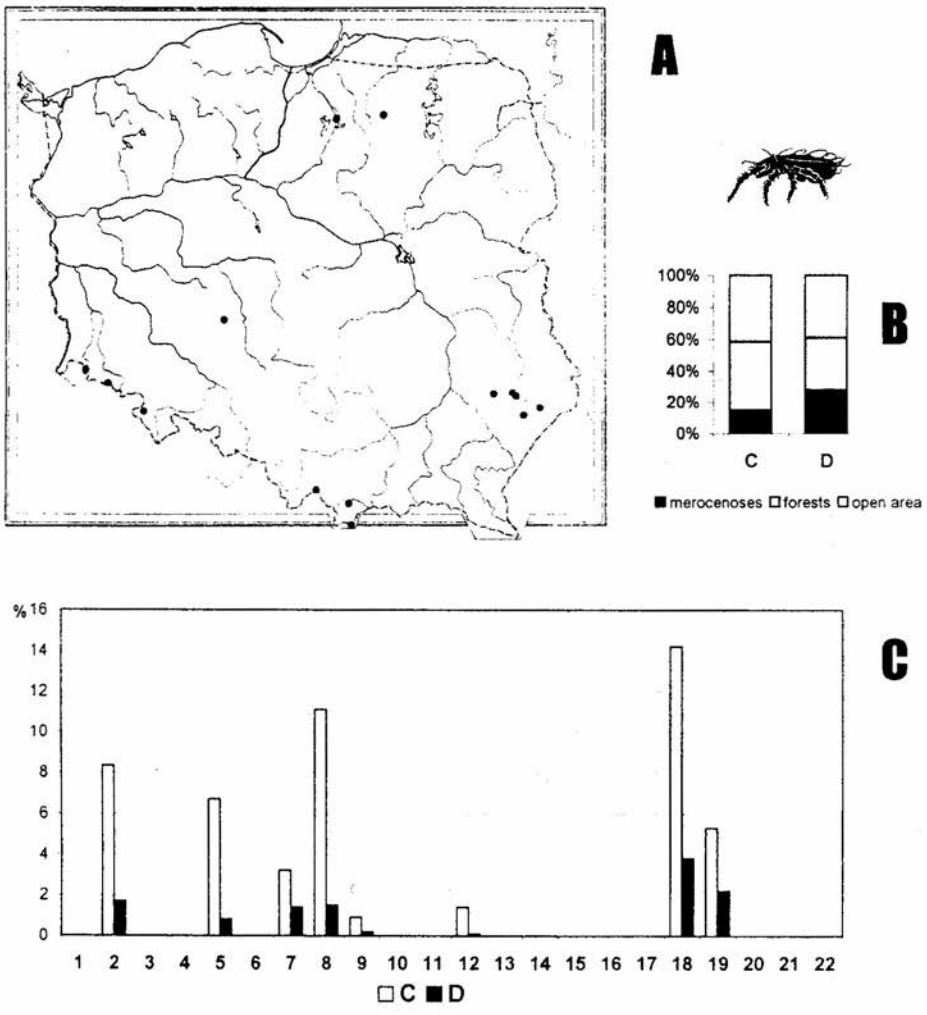


Fig. 121. *Heminothrus longisetosus* WILMANN: A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Heminothrus peltifer (C.L. Koch, 1839)

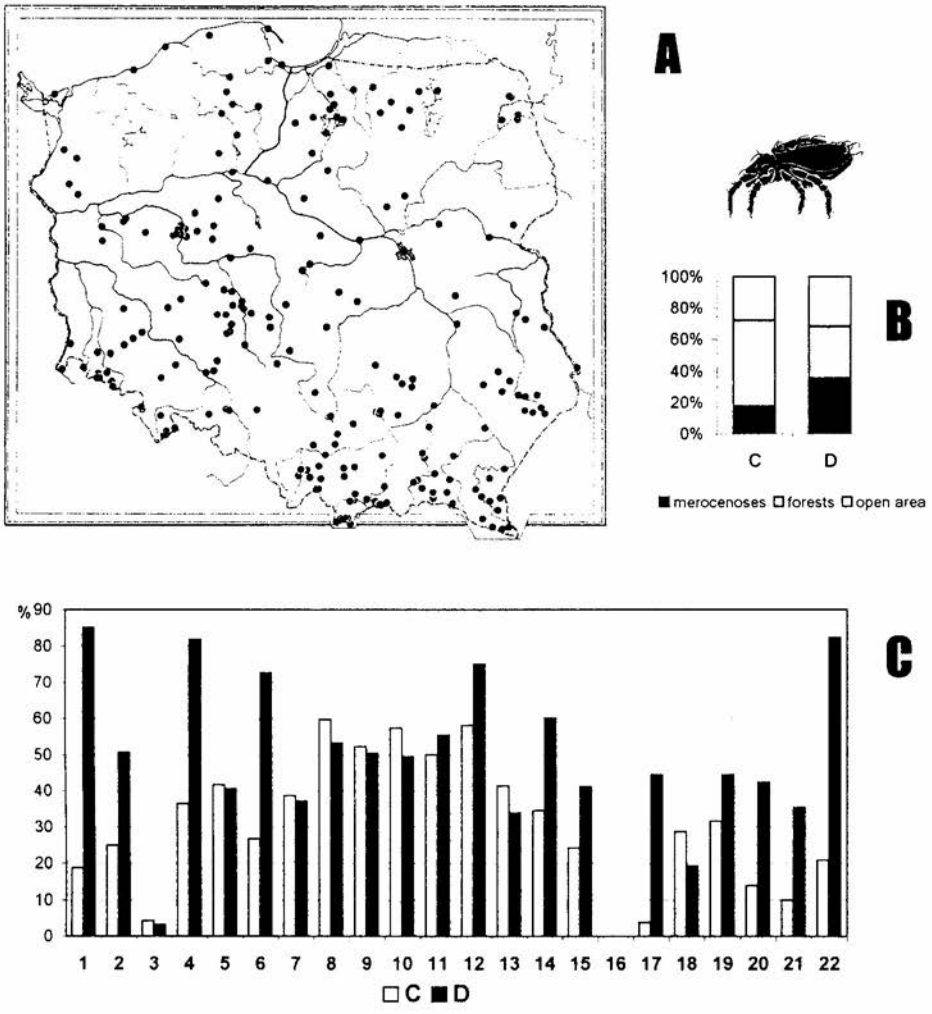


Fig. 122. *Heminothrus peltifer* (C.L. Koch): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Heminothrus targionii (BERLESE, 1885)

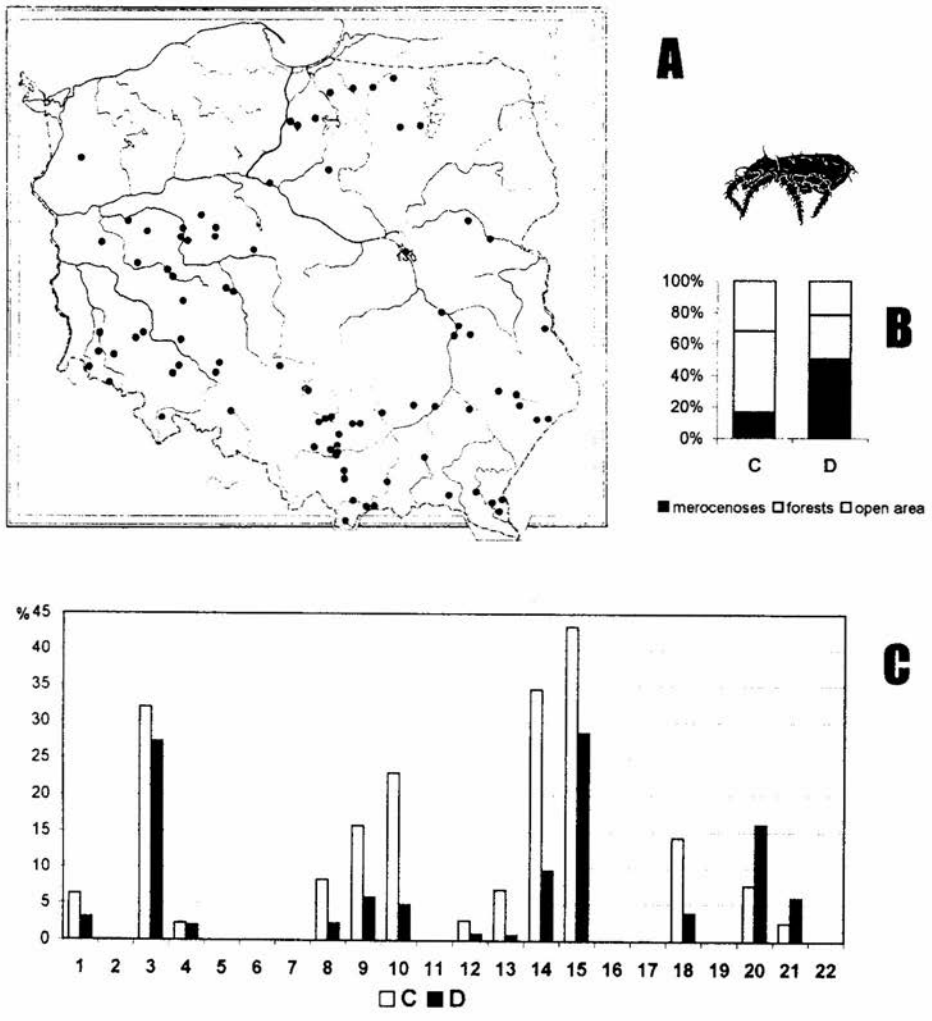


Fig. 123. *Heminothrus targionii* (BERLESE): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

Heminothrus thori (BERLESE, 1904)

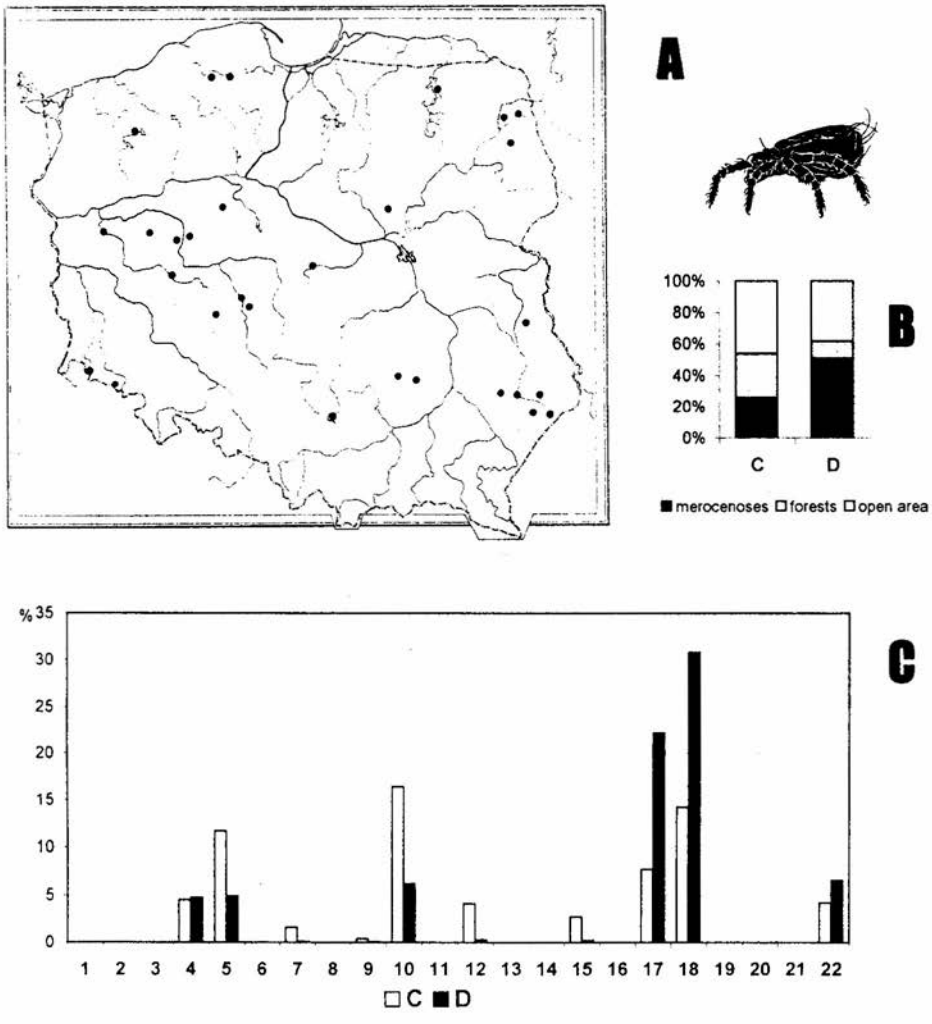
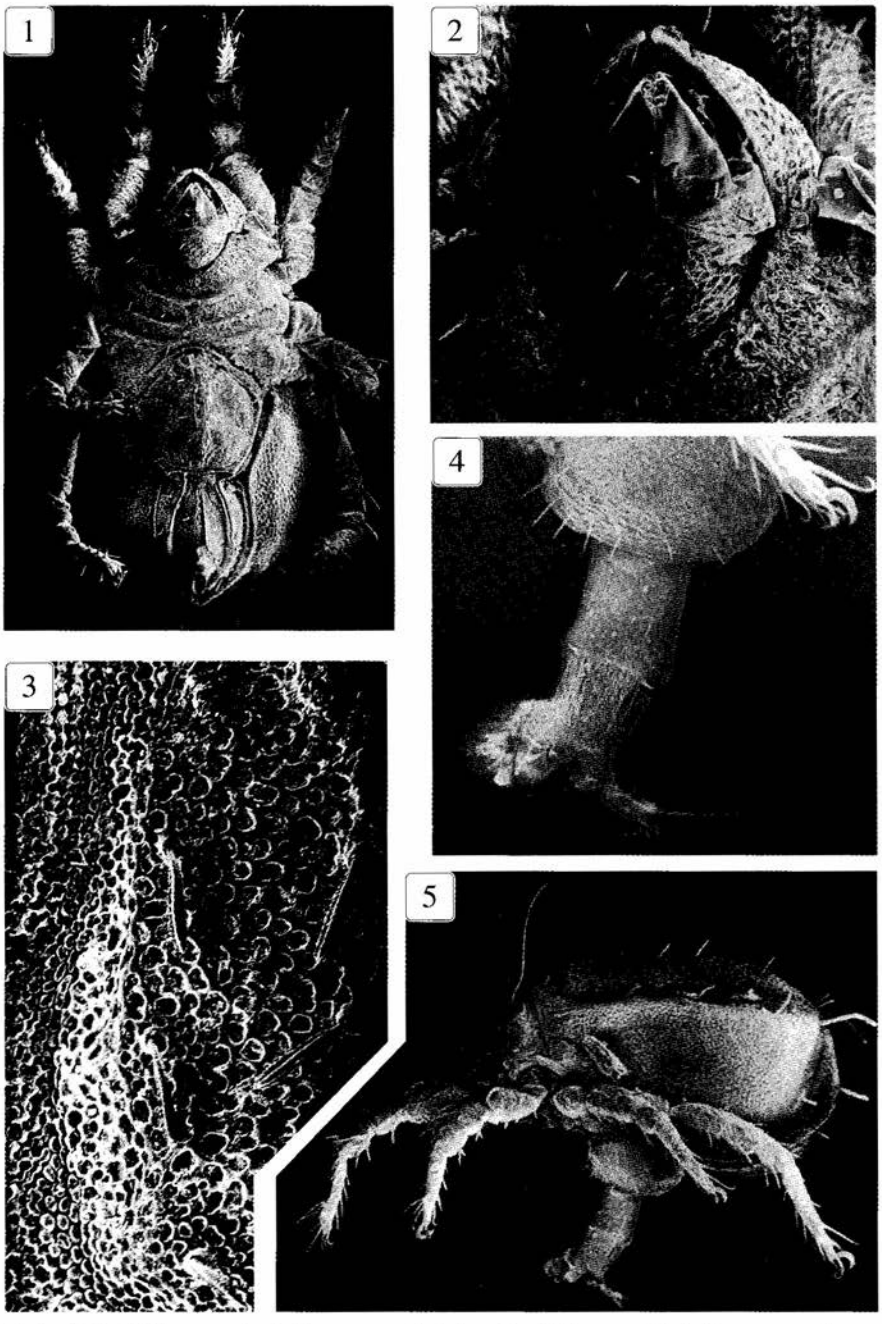
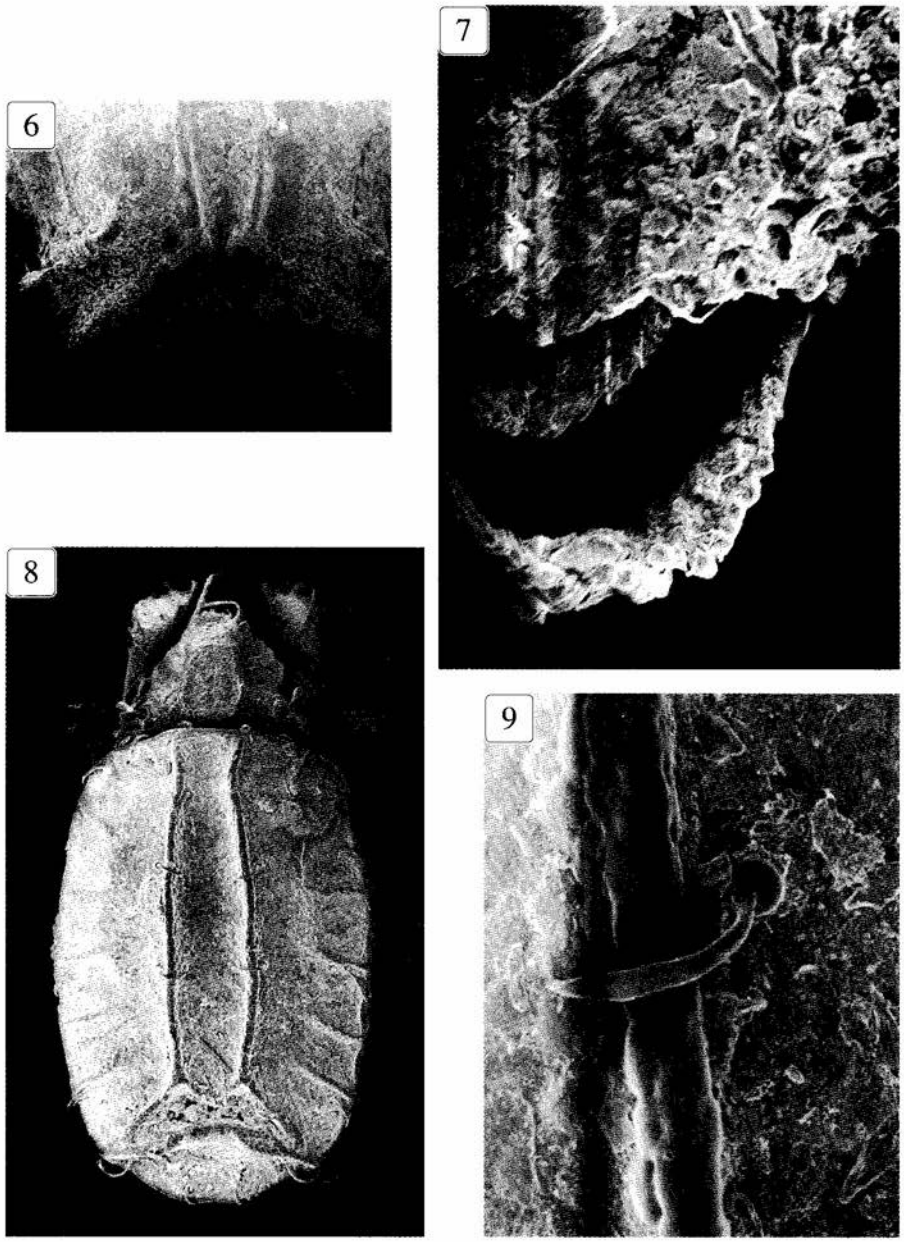


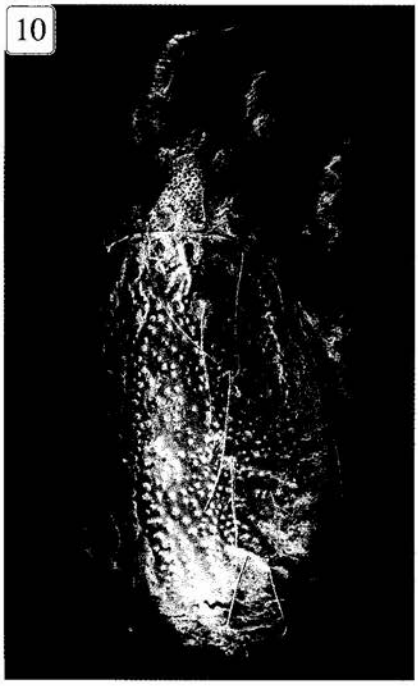
Fig. 124. *Heminothrus thori* (BERLESE): A - distribution in Poland; B - ratio of values of the constancy of occurrence (C) and dominance (D) in general types of habitats; C - values of the constancy of occurrence (C) and dominance (D) determined for particular types of habitats. For lettering see Fig. 107.

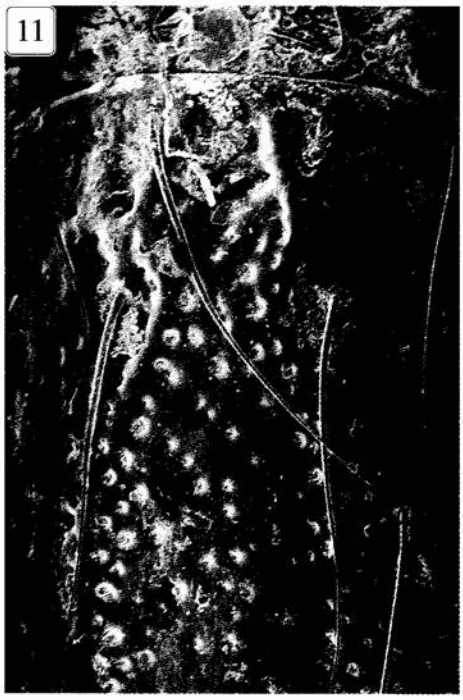


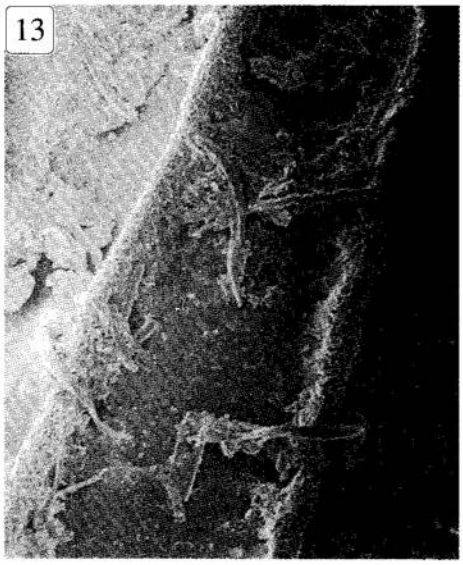
Phot. 1 - 5: 1 - *Nothrus pratensis* SELLNICK, ventral view; 2 - *Nothrus pratensis* SELLNICK, gnathosoma, ventral view; 3 - *Nothrus anauniensis* CANESTRINI et FANZAGO, microsculpture of notogaster, dorsal view; 4 - *Nothrus silvestris* NICOLET, ovipositor, lateral view; 5 - *Nothrus silvestris* NICOLET, lateral view.



Phot. 6 - 9: 6 - *Camisia horrida* (HERMANN), posterior part of notogaster, dorsal view; 7 - *Camisia horrida* (HERMANN), setae *h2* and *h3*, dorsal view; 8 - *Camisia solhoeyi* COLLOFF, dorsal view; 9 - *Camisia solhoeyi* COLLOFF, seta *d2*, dorsal view.







Phot. 10 - 13: 10 - *Heminothrus capillatus* (BERLESE), dorsal view; 11 - *Heminothrus capillatus* (BERLESE), microsculpture of notogaster, dorsal view; 11 - *Heminothrus humicolus* FORSSLUND, dorsal view; 12 - *Heminothrus humicolus* FORSSLUND, central part of notogaster with pairs of setae *d1* and *d2*, dorsal view.