Bulletin of Insectology ***63*** *(1): 1-11, 2010*
ISSN 1721-8861

Contribution towards the knowledge of bristletails (Microcoryphia Machilidae) of Italy

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Abstract

Four new species: *Charimachilis manfredoniae* sp. nov., *Lepismachilis rosannae* sp. nov., *Lepismachilis cividalis* sp. nov. and *Lepismachilis montana* sp. nov. of the family Machilidae (Microcoryphia) are described from Italy. Keys to all known species and subspecies of the genus *Charimachilis* Wygodzinsky and subgenus *Lepismachilis* (*Berlesilis*) Verhoeff are given. There are new data on the distribution in Italy of species *Trigoniophthalmus alternatus* (Silvestri).

Key words: Machilidae, *Charimachilis*, *Lepismachilis*, new species.

Introduction

Nowadays, the fauna of the Microcoryphia Machilidae of Italy is studied poorly and includes about 51 species from 9 genera: *Charimachilis* Wygodzinsky 1939 (4 species), *Dilta* Strand 1911 (3 species), *Lepismachilis* Verhoeff 1910 (13 species), *Machilis* Latreille 1932 (20 species), *Praemachilis* Silvestri 1904 (1 species), *Praetrigoniophthalmus* Janetschek 1954 (2 species), *Trigoniophthalmus* Verhoeff 1910 (4 species), *Wigodzinskylis* Janetschek 1954 (1 species), *Petrobius* Leach 1809 (3 species) (Bach de Roca, 1982; Mendes, 1990). The examination of bristletails collected by me during training in Italy at the University of Udine under the Erasmus Mundus program in the spring of 2008 has revealed one new species of the Mediterranean genus *Charimachilis* Wygodzinsky and 3 new species of the predominantly European genus *Lepismachilis* Verhoeff.

Materials and methods

All specimens of bristletails were collected mainly in Northern Italy (Alps) under stones and were preserved in 70% ethanol. Permanent microscope slides were obtained for the type series using the Faure solution.

Results

The holotypes and paratypes, mounted in Faure's solution on permanent microscope slides, and paratypes, preserved in 70% ethanol, are deposited at the Samara Agriculture Academy (Russia).

Charimachilis manfredoniae Kaplin sp. nov.

(figures 1-9)

Material examined

Italy, Puglia: near Manfredonia, bushes and grass steppe, under stones, April 16, 2008, one female, holotype (on slide), nine females (two females on slides), paratypes, leg. V. Kaplin.

Description

Body length 8.5-9.3 mm, width 2.0-2.2 mm; cerci 2.6-2.9 mm; antennae and terminal filament damaged. Body entirely covered with scales. General body color whitish, with hypodermal pigment on the head capsule, mandibles, maxillae, maxillary palpus, legs, caudal filament. Cerci about 0.30 body length, with two apical spines. Antennae, apparently, about 0.75 body length. Distal chains of flagellum with up to 8-10 subdivisions. Subdivisions of chains with 1-2 rows of bristles and 2-3 sensillae.

In ethanol, compound eyes almost black with bluish tint. Ratio of length to width of compound eye 1.03-1.06; ratio of line of contact to length of eyes 0.55-0.60. Paired ocelli sole-shaped, dark brown with white border, 0.10-0.12 x 0.32-0.38 mm. Ocelli 2.9-3.1 times as wide as long. Distance between inner margins of ocelli 0.24-0.28, between their outer margins about 1.0 times total width of eyes. Apical article of maxillary palpus (without apical spine) 0.90-0.98 times as long as the preceding one. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus with 14-17, 12-13 and 5-7 hyaline odontoid spines, respectively. Ultimate article of labial palpus oval-triangular, 2.1-2.3 times as long as wide, with 17-21 sensory cones apically. Mandibles with two distal teeth.

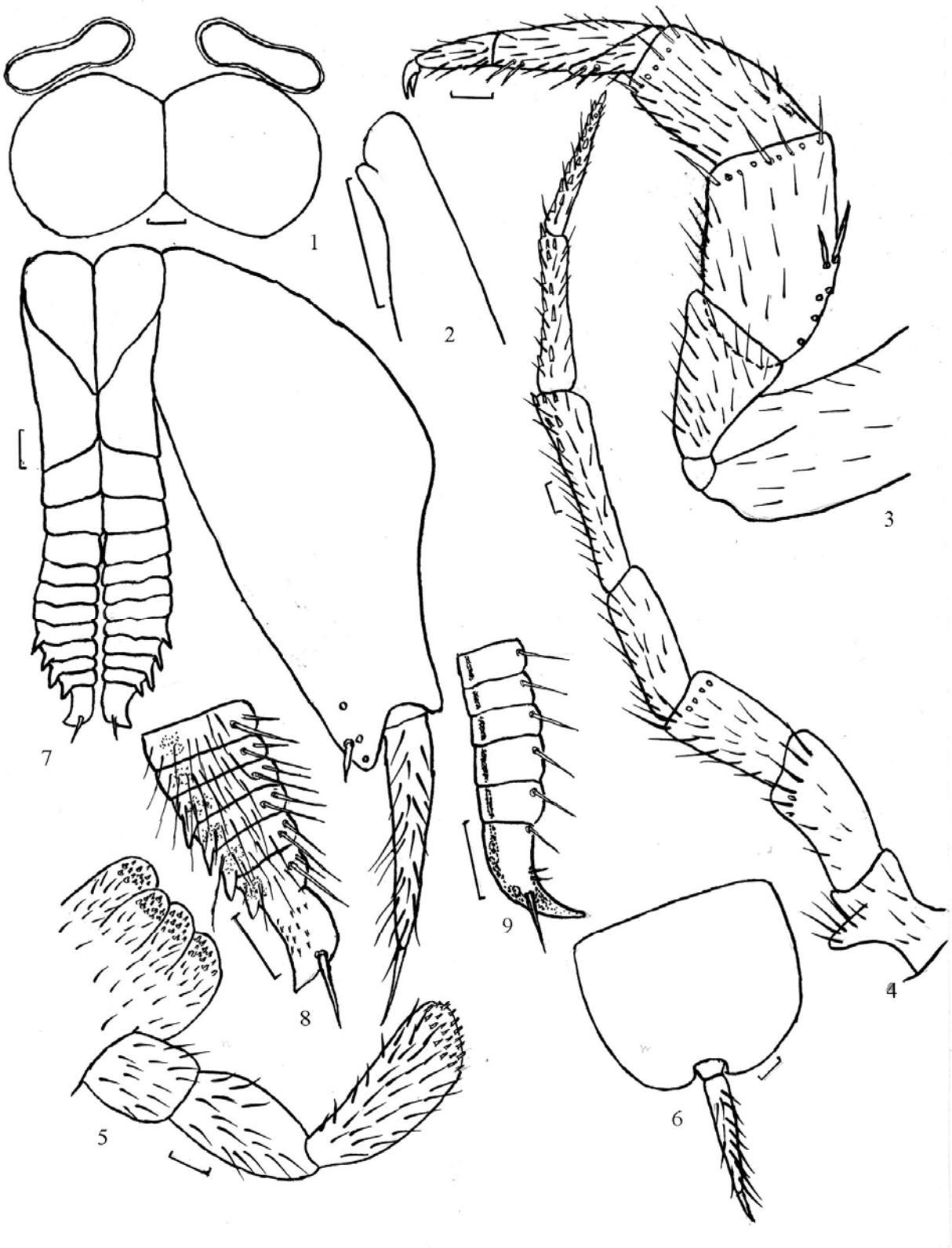
Fore femur slightly thickened. Femur I about 1.60-1.64, femur II about 1.62-1.94, femur III about 1.80-2.13 times as long as it is wide. Dorsal surface of the femur I with 5-6 macrochaetae. Typical spine-like setae absent. Maximum number of strong setae on tibia and on the second articles of the third pairs of legs. The second and third pairs of legs with stylus 0.5-0.6 mm long.

Urites I-VII with 1+1 coxal vesicles. Posterior angle of urosternites II approximately 81-84°, III-VI 71-80°, VII 59-62°. Stylus length (mm) of urites (without apical spines) II-VII 0.30-0.33, VIII 0.42-0.45, IX 0.59-0.66. Ratio of stylus (without spine) to coxite, on urites:

II-VII:	0.43-0.48
VIII:	0.70-0.71
IX:	0.41-0.42

Ratio of apical spine of stylus to stylus (without spine), on urites:

II-VII:	0.48-0.53
VIII:	0.42
IX:	0.35



Figures 1-9. *Charimachilis manfredoniae* Kaplin sp. nov. female, holotype. (1) Eyes and ocelli, front view. (2) Apex of mandible. (3) Fore leg. (4) Maxillary palpus. (5) Labial palpus and labium (part). (6) Abdominal coxite VIII. (7) Abdominal coxite IX with anterior gonapophyses. (8) Apical articles of anterior gonapophysis. (9) Apical articles of posterior gonapophysis. Scale: 0.1 mm.

Key to the species of the genus *Charimachilis* Wygodzinsky 1939, based on that of Janetschek (1957), Stach (1958), Mendes (1980)

1 (2) - The divisions of the ovipositor clothed with short setae only, posterior edge of the apical division of the anterior gonapophyses rounded. Greece (Corfù), Italy (Lecce) . . . . . *C. orientalis* (Silvestri 1908)

2 (1) - Some of the divisions of the ovipositor furnished with some long hairs, posterior edge of the apical division of the anterior gonapophyses more or less pointed with one or two apical projections.

3 (4) - Terminal divisions of the gonapophyses of the VIII abdominal urite without spines on the outer edge The apical division of the anterior gonapophyses with two well-developed apical teeth. Abdominal coxites IX with 9-11+9-11 inner lateral macrochaetae. Israel (Palestine) . . . . . *C. palaestinensis* Wygodzinsky 1939

4 (3) - 3-6 terminal divisions of the anterior gonapophyses with spines on the outer edge. Abdominal coxites IX with 2-7+2-7 inner lateral macrochaetae.

5 (6) - Anterior gonapophyses of ovipositor 20-divided, posterior gonapophyses of ovipositor 18-divided. Greece (Leonidion) . . . . . *C. dentata* Wygodzinsky 1941

6 (5) - Anterior gonapophyses of ovipositor 13-18-divided, posterior gonapophyses of ovipositor 12-17-divided.

7 (10) - Anterior gonapophyses of ovipositor 18-divided, posterior gonapophyses of ovipositor 17-divided. Abdominal coxites IX with 6-7+6-7 macrochaetae on the inner edge and 1-2+1-2 macrochaetae on the outer edge. 3-4 terminal divisions of the anterior gonapophyses with spines on the outer edge.

8 (9) - Ratio of length to width of eyes 0.70; ratio of line of contact to length of eyes 0.60. Ratio of stylus to coxite on urite VIII, 0.60, on urite IX, 0.53. Bulgaria (near Varna) . . . . . *C. armata* Stach 1958

9 (8) - Ratio of length to width of eyes 0.82; ratio of line of contact to length of eyes 0.40. Ratio of stylus to coxite on urite VIII 0.90, on urite IX 0.75. Ukraine (near Kiev) . . . . . *C. ukrainensis* Stach 1958

10 (7) - Anterior gonapophyses of ovipositor 13-15-divided, posterior gonapophyses of ovipositor 12-14-divided. Abdominal coxites IX with 3-4+3-4 macrochaetae on the inner edge, without macrochaetae on the outer edge.

11 (14) - Anterior gonapophyses of ovipositor 15-divided. Five or six terminal divisions of the anterior gonapophyses with a spine on the outer edge. Femur of foreleg with 3 dorsal macrochaetae. Mandibles with four teeth apically.

12 (13) - The apical article of the anterior gonapophyses with two well-developped sclerotized apical teeth. Apical article of maxillary palpus 1.2-1.4 times as long as the preceding one. Ratio of stylus to coxite on urite VIII 0.67, on urite IX 0.55. Russia, Caucases (near Adler) . . . . . *C. caucasicus* Kaplin 1999

13 (12) - The apical division of the anterior gonapophyses with two weakly-developped hyaline apical projections. Apical article of maxillary palpus is slightly shorter than the preceding one. Ratio of stylus to coxite on urite VIII 0.55, on urite IX 0.45. Turkey (near Bursa) . . . . . *C. wahrmani* Wygodzinsky 1959

14 (11) - Anterior gonapophyses of ovipositor 13-14-divided. Three or four terminal divisions of the anterior gonapophyses with a spine on the outer edge. Femur of foreleg with 4-7 dorsal macrochaetae. Mandibles with two or four teeth apically.

15 (16) - Mandibles with two apical teeth. Apical article of maxillary palpus shorter than the preceding one. Femur of foreleg with 5-6 dorsal macrochaetae. The last division of the anterior gonapophyses beak-shaped apically. Ratio of length to width of eyes 1.03-1.06. Italy (near Manfredonia) . . . . . *C. manfredoniae* Kaplin sp. nov.

16 (15) - Mandibles with four apical teeth. Apical article of maxillary palpus longer than the preceding one.

17 (18) - Ratio of line of contact to length of eyes 0.75. Apical article of maxillary palpus with 22-28 hyalin odontoid chaetae dorsally. Italy (Sicilia) . . . . . *C. egatensis* Bach 1982

18 (17) - Ratio of line of contact to length of eyes 0.50-0.62. Apical article of maxillary palpus with 14-20 hyalin odontoid chaetae dorsally.

19 (20) - Apical margin of the gonapophyses of the VIII abdominal urite with two blunt teeth. Paired ocelli with the lateral margin more enlarged than the median one. Ratio of length to width of eyes 0.86. Malta . . . . . *C. melitensis* Stach 1958

20 (19) - Apical margin of the gonapophyses of the VIII urite more or less rounded with one apical projection. Paired ocelli with the median margin more enlarged than the lateral one.

21 (22) - Ratio of length to width of eyes 0.93-0.96. Austria (Stubaier, Alps). Dalmatien . . . *C. relicta relicta* Janetschek 1954

22 (21) - Ratio of length to width of eyes 1.04.

23 (24) - Dorsal surface of the femur I with 5-7 macrochaetae. Paired ocelli dark, brownish black. Greece (Crete) . . . . . *C. relicta insularis* Janetschek 1954

24 (23) - Dorsal surface of the femur I with 4 macrochaetae. Paired ocelli light, brownish red. Greece . . . . . *C. relicta meridionalis* Janetschek 1957

Thoracic tergites, abdominal tergites I-IV and X, urosternites, abdominal coxites I-VIII without macrochaetae; abdominal tergites V-VI with 0-1+0-1, VII with 0-3+0-3, VIII with 0-4+0-4, IX with 3+3 sublateral macrochaetae; coxites IX with 3-4+3-4 inner lateral macrochaetae.

Ovipositor of primary type (Sturm and Bach de Rocha, 1993), sclerotized, swollen, entirely concealed by coxites of urite IX, with structure characteristic of the genus *Charimachilis*, 1.3-1.5 mm long; not reaching apices of coxites IX at distance 0.5-1.0 of its own thickness. Anterior gonapophyses with 1+12, posterior gonapophyses with 1+11-12 divisions. Posterior gonapophyses with well-developed chitinized apical horn, anterior ones with one sclerotized beakshaped apical projection and 3-4 rather large lateral spines. Apical divisions of anterior and posterior gonapophyses with preapical needles and minute sensory rods. Distal needles as long as 0.9 apical divisions of gonapophyses. All divisions of gonapophyses, except for the first and last one with 2-4 long hair-like setae.

Differential diagnosis

Charimachilis manfredoniae sp. nov. is most closely related to *C. relicta* Janetschek and can be distinguished from *C. relicta* by the mandibles with two teeth apically and apical segment of maxillary palpus shorter than the preceding one.

Etymology

The new species is named after the geographical origin of the holotype.

Discussion

Now in the genus *Charimachilis* 8-11 species are described. Paclt (1960) considers that the species *C. dentata* Wygodzinsky is a synonym of *C. orientalis* (Silvestri). According to different authors, the species *C. relicta* Janetschek includes 3-5 subspecies. Janetschek (1957) the species *C. relicta* has been divided into three subspecies: *C. r. relicta*, *C. r. meridionalis*, *C. r. insularis*. Mendes (1980) the species *C. melitensis* Stach also considers as the subspecies *C. r. melitensis* (Stach). Bach de Rocha (1982) has described from Italy the subspecies *C. r. egatensis* Bach. In the genera of the family Machilidae the species rather well differ mainly on a structure of males. The majority of species and subspecies of the genus *Charimachilis* are described females, which makes their classification difficult. Males are described only in one species *C. caucasicus* Kaplin (Kaplin, 1999). Janetschek (1957) gives the erroneous description of a structure of male *C. r. insularis*, corresponding apparently to a male of the genus *Lepismachilis*. In agreement our point of view, *C. melitensis* represents a species on a structure of ovipositor and eyes. Ratio of length to width of eyes *C. melitensis*, 0.86; *C. relicta*, 0.93-1.04. Apical margin of the gonapophyses of the VIII urite of *C. melitensis* with two blunt teeth, *C. relicta* more or less rounded without apical teeth. *C. egatensis* Bach n. comb. differs from *C. relicta* on the structure of the eyes, maxillary and labial palpus. Ratio of line of contact to length of eyes *C. egatensis*, 0.75; *C. relicta*, 0.5-0.6. Apical article of maxillary palpus *C. egatensis* with 22-28, *C. relicta* 15-18 hyalin odontoid chaetae dorsally. Ultimate article of labial palpus *C. egatensis* 2.2-2.3, *C. relicta* 1.8-2.0 times as long as wide.

***Lepismachilis* (*Berlesilis*) *rosannae* Kaplin sp. nov.**

(figures 10-19)

Material examined

Italy, Friuli-Venezia Giulia: near Trieste, gramineous oak-pine mixed wood, under the bark of fallen dead off trees, under stones, March 16, 2008, one male, holotype (on slide), six males, thirteen females (one female on slide), paratypes, leg. V. Kaplin.

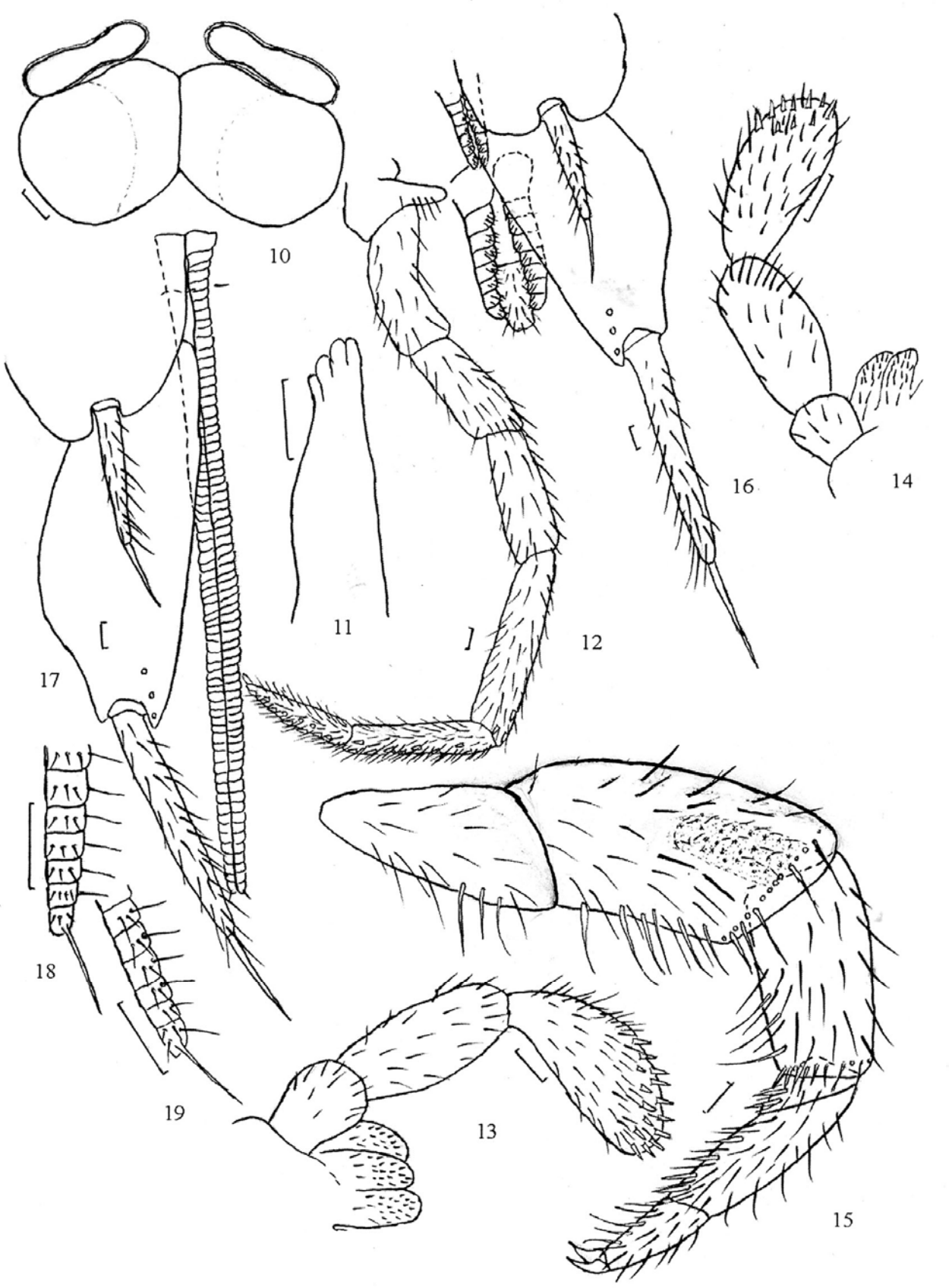
Description

Body length of male, 9.0-10.3 mm; of female, 9.5-11.0 mm, width 2.0-2.2 mm; cerci: 3.3-3.5 mm; antennae and terminal filament damaged. Body entirely covered with scales. General body color yellowish, with violet hypodermal pigment the most intensive on a head capsule, frons, around eyes, ocelli, in the bases of scapus, in the basic part of mandibles, on the first segmenf of maxillary palpus, coxas. Antennae a little shorter than body length. Distal chains of flagellum with up to 8-10 (male) or 11-13 (female) subdivisions. Subdivisions of chains with 2 rows of bristles and 1-2 rosette-shaped sensillae. The basis of scapus and pedicellus of males and females with a small fields containing about 10-20 small sensory conic setae. Cerci about 0.32-0.36 body length.

In ethanol, colour of compound eyes from grey near a line of contact and in a forward part to dark in a lateral and back part. Ratio of length to width of compound eye 1.03-1.10; ratio of line of contact to length of eyes 0.50-0.58. Paired ocelli sole-shaped, dark with narrow white border, 0.12-0.15 x 0.35-0.40 mm. Ocelli 3.2-3.6 times as wide, as long. Distance between inner margins of ocelli 0.14-0.19, that between outer margins of ocelli about 0.95-0.98 times total width of eyes. Clypeus, maxillary and labial palpus, legs of male and female without long hair-like setae. Apical article of maxillary palpus (without apical spine) 0.94-0.96 (female) or about 0.78 (male) times as long as the preceding one. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus with 11-12, 7-9 and 2-3 hyaline odontoid spines, respectively. Ultimate article of labial palpus oval-triangular, 2.2-2.4 times as long as wide. Mandibles with four distal teeth.

Fore femur of female and especially male widened. Femur I of male about 1.7-1.8, female 1.9; femur II of male 2.0, female 2.2-2.3; femur III of male 2.1, female 2.3-2.4 times as long as it is wide. Fore femur of male with opened sensory field, contacting to the distal row of strong setae. Sensory field includes about 20-28 rosette-shaped sensillae. The metric relations found in the sensory field and femur are as follows:

LF/WF:	1.70-1.80
LSF/WSF:	2.0-2.1
LSF/LF:	0.38-0.44
WSF/WF:	0.33-0.36
d/LF:	0.55-0.56
d/LSF:	1.42-1.43
d/WSF:	2.77-2.87



Figures 10-19. *Lepismachilis* (*Berlesilis*) *rosannae* Kaplin sp. nov. (10-13, 15, 16) Male, holotype. (14, 17-19) Female, paratype. (10) Eyes and ocelli, front view. (11) Apex of mandible. (12) Maxillary palpus. (13) Labial palpus and labium (part) of male. (14) Labial palpus and labium (part) of female. (15) Fore leg. (16) Abdominal coxites VIII and IX of male, with parameres and penis. (17) Abdominal coxites VIII and IX of female, with anterior gonapophyses. (18) Apical divisions of anterior gonapophysis. (19) Apical divisions of posterior gonapophysis. Scale: 0.1 mm.

Key to the species of the subgenus *Lepismachilis* (*Berlesilis*) Verhoeff 1910

1 (2) - 2+2 coxale vesicles on the urites II-V . . . . . subgenus *Lepismachilis*

2 (1) - 2+2 coxale vesicles on the abdominal urites II-VI. Fore femur of males with opened sensory field, contacting to the distal row of strong setae . . . . . subgenus *Berlesilis*

3 (4) - Ratio of stylus (without spine) to coxite on urite VIII 0.80 (male), 0.94 (female); on urite IX 1.07 (male), 0.90 (female). Clypeus, II-VII articles of maxillary palpus and legs of males with numerous long ciliate setae. Ratio of basal portion of penis to apical portion about 2.2-2.4. Spain, France, Italy, Corsica, Serbia, Bulgaria, Romania . . . . . *L.* (*B.*) *targionii* (Silvestri 1904)

4 (3) - Ratio of stylus (without spine) to coxite on urite VIII less than 0.80, on urite IX less than 0.90. Clypeus, II-VII articles of maxillary palpus and legs of males without numerous long ciliate setae. Ratio of basal portion of penis to apical portion about 1.2-1.3.

5 (6) - Ratio of length to width of eye about 1.05. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus with 11-12, 7-9 and 2-3 hyaline odontoid spines, respectively. Cerci 0.32-0.36 body length. LSF/WSF about 2.0-2.1. Male with anterior parameres 1+5-6-divided, posterior parameres 1+7-divided. Italy . . . . . *L.* (*B.*) *rosannae* sp.nov.

6 (5) - Ratio of length to width of eye about 0.83. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus with 16-19, 16-17 and 10 hyaline odontoid spines, respectively. Cerci about body length. Sensory field of fore femur narrow, LSF/WSF about 4.58. Male with anterior parameres 1+7-8-divided, posterior parameres 1+8-divided. Balearic Islands . . . . . *L.* (*B.*) *affinis* Gaju, Bach et Molero 1993

LF: length of femur, WF: width of femur, LSF: length of sensorial field, WSF: width of sensorial field, d: distance between the border of the sensorial field and the basis of the femur. Number of spine-like setae of tibiae: tibia I, female, 1, male 0; tibia II, female and male, 1; tibia III, female and male, 2-4. Number of spine-like setae of tarsi: tarsi I, female, 1+2+0, male, (2-4)+(2-3)+0; tarsi II, female, (5-6)+(5-7)+0, male, (3-4)+(4-5)+0; tarsi III, female, 3+(7-9)+0, male (3-4)+(4-5)+0. The second and third pair of legs with stylus 0.65-0.68 mm long.

Urites I,VII with 1+1 coxal vesicles, II-VI with 2+2 coxal vesicles. Posterior angle of urosternites II-III approximately 86-93°, IV-VI 78-83°, VII 92-102°, VIII (male) about 140°. Stylus length (mm) of urites (without apical spines) II-VII 0.38-0.43 (male), 0.39-0.44 (female); VIII 0.46 (male), 0.53 (female); IX 0.91 (male), 1.06 (female). Ratio of stylus (without spine) to coxite, on urites:

	male	female
II:	0.55	0.55
III:	0.50	0.52
IV-VI:	0.45-0.48	0.45-0.48
VII:	0.46	0.50
VIII:	0.54	0.75
IX:	0.78	0.69

Ratio of apical spine of stylus to stylus (without spine), on urites:

	male	female
II:	0.39	0.42
III:	0.46	0.48
IV-VIII:	0.51-0.55	0.56-0.58
IX:	0.38	0.45

Ratio of sternite to coxite, on urites:

	male	female
II:	0.52	0.58
III:	0.56	0.58
IV-VI:	0.58-0.61	0.64-0.67
VII:	0.52	0.50
VIII:	0.21	-

Thoracic tergites, abdominal tergites I-III, urosternites, abdominal coxites I-VIII without macrochaetae; abdominal tergites IV-VI with 1-2+1-2, VII-VIII with 2-3+2-3, IX with 3-5+3-5, X with 1-2+1-2 sublateral macrochaetae; coxites IX with 2-3+2-3 inner lateral macrochaetae.

Ovipositor of tertiary type (Sturm and Bach de Roca, 1993), slender, elongate, surpassing apices of styli IX by about the length of the latter. Anterior and posterior gonapophyses with 69-71 divisions. Basal 9-10 divisions of anterior and posterior gonapophyses glabrous. Terminal colorless needles on anterior and posterior gonapophyses not longer than four apical divisions taken together.

Male genitalia with parameres on abdominal urites VIII and IX. Anterior parameres 1+5-6-divided, posterior parameres 1+7-divided. Penis and parameres entirely concealed by coxites of urite IX. Penis surpassing apices of parameres IX by about 0.4 the width of its apical portion, not attaining level of apices of coxites IX by about 0.3 mm. Ratio of basal portion of penis to apical portion 1.21.

Differential diagnosis

Lepismachilis rosannae sp. nov. belongs to the subgenus *Berlesilis* Verhoeff with 2+2 coxal vesicles on male and female abdominal coxites II-VI. *L. rosannae* sp. nov. and is most similar in structure to *L. affinis* Gaju, Bach et Molero 1993, which described, unfortunately, only on males (Gaju-Ricart *et al*., 1993). *L. rosannae* sp. nov. males differ from those of *L. affinis* in the structure of compound eyes, maxillary palpus, cerci, sensory field of fore femur, parameres. Ratio of length to width of compound eye in *L. rosannae* sp. nov. about 1.05, *L. affinis* about 0.83. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus in *L. rosannae* sp. nov. with 11-12, 7-9 and 2-3, *L. affinis* with 16-19, 16-17 and 10 hyaline odontoid spines, respectively. Cerci *L. rosannae* sp. nov. about 0.32-0.36, *L. affinis* 0.58 body length.

LSF/WSF *L. rosannae* sp. nov. about 2.0-2.1, *L. affinis* 4.58. Male of *L. rosannae* sp. nov. with anterior parameres 1+5-6-divided, posterior parameres 1+7-divided, *L. affinis* with anterior parameres 1+7-8-divided, posterior parameres 1+8-divided.

Etymology

The new species is named after my curator in Italy, professor Rosanna Giaquinta from the University of Udine (Faculty of foreign languages and literature).

Discussion

Now in the subgenus *Lepismachilis* (*Berlesilis*) Verhoeff only 3 species are described (Bach de Roca, 1982; Gaju-Ricart *et al*., 1993).

***Lepismachilis* (*Lepismachilis*) *cividalis* Kaplin sp. nov.**

(figures 20-27)

Material examined

Italy, Friuli-Venezia Giulia: near Cividale, chestnut (*Castanea sativa*) wood, under stones, March 25, 2008, one male, holotype (on slide), leg. V. Kaplin.

Description

Body length 12 mm; width 2.5 mm; cerci 4.0 mm; antennae and terminal filament damaged. Body entirely covered with scales. General body color yellowish, with violet hypodermal pigment the most intensive on the head capsule, frons, mandibles, maxilles, maxillary palpus, scapus, pedicellus, coxae, trochanters, femora, around compound eyes, ocelli, the bases of antennae, caudal filament, cerci. Antennae a little shorter than body length. Distal chains of flagellum with up to 7-12 subdivisions. Subdivisions of chains with one row of bristles and 2-3 sensillae. Cerci about 4.0 mm long, or 0.34 body length.

In ethanol, colour of compound eyes dark. Ratio of length to width of compound eye 1.11; ratio of line of contact to length of compound eyes 0.58. Paired ocelli sole-shaped, dark with narrow white border, 0.14 x 0.50 mm. Ocelli 3.6 times as wide as long. Distance between inner margins of ocelli 0.27 times total width of eyes. Clypeus and labrum with comparatively long and dense setae. Apical article of maxillary palpus (without apical spine) 0.82-0.86 times as long as the preceding one. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus with 9-14, 12-14 and 3 hyaline odontoid spines, respectively. IV-VII articles of maxillary palpus with comparatively long and dense ciliate setae. Labial palpus without ciliate setae. Ultimate article of labial palpus oval-triangular, 2.72-2.90 times as long as wide. Mandibles with four distal teeth.

Fore femur widened, with opened sensory field, contacting to the distal row of strong setae. The metric relations found in the sensory field and femur are as follows:

LF/WF:	1.43-1.47
LSF/WSF:	2.91-3.00
LSF/LF:	0.68-0.69
WSF/WF:	0.48-0.50
d/LF:	0.26-0.27
d/LSF:	0.39-0.40
d/WSF:	1.16

Trochanters and femora with comparativly long and dense ciliate setae. Tibiae, first and third articles of tarsi without spine-like setae. Number of spine-like setae on the second article of tarsi: tarsi I, 1; tarsi II, 2-3; tarsi III, 3-4. Spine-like setae are expressed not distinctly. The second and third pair of legs with stylus 0.77-0.82 mm long.

Abdominal urites I, VI-VII with 1+1, II-V with 2+2 coxal vesicles. Posterior angle of sternites II-VI approximately 79-82°, VIII about 130°. Stylus length (mm) of abdominal urites (without apical spines) II-VII 0.49-0.59, VIII 0.63, IX 1.34. Ratio of stylus (without spine) to coxite, on urites:

II-IV:	0.61-0.62
V-VII:	0.50-0.55
VIII:	0.59
IX:	0.88

Ratio of apical spine of stylus to stylus (without spine), on urites:

II-IV:	0.51-0.58
V-VII:	0.64-0.72
VIII:	0.68
IX:	0.37

Ratio of sternite to coxite, on urites:

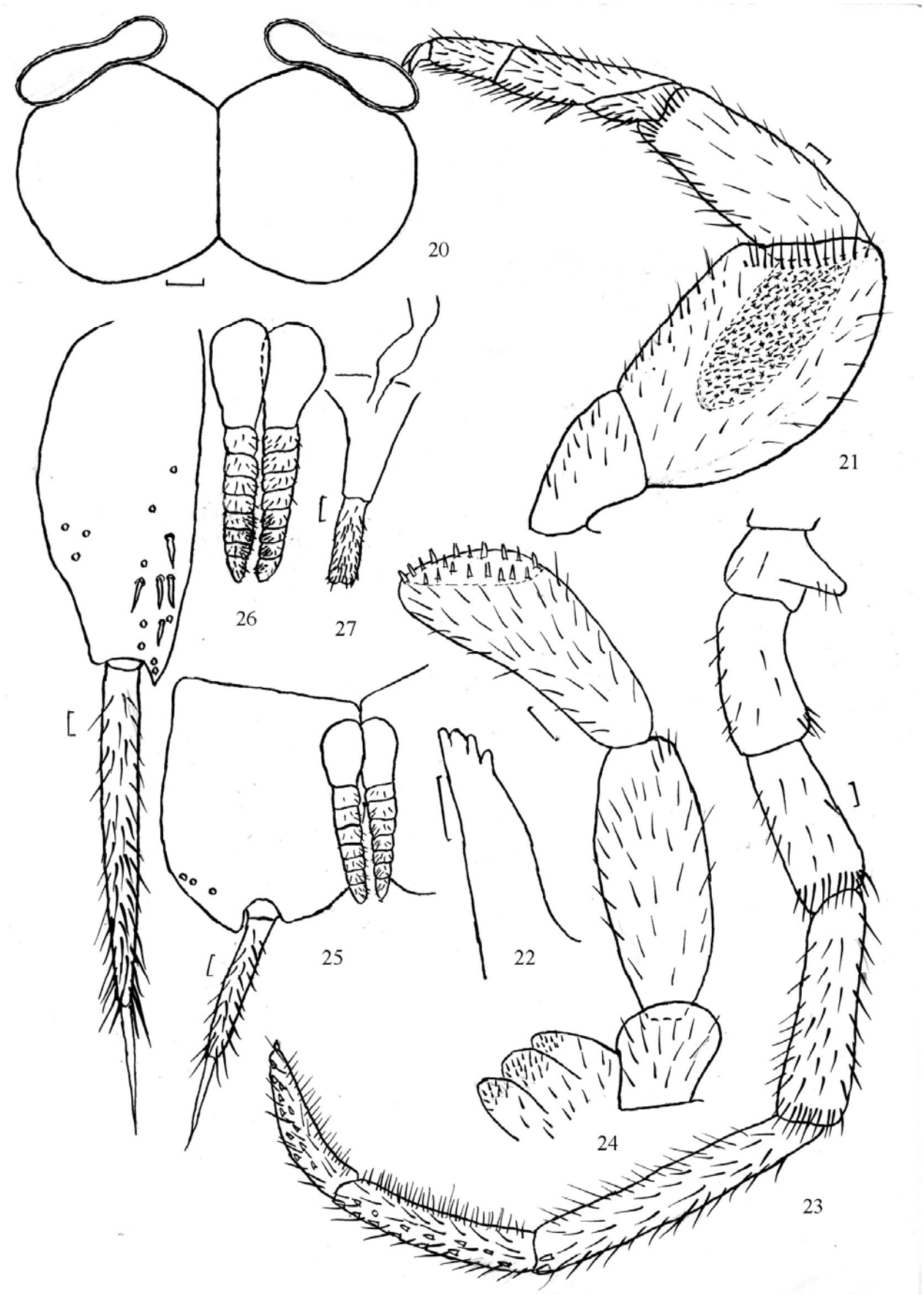
II-VI:	0.56-0.62
VII:	0.47
VIII:	0.17

Thoracic tergites, abdominal tergites I-III, urosternites, abdominal coxites I-IV without macrochaetae; abdominal tergites IV-V with 2-3+2-3, VI-IX with 4+4, X with 3+3; abdominal coxites V-VI with 0-2+0-2, VII with 1-2+1-2, VIII with 1-3+1-3 sublateral macrochaetae; coxites IX with 13-15+13-15 inner and 1-3+1-3 outer lateral macrochaetae.

Male genitalia with parameres on urites VIII and IX. Anterior parameres 1+7-divided, posterior parameres 1+8-divided. Penis and parameres entirely concealed by coxites of urite IX. Posterior parameres not attaining level of apices of coxites IX by about 0.27-0.28 length of parameres. Posterior parameres in 1.38 times as long as anterior parameres. Ratio of basal portion of penis to apical portion 1.30.

Differential diagnosis

Lepismachilis cividalis sp. nov. belongs to the subgenus *Lepismachilis* Verhoeff with 2+2 coxal vesicles on urites II-V. Species of the subgenus *Lepismachilis* s.s. can be divided into four groups on a structure of sensory field on the fore femur of males: inner surface of fore femur without sensory field; sensory field opened, contacting to the distal row of strong setae; sensory field closed, separating from the distal row of strong setae by 1-2 or more than 2 rows of scales (Wygodzinsky, 1950; Mendes, 1981). Sensory field of males *L. cividalis* sp. nov. and also *L.* (*L.*) *notata* Stach 1919 (part), *L.* (*L.*) *cisalpina* Wygodzinsky 1941; *L.* (*L.*) *y-signata* Kratochvil 1945 (part), *L.* (*L.*) *kahmanni* Bitsch 1964; *L.* (*L.*) *hauseri* Bitsch 1974, *L.* (*L.*) *gimnesiana* Mendes 1981 opened, contacting to the distal row of strong setae. *L. cividalis* sp. nov. is most similar in structure to *L.* (*L.*) *gimnesiana. L. cividalis* sp. nov. males differ from those of *L. gimnesiana* in the sizes of body, the structure



Figures 20-27. *Lepismachilis* (*Lepismachilis*) *cividalis* Kaplin sp. nov. male, holotype. (20) Eyes and ocelli, front view. (21) Fore leg. (22) Apex of mandible. (23) Maxillary palpus. (24) Labial palpus and labium (part). (25) Abdominal coxite VIII with anterior parameres. (26) Abdominal coxites IX with posterior parameres. (27) Penis. Scale: 0.1 mm.

of compound eyes, maxillary and labial palpus, sensory field of fore femur, abdominal coxites, parameres. Body length of *L. cividalis* sp. nov. about 12 mm, *L. gimnesiana* 7-8 mm. Ratio of line of contact to length of compound eyes *L. cividalis* sp. nov. 0.58, *L. gimnesiana* 0.70-0.72. IV-VII articles of maxillary palpus *L. cividalis* sp. nov. and I-VII articles of maxillary palpus *L. gimnesiana* with comparatively long and dense ciliate setae. Ultimate article of labial palpus *L. cividalis* sp. nov. 2.72-2.90, *L. gimnesiana* about 2.0 times as long as wide. Ratio of length to width of sensory field on fore femur *L. cividalis* sp. nov. about 2.9-3.0, *L. gimnesiana* 2.1-2.5. Abdominal coxites IX *L. cividalis* sp. nov. with 13-15+13-15 inner and 1-3+1-3 outer lateral macrochaetae, *L. gimnesiana* with 3-5+3-5 inner lateral macrochaetae. Male of *L. cividalis* sp. nov. with anterior parameres 1+7-divided, posterior parameres 1+8-divided, *L. gimnesiana* with anterior parameres 1+4-6-divided, posterior parameres 1+6-7-divided.

Etymology

The new species is named after the geographical origin of the holotype.

***Lepismachilis* (*Lepismachilis*) *montana* Kaplin sp. nov.**

(figures 28-38)

Material examined

Italy, Veneto: near Ponte nelle Alpi, heather-deciduous wood, stony talus, under stones, May 11, 2008, one male, holotype (on slide), one female (on slide); Friuli-Venezia Giulia: near Sacile, March 29, 2008, two males, paratypes, leg. V. Kaplin.

Description

Body length 8.3-8.7 mm; width 1.8 mm; antennae, terminal filament and cerci damaged. Body entirely covered with scales. General body color yellowish, with violet hypodermal pigment the most intensive on the head capsule, frons, mandibles, maxilles, lateral parts of clypeus, first article of maxillary palpus, coxae, trochanters, around eyes, ocelli, the bases of antennae. Antennae a little shorter than body length. Distal chains of flagellum with up to 7-9 subdivisions. Subdivisions of chains with 2 rows of bristles and 1-3 sensillae.

In ethanol, colour of compound eyes grey dark, non-uniformly painted. Ratio of length to width of compound eye 1.20-1.25; ratio of line of contact to length of compound eyes 0.52-0.55 (male), 0.58 (female). Paired ocelli sole-shaped, dark with narrow white border, 0.10 x 0.38 mm (male), 0.09 x 0.30 (female). Ocelli 3.8 (male), 3.4 (female) times as wide as long. Distance between inner margins of ocelli 0.28 (male), 0.32 (female) times total width of eyes. Clypeus, labrum, maxillary and labial palpus, legs of males without long and dense ciliate setae. Apical article of maxillary palpus (without apical spine) 1.01-1.05 times as long as the preceding one. Dorsal surface of 7th, 6th and 5th articles of maxillary palpus with 8-11, 7-8 and 2 hyaline odontoid spines. Ultimate article of labial palpus oval-triangular, 2.2 times as long as wide. Mandibles with four distal teeth.

Fore femur of male widened, with closed sensory field, separating from the distal row of strong setae by 2 rows of scales. The metric relations found in the sensory field and femur are as follows:

LF/WF:	1.53-1.56
LSF/WSF:	1.86
LSF/LF:	0.50-0.52
WSF/WF:	0.41-0.44
d/LF:	0.31-0.28
d/LSF:	0.52-0.54
d/WSF:	1.0-1.14

Tibiae and tarsi without well-expressed spine-like setae. The second and third pair of legs with stylus 0.48-0.51 mm long.

Urites I, VI-VII with 1+1 coxal visicles, II-V with 2+2 coxal vesicles. Posterior angle of urosternites II-VI approximately 80-90°. Stylus length (mm) of urites (without apical spines) II-VII 0.31-0.37 (male), 0.33-0.39 (female), VIII 0.39 (male), 0.46 (female), IX 0.69 (male), 0.78 (female). Ratio of stylus (without spine) to coxite, on urites:

	male	female
II-IV:	0.59-0.61	0.51-0.58
V-VII:	0.46-0.50	0.45-0.47
VIII:	0.59	0.72
IX:	0.72	0.64

Ratio of apical spine of stylus to stylus (without spine), on urites:

	male	female
II-IV:	0.38-0.44	0.46-0.50
V-VIII:	0.54-0.58	0.55-0.60
IX:	0.44-0.46	

Ratio of sternite to coxite, on urites:

	male	female
III-VII:	0.55-0.63	0.52-0.53

Thoracic tergites, abdominal tergites I-III, urosternites, abdominal coxites I-VIII without macrochaetae; abdominal tergites IV-V with 1-2+1-2, VI with 2+2, VII with 3+3, VIII-IX with 3-4+3-4, X with 2+2; abdominal coxites IX with 5+5 inner lateral macrochaetae.

Ovipositor slender, elongate, reaching apices of styli IX, or slightly surpassing them; about 2.2 mm long. Anterior and posterior gonapophyses with 52-53 divisions. Terminal colorless needles on anterior and posterior gonapophyses not longer than three apical divisions taken together.

Male genitalia with parameres on urites VIII and IX. Anterior parameres 1+5-divided, posterior parameres 1+6-divided. Penis and parameres entirely concealed by coxites of abdominal urite IX. Posterior parameres not attaining level of apices of coxites IX by about 0.48 length of parameres. Posterior parameres in 1.65 times as long as anterior parameres. Ratio of basal portion of penis to apical portion 1.12.

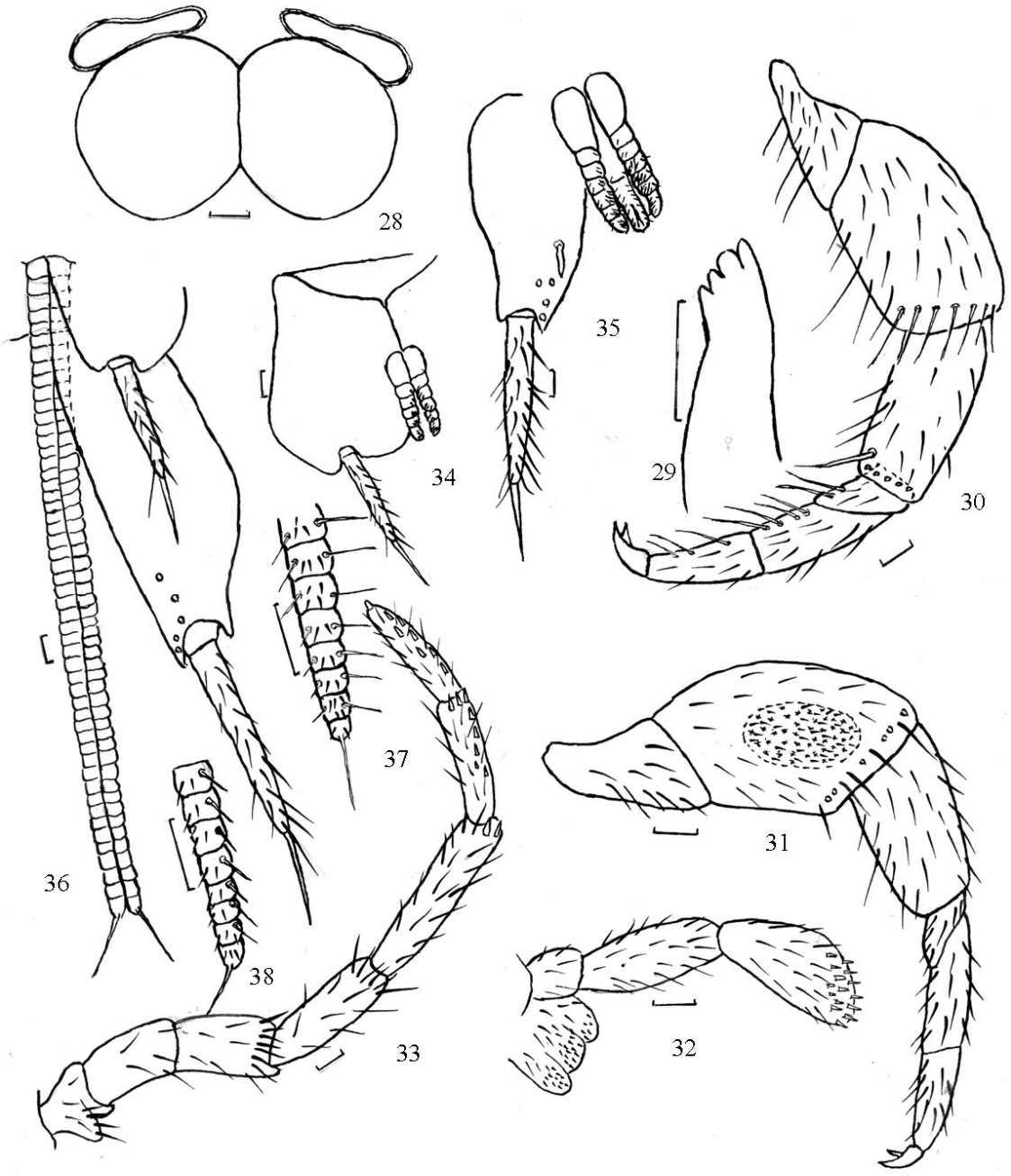
Differential diagnosis

Lepismachilis montana sp. nov. belongs to the subgenus *Lepismachilis* Verhoeff with 2+2 coxale vesicles on abdominal coxites II-V. Sensory field of males *L. montana* sp. nov. and also *L.* (*L.*) *rozsypali* Kratochvil 1945, *L.* (*L.*) *philippi* Wygodzinsky 1953, *L.* (*L.*) *handschini* Wygodzinsky 1950, *L.* (*L.*) *y-signata* Kratochvil 1945 (part), *L.* (*L.*) *notata* Stach 1919 (part) closed, separated

from the distal row of strong setae by 1-2 rows of scales. *L. montana* sp. nov. differs from all described species of this group due to the following features. Ratio of length to width of compound eye *L. montana* sp. nov. 1.20-1.25; other species about 0.95-1.05. Clypeus, labrum, maxillary and labial palpus, legs of males *L. montana* sp. nov. without long and dense ciliate setae. Fore femur of male *L. montana* sp. nov. strongly widened. Ratio of length to width of fore femur *L. montana* sp. nov., 1.53-1.56; other species about 1.65-2.35. Last article of maxillary palpus of male *L. montana* sp. nov. almost as long as the penultimate. The relation of length of last article of maxillary palpus of other species to length the penultimate about 0.56-0.90.

Etymology

The new species is named after the habitat of the holotype.



Figures 28-38. *Lepismachilis* (*Lepismachilis*) *montana* Kaplin sp. nov. (28, 31-35) Male, holotype. (29, 30, 36-38) Female, paratype. (28) Eyes and ocelli, front view. (29) Apex of mandible. (30) Fore leg of female. (31) Fore leg of male. (32) Labial palpus and labium (part). (33) Maxillary palpus. (34) Abdominal coxite VIII of male with anterior parameres. (35) Abdominal coxites IX of male with posterior parameres and penis. (36) Abdominal coxites VIII and IX of female, with anterior gonapophyses. (37) Apical divisions of anterior gonapophysis. (38) Apical divisions of posterior gonapophysis. Scale: 0.1 mm.

Trigoniophthalmus alternatus (Silvestri 1904)

Material Examined

Italy, Liguria: Ventimiglia (near Airolia), May 24. 2008, three males, two females; Trentino: Trento, May 25, 2008, three males, six females; Veneto: Ponte nelle Alpi, May 11, 2008, three males, two females; Friuli-Venezia Giulia: Carnia, May 14, 2008, one male, three females; Tarviseo, April 19, 2008, two males, two females, leg. V. Kaplin.

T. alternatus was collected in Ventimiglia, Ponte nelle Alpi, Carnia and Tarviseo for the first time.

Acknowledgements

This research was supported by the Programme Erasmus Mundus External Cooperation Window (EM ECW), Project: International Academic Mobility Network with Russia.

I thank Melanie Dahms (University of Hohenheim, Eastern Europe Centre, Stuttgart, Germany), Massimo Plaino (University of Udine, International Relation Office, Udine, Italy), Rosanna Giaquinta (University of Udine, Faculty of foreign languages and literature) for their kind help in my training in Italy at the University of Udine.

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Received April 22, 2009. Accepted September 23, 2009.