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Contribution to the knowledge of the Chamaemyiidae (Diptera), with particular reference to the fauna of Switzerland

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The present paper deals with 204 specimens of Chamaemyiidae from various countries of the western Palaearctic region belonging to 34 species of which 4 are new to science. They are described, illustrated and compared with related species. The new taxa were collected in Switzerland (*Parochthiphila nigrolineata* sp. nov. and *Leucopis latifrons* sp. nov.), Croatia (*Parochthiphila ruderalicola* sp. nov.) and Israel (*Leucopis curtisetosa* sp. nov.). Twenty-six of the 28 species recorded from Switzerland are new for this country. For most species, illustrations of the genital structures are presented in order to facilitate identification. A short analysis of their distribution patterns in Switzerland is given.

Keywords: Chamaemyiidae, faunistics, systematics, western palaearctic region, new species

INTRODUCTION

The Chamaemyiidae are small, inconspicuous greyish flies. As far as is known all of them are predators of Sternorrhyncha in their larval stage. Therefore, they may play an important role in biological control of Aphids and scale insects. However, our knowledge of the faunistics and systematics of the family is still rather poor, and this may be one reason why they have hardly been studied by applied entomologists.

The poor knowledge of the family is rather obvious for Switzerland. Only four species (of the 111 species known from Europe) have been published for this country to date (TANASIJTSHUK, 1984, 1986): *Leucopis hennigrata* MCALPINE, *L. atratula* (RATZEBURG), *L. tapiae* BLANCHARD and *L. freyi* MCALPINE. This situation is very similar to that of other European countries. Their small size, their similarity in general appearance and the difficulties in identification, which is almost entirely based on the study of the male genitalia, are the principal reasons for their having been neglected. The aim of this publication is to give new data on the diversity and distribution of the Chamaemyiidae in Switzerland and other Western Palaearctic countries. In addition four species new to science were found. These will be described and illustrated in detail and compared with related species. Thus, this paper does not only improve the knowledge of the faunistics of Switzerland, but it also adds to the knowledge on taxonomy of the whole western Palaearctic region.

MATERIAL AND METHODS

The investigated material belongs to the entomological collection of the Swiss Federal Institute of Technology (ETHZ) and the private collections of B. MERZ (CBM) and G. BÄCHLI (CGB). The holotypes of the new species are deposited in the ETHZ, paratypes in the ETHZ, CBM and the private collection V. BESCHOVSKI (CVB), where some duplicates have also been stored.

The major part of the material studied was collected in Switzerland, but a small number of specimens also originates from Croatia, France, Italy, and Israel.

Chiefly only male specimens have been determined. Females were only identified when they could clearly be affiliated with their respective males or when they show unique characters.

The systematic list and geographical distribution follows TANASIJTSHUK (1984, 1986), and the recent additions of BESCHOVSKI & TANASIJTHUK (1990) and TANASIJTSHUK & BESCHOVSKI (1991). The morphological terminology follows MCALPINE (1981).

For each species, exact localities, general distribution and some additional taxonomic notes are given. Some of the taxonomic peculiarities of the genital structure of the new species and of their closest relatives are presented in figures. Many species show slight differences as compared with the descriptions of TANASIJTSHUK (1986). Therefore, in order to clear up the taxonomy of the species, more or less detailed descriptions are presented in word and with new drawings. All drawings were made from the right side of the insects under equal magnification, and are presented with a scale of 0.02 mm. The illustrated parts are only named in the first figures.

SYSTEMATIC PART

Subfamily Chamaemyiinae

Parochthiphila CZERNY, 1904

Subgenus *Parochthiphila*
group *spectabilis*

1. *Parochthiphila* (s. str.) *spectabilis* (LOEW, 1858)

Material studied (1 specimen): France: 1 ♀, B-d-R, Salin de Giraud, 29.V.1995, leg. MERZ & EGGENBERGER.

Distribution: England, Finland, Estonia, Austria, Hungary, Bulgaria, Southern part of European Russia, Crimea, Western Siberia and Kazakhstan. New for France.

Taxonomic notes: The species can easily be recognized by the 3 mesopleural bristles, yellow antennae, tibiae (except for base which has a dark ring) and tarsi, by the presence of black abdominal spots (dorsally on terga 4–5(–6), laterally on terga 3–5(–6)) and by the common grey dusting on head and thorax. Arista light-yellow, not dark brown as in TANASIJTSHUK (1986), palpi yellow.

2. *Parochthiphila* (s. str.) *nigrolineata* spec. nov.

Material studied (42 specimens): **Holotype** ♂, Switzerland, VS, 630 m, Leuk-Pfynwald, 6.VII.1997, leg. MERZ. Paratypes: 15 ♂♂, 6 ♀♀ with same data as holotype. Additional paratypes from Switzerland: 6 ♂♂, as holotype, but 25.V.1997; 3 ♂♂, as holotype, but 12.VIII.1997. 1 ♂, VS, 600–650 m, Leuk-Pfynwald, 15.V.1996, leg. MERZ & BÄCHLI. 1 ♂, 3 ♀♀, same data, but 19.V.1996. 1 ♂, 1 ♀, VS, 650 m, Leuk-Pfynwald, 2.V.1993, leg. MERZ. 1 ♀, VS, 620 m, Leuk-Rotafen, 10.VIII.1997, leg. MERZ. 2 ♀♀, VS, Brig, 800m, 23.V.1988, leg. MERZ. 1 ♂, VS, 1310 m, Visperterminen, 21.VII.1992, leg. SAUTER.

The holotype and some paratypes are deposited in the ETHZ, the other paratypes in CBM and CVB.

Diagnosis: Antennae black except for insertion of arista, mesonotum with 2 short, mat-shining dark bands on the lines of the last 3 dorsocentral bristles, mesopleura bare, tibiae and metatarsi yellow except for base of ti_3, abdomen with dark elliptical spots dorsally on tergites 3–5 and with a shining black band on each side of the abdomen.

Male: Head: about 1.2 times higher than wide. Antennae black, first flagellomere with a small yellow spot around the base of the arista. Pedicellum yellow-grey dusted dorsally. Arista three times longer than first flagellomere, bicoloured (apical part yellow, about 5–7 times longer than black basal joint). Frons 1.14 times wider than long and with large transverse black band between the anterior orbital bristles. Chaetotaxy as usual in the genus. Face with thin keel between antennal base and without black transverse band below the antennae. Gena wide, equal to one third of the height of the eye, with 5–6 strong peristomal bristles, the first of which is vibrissa-like. Eyes rhomboidal with rounded corners, almost as high as long. Proboscis brown, palpi short, dark brown and thin.

Thorax: grey dusted, with two short, mat-shining black, lightly arch-shaped stripes lying on the last three dorsocentral bristles. Chaetotaxy as usual in the genus. All 4 dorsocentral bristles strong, well developed. Acrostichals incomplete bi- to quadriserial. Mesopleural bristles and setae absent. Scutellum grey dusted. Halteres yellow. Wings light yellow-brown with brown veins. Discoidal cell elongated, distance between r-m and dm-cu 2.5 times as long as dm-cu; apical part of CuA_1 about as long as to 1.5 times longer than dm-cu.

Legs: Femora black with yellow apex, posterior side of the hind femora shining black. Tibiae yellow-brown, the posterior tibiae with black band on the basal quarter. Metatarsi yellow, the subsequent 4 segments brown to black-brown. Middle tibiae with long, brown apico-ventral bristle.

Abdomen: grey-green dusted, lightly mat-shining. Tergites 3–5 dorsally with elongated black spots on the anterior two thirds of each tergite, forming thus two large black bands on the abdomen; the spots on tergite 3 may be weaker than those on tergites 4 & 5; tergites 2–5 laterally with a shining black band.

Genitalia (Figs 1–4, 46–47): Comparatively large with high epandrium and small cerci. Aedeagus lightly bent on the basal third, the remaining part almost at a right angle, tapering to the apex; basal part slightly enlarged backwards; apex in dorso-ventral view threelobate. Gonites large (Fig. 46), distal half of hypandrium thin.

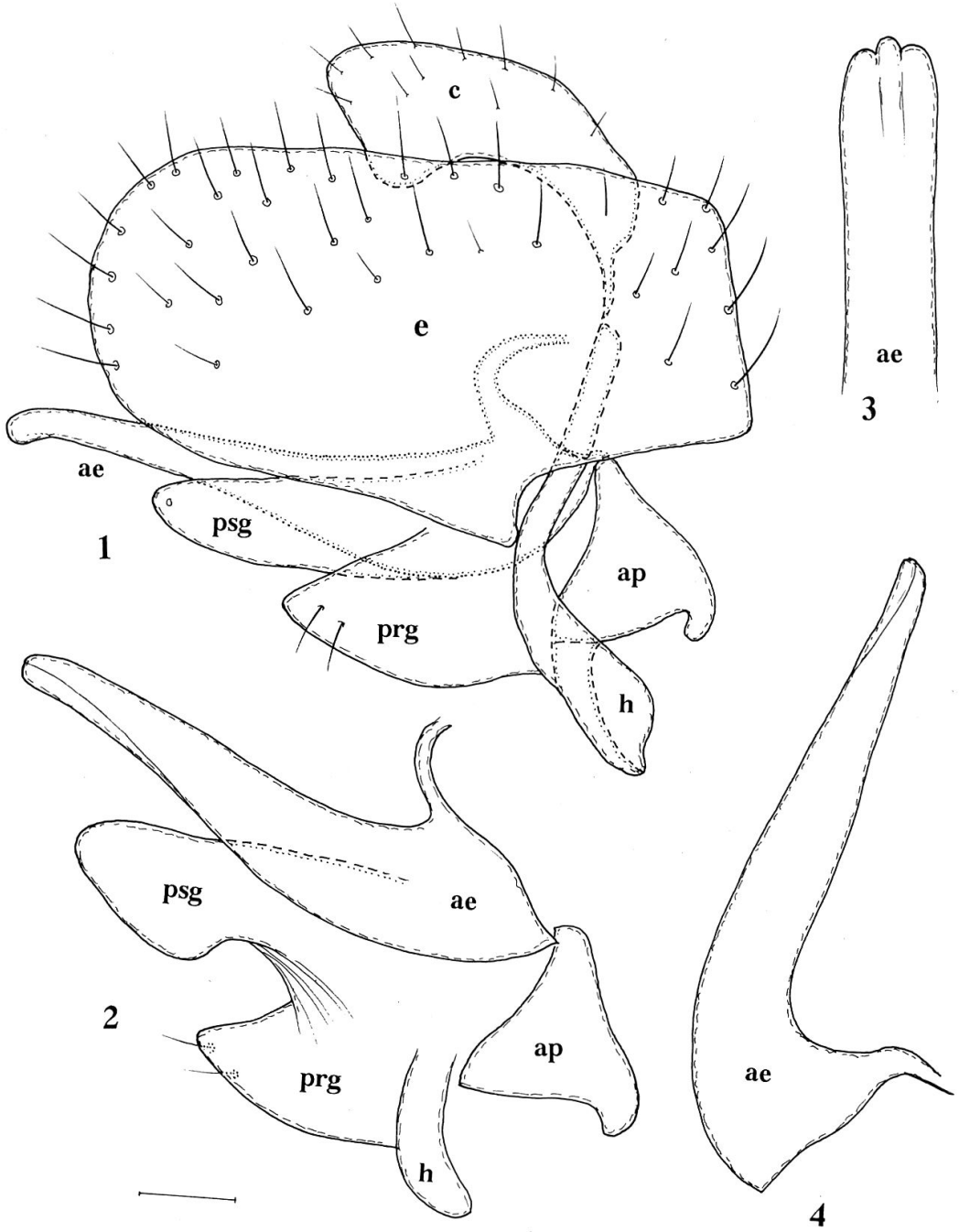
Length: 3.5 mm; wing 2.52 mm.

Female: similar to male. Anterior half of the frons lightly golden-grey dusted except for black transverse bands. Fifth tergite flattened laterally with a black basal band dorsally. Cerci black, longer than epiproct (Figs 5–7); sclerotised plate of the hypoproct rectangular, densely covered with short spines, and with 4 long bristles at apex. Spermathecae comparatively small (Fig. 8).

Length: 2.24–3.15 mm; wings: 2.52 mm.

Taxonomic notes: There is some variability in the external features of the specimens studied. The black bands on the mesonotum are diffuse, their extension varies depending on the angle of observation. The base of the aedeagus is only slightly arched in the Paratypes from Leuk–Pfynwald (Figs 1–2, 47). The specimen from Visperterminen however shows a clear curve in the basal quarter (Fig. 4).

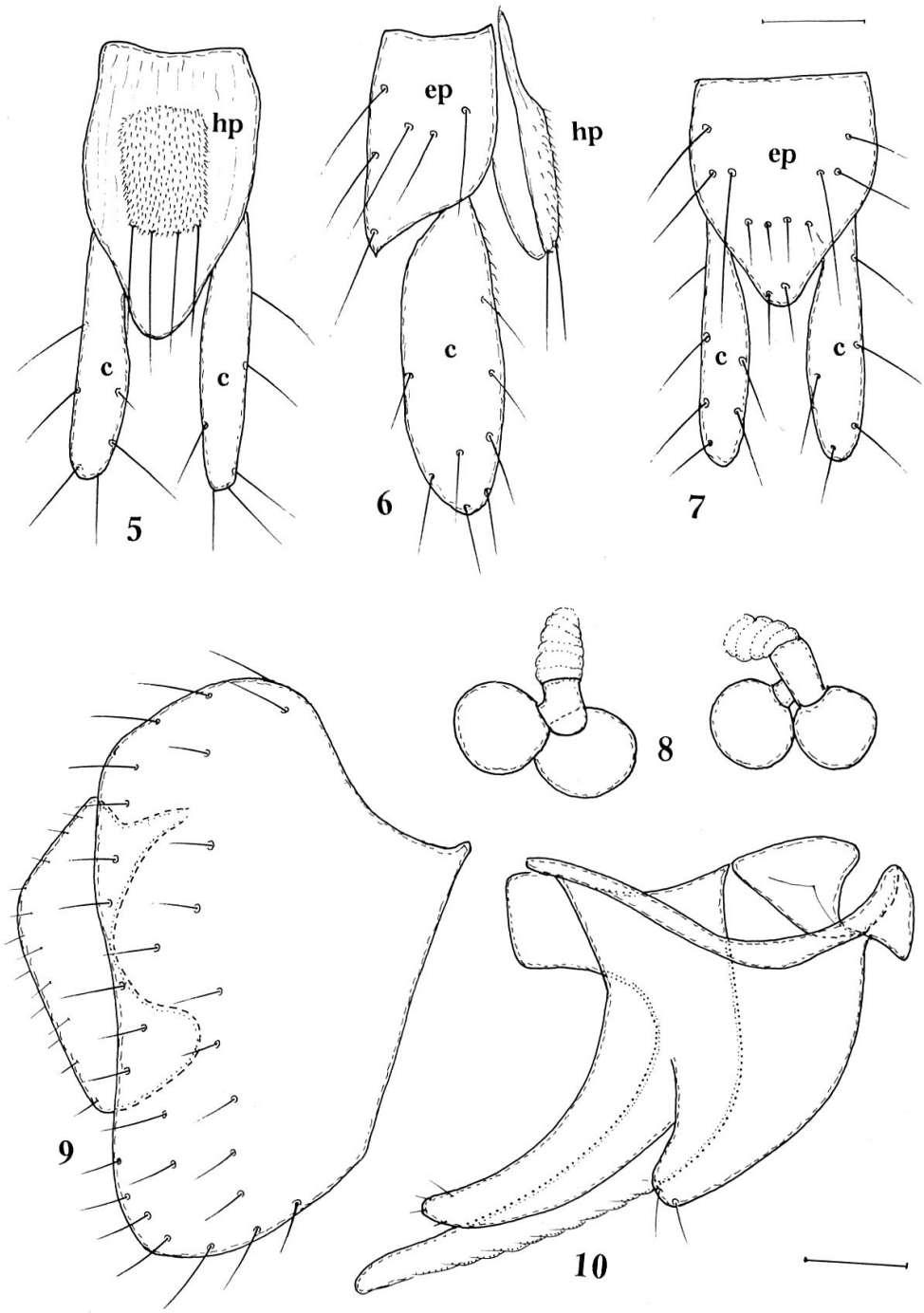
Differential diagnosis: An externally similar species (black bands on the mesonotum and 4 dorsocentral bristles) is *P. nartshukella* TANASIJTSHUK, but *P. nigrolineata* is distinguished by the black colour of the scapus and first flagello-



Figs 1–4. *Parochthiphila nigrolineata* sp. nov. – Figs 1–3: ♂ paratype from Leuk-Pfynwald. 1, genital complex, lateral view; 2, aedeagus and left gonites from inside; 3, apex of the aedeagus, dorsoventral view. – Fig. 4: aedeagus of the paratype from Visperterminen, 21.VII.1992, lateral view. Abbreviations: ae = aedeagus; ap = aedeagal apodeme; c = cerci; e = epandrium; h = hypandrium; prg = pregonite; psg = postgonite.

mere, the bare mesopleura and the shorter dark bands on the mesonotum, which do not extend to the scutellum as in *P. nartshukella*. Further, the new species has only 2 dorsal black bands along the dorsocentral lines and lacks the lateral ones. The two species also clearly differ in the structure of the aedeagus in lateral view.

Etymology: The new species is named for the black bands on the mesonotum and the abdomen.



Figs 5–10. Figs 5–8: *Parochthiphila nigrolineata* sp. nov., ♀ genitalia. 5, hypoproct and cerci, ventral view; 6, hypoproct, epiproct and cerci, lateral view, 7, epiproct and cerci, dorsal view, 8, spermathecae. – Figs 9–10: *Parochthiphila coronata* (Loew), ♂ genitalia, lateral view. 9, epandrium; 10, hypandrial complex. Abbreviations: c = cerci; ep = epiproct; hy = hypoproct.

Subgenus *Euestelia* Enderlein, 1927
group *coronata*

3. *Parochthiphila (Euestelia) coronata* (Loew, 1858)

Material studied (2 specimens): Switzerland: 1 ♂, BL, 265 m, Birsfelden, 13.VI.1989, leg. Merz. France: 1 ♀, B-d-R, Arles, Rhône-Ufer, 27.V.1995, leg. Merz & Eggenberger.

Distribution: Transpalaearctic species, known from North Africa, Spain and England to Israel, Iran and the Russian Far East. New for France and Switzerland.

Taxonomic notes: Arista bicoloured: basal part black, apical part lightly yellow and 4–5 times longer than basal part. Acrostichal setae in 2 sparse rows, twice as wide apart from each other as from dorsocentrals. Epandrium with enlarged apicoventral part and almost rectangularly curved aedeagus (Figs 9–10).

group *nigripes*

4. *Parochthiphila (Euestelia) nigripes* (STROBL, 1900)

Material studied (1 specimen): France: 1 ♂, B-d-R, S de Berbentane, La Montagnette, 5.VI.1995, leg. MERZ & EGGENBERGER.

Distribution: Spain, Hungary, Balkan Peninsula, Moldavia, Crimea, Ukraine, Southern part of European Russia, Caucasus and Central Asia. New to France.

Taxonomic notes: This species belongs to the group with black tibiae and tarsi. It has 4 rows of acrostichal setae which extend to the line of the last pair of dorsocentral bristles. Aedeagus small, its apical three-quarters at a right angle, basiphallus slightly widened (Fig. 12). Ventral side of epandrium with an anteroventral angle (Fig. 11).

5. *Parochthiphila (Euestelia) decipia* TANASIJTSHUK, 1986

Material studied (2 specimens): Italy: 1 ♂, 1 ♀, Puglia, Mte. Gargano, 650 m, 5 km E S. Giovanni, 26.VII.1995, leg. MERZ.

Distribution: Known from Moldavia, Georgia, Armenia, Ex Soviet Central Asia, Afghanistan and Western China. This is the first record for Southern Europe.

Taxonomic notes: The first flagellomere is yellow around the base of the arista which is bicoloured: dark basal joint and light yellow apically; the pedicellus is grey-yellow dusted on the dorso-internal side. Acrostichal setae in 4–5 irregular rows, reaching backwards to the line of the third dorsocentrals. Tibiae and tarsi yellow, only the last tarsal segments dark. Abdomen of the male unspotted, those of the female with 2 pairs of black spots dorsally and laterally on tergites 3–5.

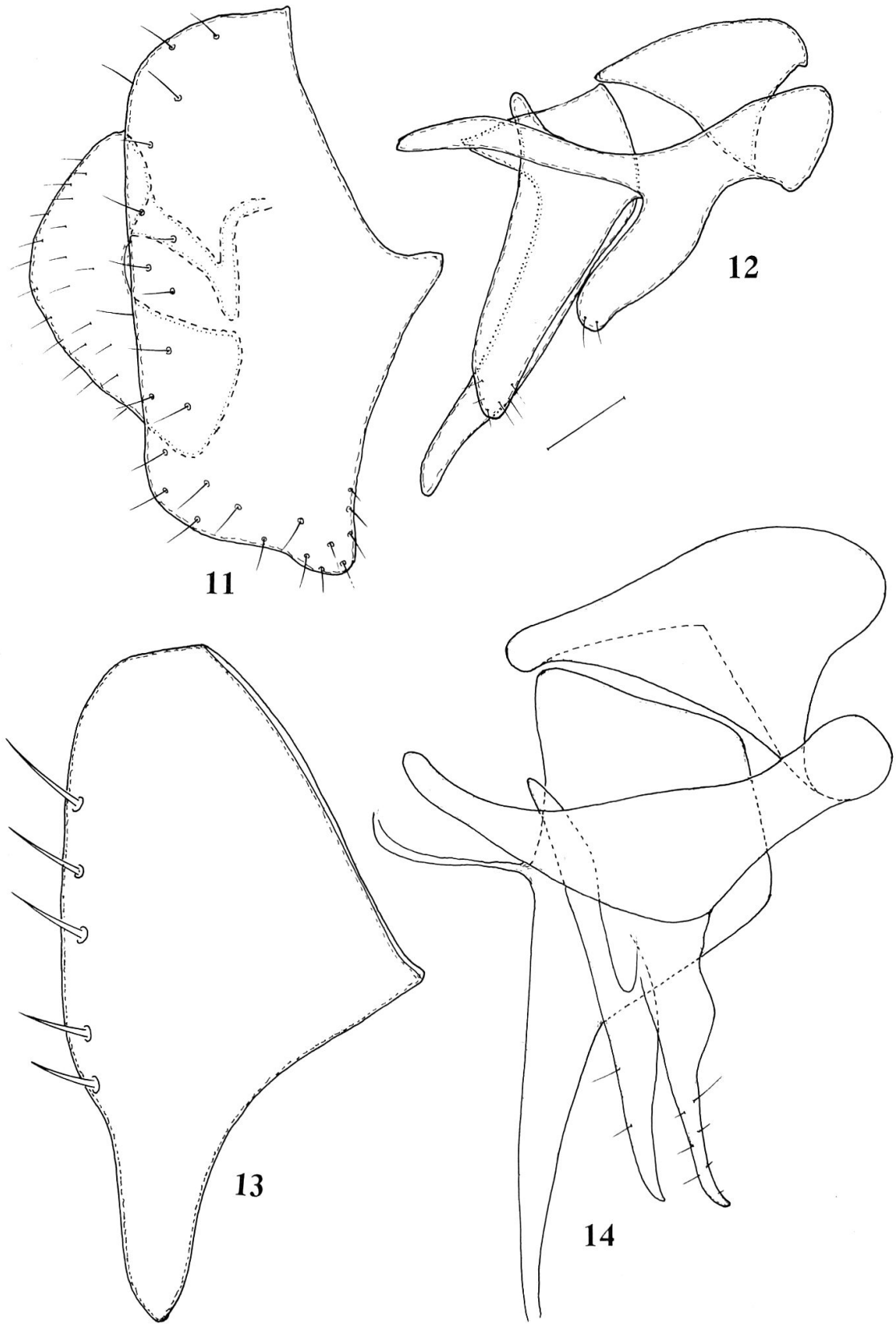
6. *Parochthiphila (Euestelia) ruderalicola* spec. nov.

Material studied (1 specimen): **Holotype**, Croatia, 1 ♂, Savudrjia near Piran, 45.50° N, 13.50° E, ruderal site, 9.IX.1987, leg. MERZ. It is deposited in the ETHZ.

Diagnosis: Only the last two dorsocentral bristles are well developed, tibiae and tarsi yellow, abdomen unspotted, basal part of aedeagus extended backwards considerably and exhibiting clearly developed small teeth on the apex.

Male: Head: about 1.23 times higher than wide. Antennae black but base of arista on yellow ground, arista bicoloured, yellow apically, this part about 5.5 times longer than black base. Frons grey dusted with two clear transverse black bands in the anterior half. Chaetotaxy as usual in the genus. The width of the frons is equal to half of the head. Face grey with narrow keel between antennal bases, and with a wide black band below the antennae. Gena wide, with a row of peristomal bristles, and with one long bristle in the middle below the eyes. Proboscis short, yellow-brown, palpi short, thin, black. Eyes large, three times higher than gena.

Thorax: grey-dove dusted without dark stripes on mesonotum. Chaetotaxy regular for the genus, but only the last two dorsocentrals are well developed, which are



Figs 11–14. Figs 11–12: *Parochthiphila nigripes* (STROBL), ♂ genitalia, lateral view. 11, epandrium; 12, hypandrial complex. – Figs 13–14: *Leucopis celsa* TANASIJTSHUK, ♂ genitalia, lateral view. 13, epandrium; 14, hypandrial complex.

somewhat longer than the other bristles. Acrostichal setae in 4–5 irregular rows, extending backwards to the level of the last dorsocentrals. Mesopleura bare. Halteres yellow. Wings light yellow with yellow veins; distance between r-m and dm-cu about 1.8 times the length of dm-cu; apical sector of CuA_1 equal to dm-cu.

Legs with yellow tibiae and tarsi. Femora black, grey dusted, with yellow apices.

Abdomen: dove-grey, unspotted.

Genitalia (Figs 15–17): Epandrium and cerci comparatively large (Fig. 15). Aedeagus with a specific enlarged basal part which is directed backwards (Fig. 16), in lateral view arch-shaped, in dorso-ventral view with parallel sides (Fig. 17), and with small teeth on the dorsal part of the distiphallus (Figs 16–17). Praegonites comparatively short.

Length: 3.5 mm; wing 2.7 mm.

Female: unknown.

Differential diagnosis: The new species is close to *P. gracilipyga* TANASIJTSHUK by the colour of the legs, but can be distinguished from the latter by the structure of the aedeagus. *P. ruderalicola* is comparable to *P. coronata* with regard to the enlarged basal part of the aedeagus, but the two species differ in the shape of the epandrium (Figs 9 and 15) and the curve of the aedeagus of *P. coronata* is more rectangular (Fig. 10) than in *P. ruderalicola* (Fig. 16). Judging from the description in CZERNY (1936), *P. frontella* RONDANI may be related to the new species, but as the genital structure of that species is unknown, this cannot be proved. The hind tibiae apparantly have black rings on basal and apical part in *P. frontella*, whereas they are entirely yellow in the new species.

Etymology: The new species is named after the habitat where it was collected.

Chamaemyia MEIGEN, 1803

group *elegans*

7. *Chamaemyia polystigma* (MEIGEN, 1830)

Material studied (16 specimens): Switzerland: 1 ♀, GR, Ftan, 1600 m, 19.VII.1994, leg. MERZ. 1 ♀, GR, Mesocco, 890 m, 20.VIII.1991, leg. MERZ & FREIDBERG. 1 ♂, GR, Samedan, 1720 m, 20.VII.1987, leg. SAUTER. 1 ♀, GR, Samnaun, 1950 m, 10.VII.1987, leg. MERZ. 1 ♂, GR, Zuoz, 1860 m, 19.VII.1977, leg. SAUTER. 1 ♂, TI, Faido, 24.–31.VIII.1981, leg. BÄCHLI. 1 ♂, TI, Lodano, 10.–11.IX.1991, leg. BÄCHLI. 1 ♂, VS, Baltschieder, Rotten-Ufer, 650 m, 17.V.1996, leg. MERZ. 1 ♂, VS, Grône/Poutafontana, 510 m, 18.V.1996, leg. MERZ & BÄCHLI. 2 ♀♀, VS, Leuk-Brentjong, 900 m, 12.VIII.1993, leg. MERZ. 2 ♀♀, same locality, 16. & 18.V.1996, leg. MERZ & BÄCHLI. 1 ♀, VS, Visperterminen, 1540 m, 17.VII.1995, leg. MERZ. 1 ♀, ZH, Zürich-Allmend, 420 m, 6.IX.1993, leg. MERZ. Israel: 1 ♂, near Banyas, 16.IV.1992, leg. MERZ & FREIDBERG.

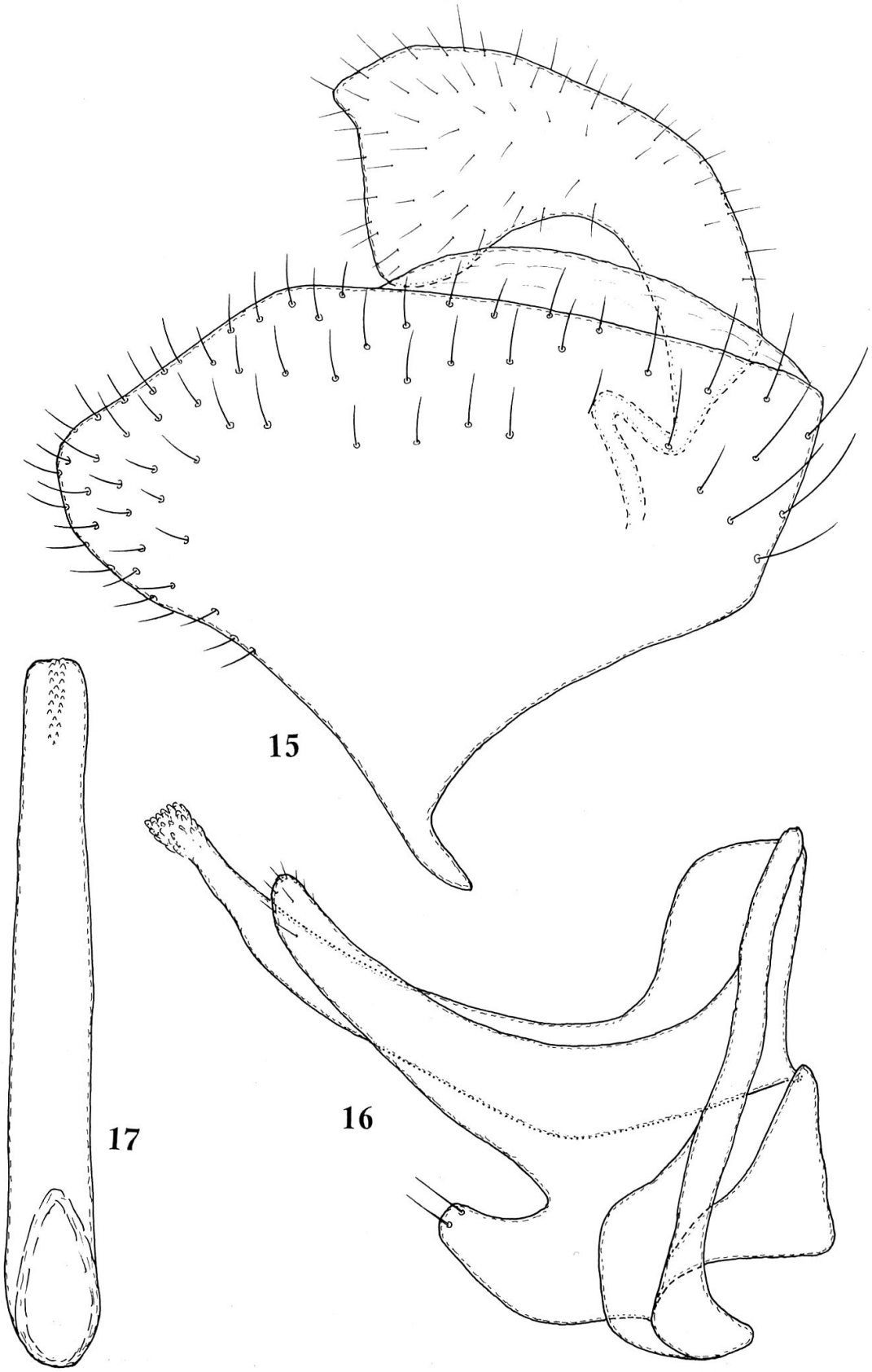
Distribution: Transpalaearctic species, known from Europe and North Africa to the Far East. New for the fauna of Switzerland and Israel.

8. *Chamaemyia submontana* BESCHOVSKI, 1994

Material studied (6 specimens): Switzerland: 1 ♂, GR, Ardez, 1300 m, 16.VIII.1991, leg. MERZ & FREIDBERG. 1 ♂, GR, Juf-Stallerberg, 2200–2550 m, 19.VI.1994, leg. MERZ. 1 ♂, GR, Samedan, 1730 m, 24.VII.1987, leg. MERZ. 1 ♂, TI, Mte. S. Giorgio, 1000 m, 24.VIII.1991, leg. MERZ & FREIDBERG. 1 ♂, VS, Hohtenn-Bahnhof, 1250 m, 3.IX.1991, leg. MERZ. 1 ♂, VS, Visperterminen-Rothorn, 2000–2200 m, 21.VII.1995, leg. MERZ.

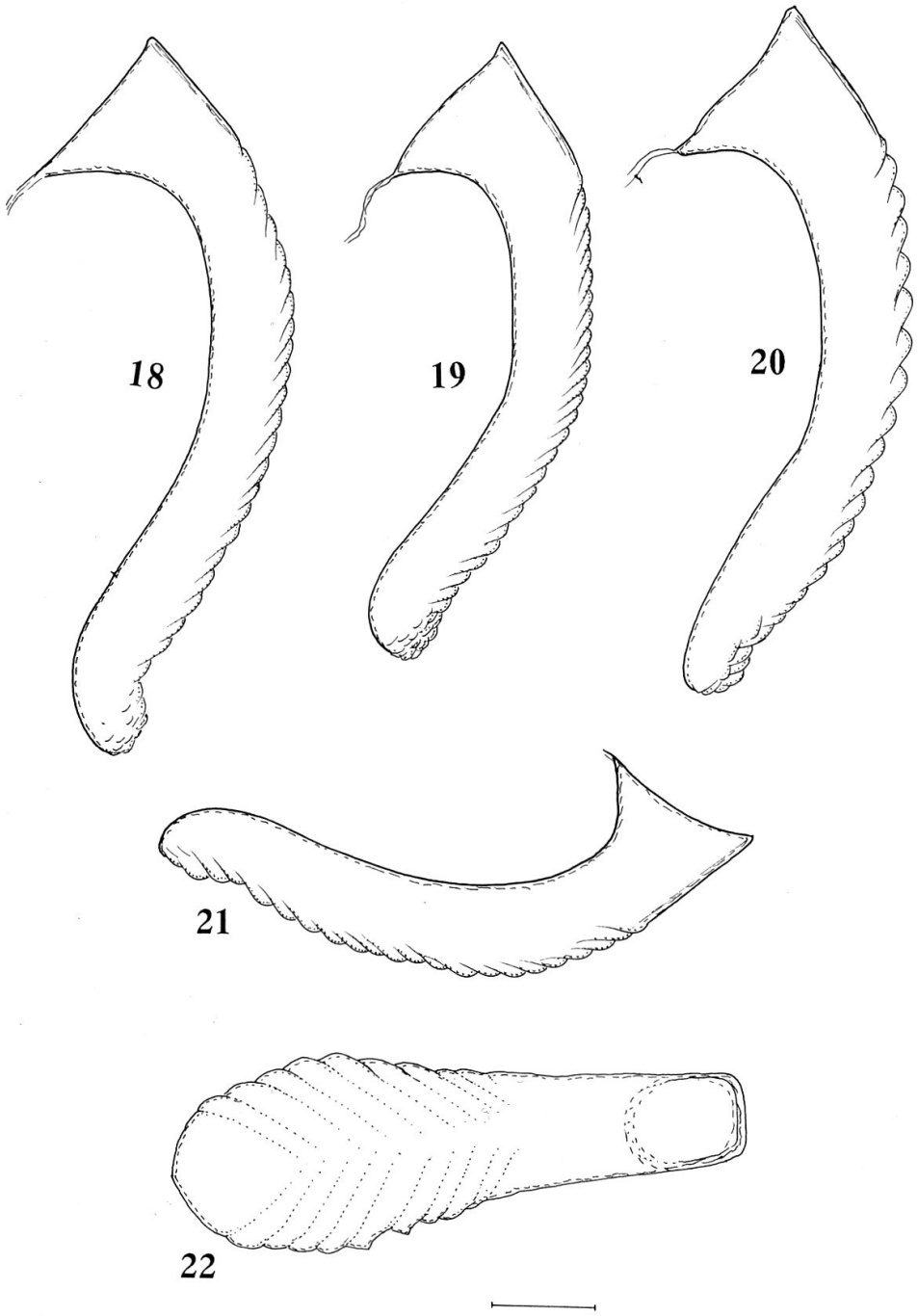
Distribution: Bulgaria. New for Switzerland.

Taxonomic notes: The Swiss specimens differ slightly from the populations in Bulgaria: The antennae are entirely black. Two of the specimens have yellow



Figs 15–17. *Parochthiphila ruderalicola* sp. nov., ♂ genitalia of the holotype. 15, epandrium, lateral view; 16, hypandrial complex, lateral view; 17, aedeagus, dorso-ventral view.

palpi, in the other specimens they are black-brown. The abdominal spots are either absent, or only present dorsally on tergites 3–5, or may even be conspicuous laterally on tergites 3–5. The posterodorsal angle of the basal part of the aedeagus is more enlarged backwards than in the Bulgarian specimens, but less conspicuous than in *C. aestiva*. Similarly, in dorso-ventral view the aedeagus is somewhat wider compared with Bulgarian specimens (Fig. 22). The length of the aedeagus is more variable than in the type series (Figs 18–21).



Figs 18–22. *Chamaemyia submontana* BESCHOVSKI. Variations in the shape of the aedeagus in lateral view. 18, VS, Hohtenn-Bahnhof, 9.IX.1991, palpi yellow; 19, TI, Mte. S. Giorgio, 24.VIII.1991, palpi yellow; 20, VS, Visperterminen-Rothorn, 21.VII.1995, palpi black; 21, GR, Juf-Stallerberg, 19.VI.1994, palpi black. 22, GR, Samedan, 24.VII.1987, palpi black, aedeagus in dorso-ventral view.

9. *Chamaemyia sylvatica* COLLIN, 1966

Material studied (4 specimens): Switzerland: 1 ♂, SZ, Pragelpass, 5.VIII.1991, leg. BÄCHLI. 1 ♂, ZH, Dietikon, 13.VI.1991, leg. BÄCHLI. Israel: 2 ♂♂, Yeroham Pond, 16.III.1995, leg. MERZ.

Distribution: England, Poland, Hungary, Bulgaria to the Russian Far East (BESCHOVSKI, 1994). New for Switzerland and the Eastern Mediterranean region (Israel).

Taxonomic notes: The specimens correspond very well with the original description of COLLIN (1966) in the coloration of the antennae, legs and abdominal spots. The shape of the aedeagus is very characteristic (Figs 23–24). The length of the aedeagus varies from 0.42–0.46 mm, in the holotype it is 0.40 mm (Fig. 25).

10. *Chamaemyia aridella* (FALLÉN, 1823)

Material studied (1 specimen): Switzerland: 1 ♂, VS, Visperterminen, 1330 m, 22.VII.1992, leg. SAUTER.

Distribution: This species has been confused in the past with other species, therefore, its distribution is not sufficiently known. Established records are available for England (COLLIN, 1966), Bulgaria, Poland, Hungary and the former Czechoslovakia (Hribi, Helicopez). New for Switzerland.

Taxonomic notes: The species is very characteristic with its unspotted abdomen and the long aedeagus with the very long posterodorsal enlargement at the base.

11. *Chamaemyia aestiva* TANASIJTSHUK, 1970

Material studied (1 specimen): Switzerland: 1 ♂, ZH, Flaach, 22.VII.1996, leg. BÄCHLI.

Distribution: Throughout the Palaearctic region. New for Switzerland.

12. *Chamaemyia elegans* (PANZER, 1809)

Material studied (2 specimens): Switzerland: 1 ♀, AG, Umgebung Aarau, 3.VIII.1926, leg. ZÜRCHER. 1 ♂, ZH, Zürich-Albisgütli, 480 m, 2.VII.1997, leg. MERZ.

Distribution: Transpalaearctic species, known from the Far East to England, Germany, Austria, Hungary and the Balkan Peninsula in the west. New for Switzerland.

Taxonomic notes: The species is easily recognized by the abdominal pattern of black, interrupted bands on tergites 3–5.

13. *Chamaemyia nataliae* TANASIJTHUK, 1986

Material studied (1 specimen): Switzerland: 1 ♀, TI, Piora, 1950 m, 25.VII.1984, leg. SAUTER.

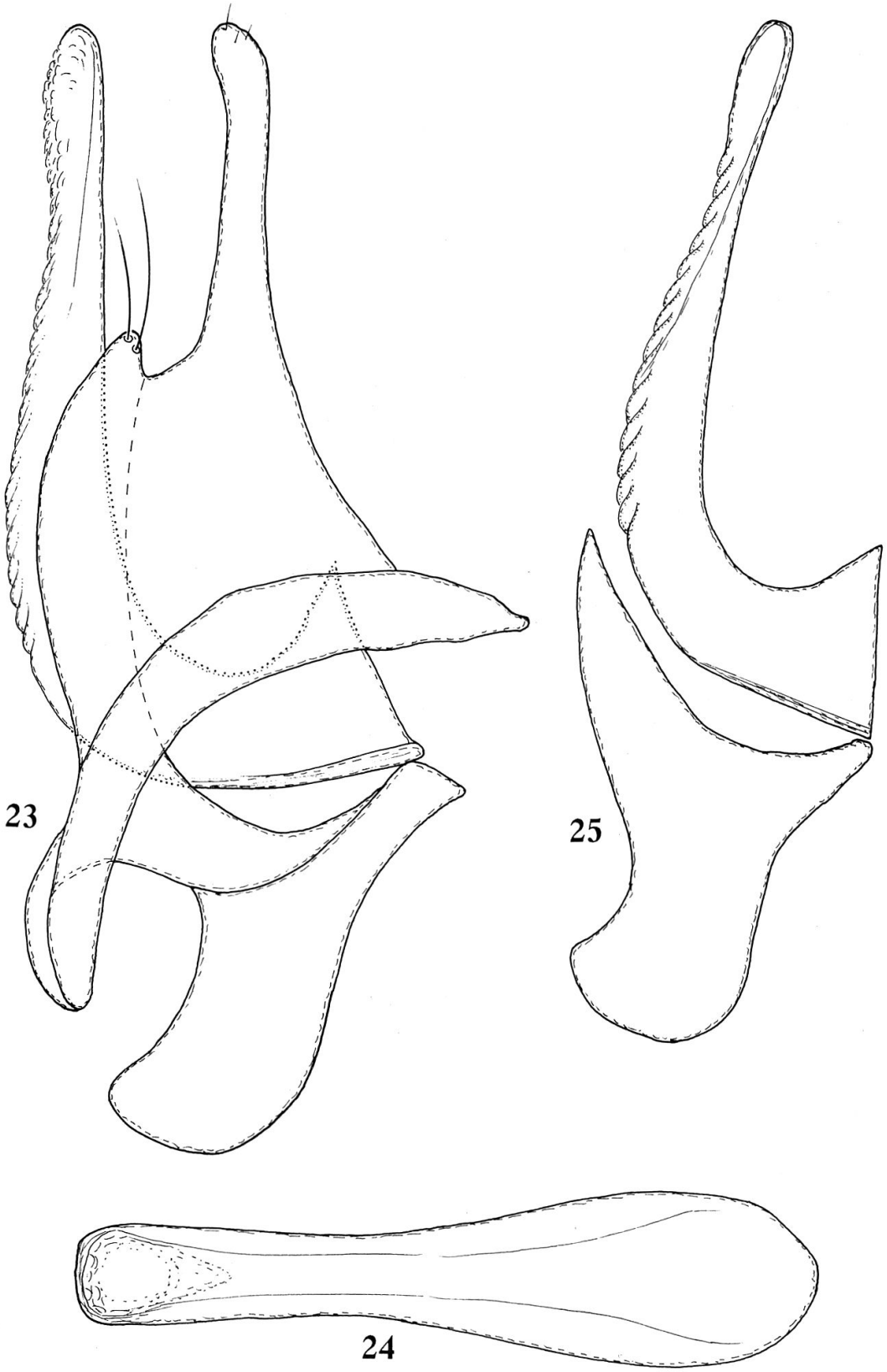
Distribution: So far only known from the Central Caucasus. New for Switzerland.

Taxonomic notes: The specimen studied corresponds exactly with the original description (TANASIJTSHUK, 1986).

group *juncorum*

14. *Chamaemyia geniculata* (ZETTERSTEDT, 1838)

Material studied (8 specimens): Switzerland: 1 ♂, GR, Ftan-Clünas, 5.VIII.1996, leg. MERZ & BÄCHLI. 1 ♀, GR, Samedan, 1720 m, 20.VII.1987, leg. SAUTER. 2 ♂♂, SZ, Pragelpass, 5.VIII.1991, leg.



Figs 23–25. *Chamaemyia sylvatica* COLLIN. ♂ genitalia. Figs 23–24: Specimens from Israel (Yeroham Pond, 16.III.1995). 23, hypandrial complex, lateral view; 24, aedeagus, dorsal view. – Fig. 25: Aedeagus and aedeagal apodem in lateral view of the lectotype (England, Wooditon wood, 10.V.1930).

BÄCHLI. 2 ♂♂, TI, Gordola, 200 m, 2.IV.1988, leg. MERZ. 1 ♂, VS, Baltschieder, 17.V.1996, leg. MERZ & BÄCHLI. 1 ♂, VS, Grächen, 5.VI.1987, leg. MERZ.

Distribution: Transpalaearctic species, which is known from England, France, Italy to Central Asia and the Far East (TANASIJTSHUK, 1986). New for Switzerland.

Taxonomic notes: The specimen from Grächen has brown palpi and yellow anterior and middle tibiae; the hind tibiae have a dark band. The male genitalia, however, correspond exactly with the concept of the species.

15. *Chamaemyia juncorum* (FALLÉN, 1823)

Material studied (4 specimens): Switzerland: 1 ♀, GR, Lenzerheide, 1500 m, 9.X.1991, leg. MERZ. 1 ♀, GR, Lenzerheide-Piz Danis, 2400 m, 8.VIII.1992, leg. MERZ. 1 ♀, GR, Zuoz, 1870 m, 3.VIII.1990, leg. MERZ. 1 ♂, VS, Visperterminen, 1330 m, 22.VII.1992, leg. SAUTER.

Distribution: Transpalaearctic species, which is known from North Africa, Spain and England to Central Asia, China and the Far East. New for Switzerland.

Taxonomic notes: This species has abdominal spots on tergites 3–5 dorsally and ventrally, or only dorsally; the colour of the palpi varies from yellow to dark brown.

Subfamily Leucopinae

Leucopis MEIGEN, 1830

Subgenus *Neoleucopis* MALLOCH, 1921

16. *Leucopis (Neoleucopis) atratula* RATZEBURG, 1844

Material studied (1 specimen): Switzerland: 1 ♂, GR, Ftan-Clünas, 5.VIII.1996, leg. MERZ & BÄCHLI.

Distribution: England, Central Europe, Turkey, Azarbaijdzhan, Georgia, Eastern Siberia (Irkutsk region). Introduced for Biological Control to North America, Argentina, New Zealand, Hawaii. First mentioned from Switzerland by MCALPINE (1971).

Subgenus *Leucopomyia* MALLOCH, 1921

17. *Leucopis (Leucopomyia) silesiaca* EGGER, 1862

Material studied (2 specimens): Switzerland: 1 ♀, GR, Rothenbrunnen, 630 m, 19.VIII.1993, leg. MERZ. 1 ♂, VS, Leuk, 640 m, 27.VII.1991, leg. MERZ.

Distribution: Transpalaearctic species, known from the Far East to Italy and France in the West. New for Switzerland.

Taxonomic notes: The species may be recognized easily from external characters: Tibiae and tarsi yellow, mesonotum with prominent brown stripes. The male genitalia are characterized by the small epandrium and the large hypandrial complex (Fig. 26). However, there seems to be some variation in details of these structures, as may be seen by comparison of Fig. 26 with TANASIJTSHUK (1986, Fig. 308).

18. *Leucopis (Leucopomyia) latifrons* spec. nov.

Material studied (2 specimens): **Holotype** ♂: Switzerland, VS, Leuk-Pfynwald, 600–650 m, 15.V.1996, leg. MERZ & BÄCHLI. Paratype ♀: Switzerland, VS, Leuk-Brentjong, 900 m, 16.V.1996, leg. MERZ & BÄCHLI. The holotype is desposited in ETHZ, the paratype in CBM.

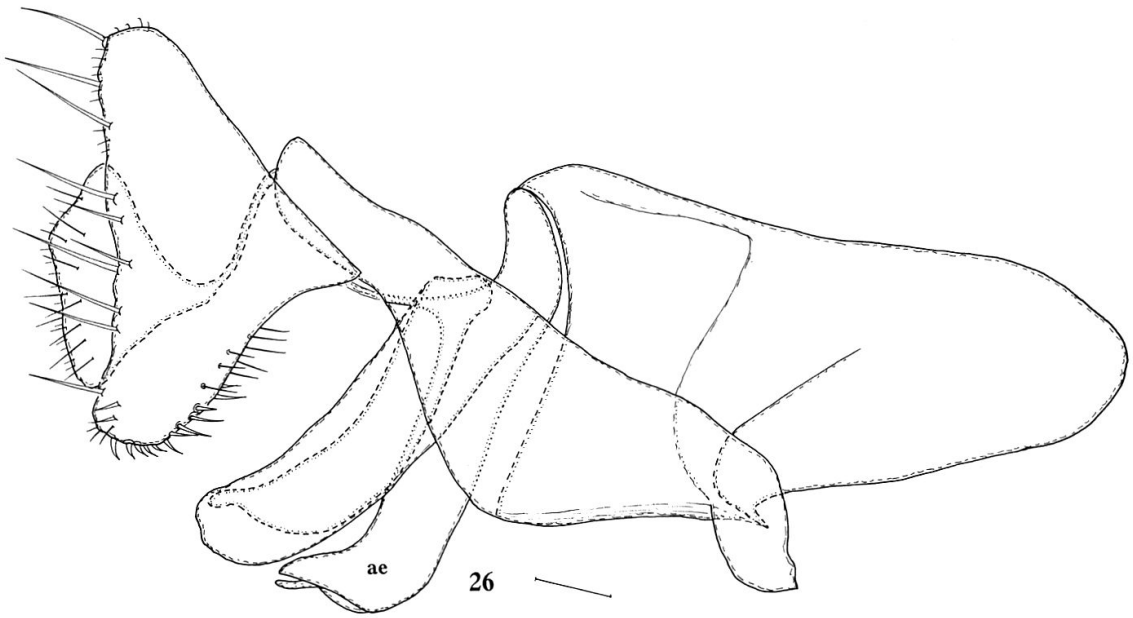


Fig. 26. *Leucopis silesiaca* EGGER, ♂ genitalia, general view from lateral position.

Diagnosis: Dark grey, frons wide, a little wider than one half of the width of the head. Antennae, palpi and legs black. Sector of vein M_{1+2} between r-m and dm-cu shorter than dm-cu, aedeagus C-shaped.

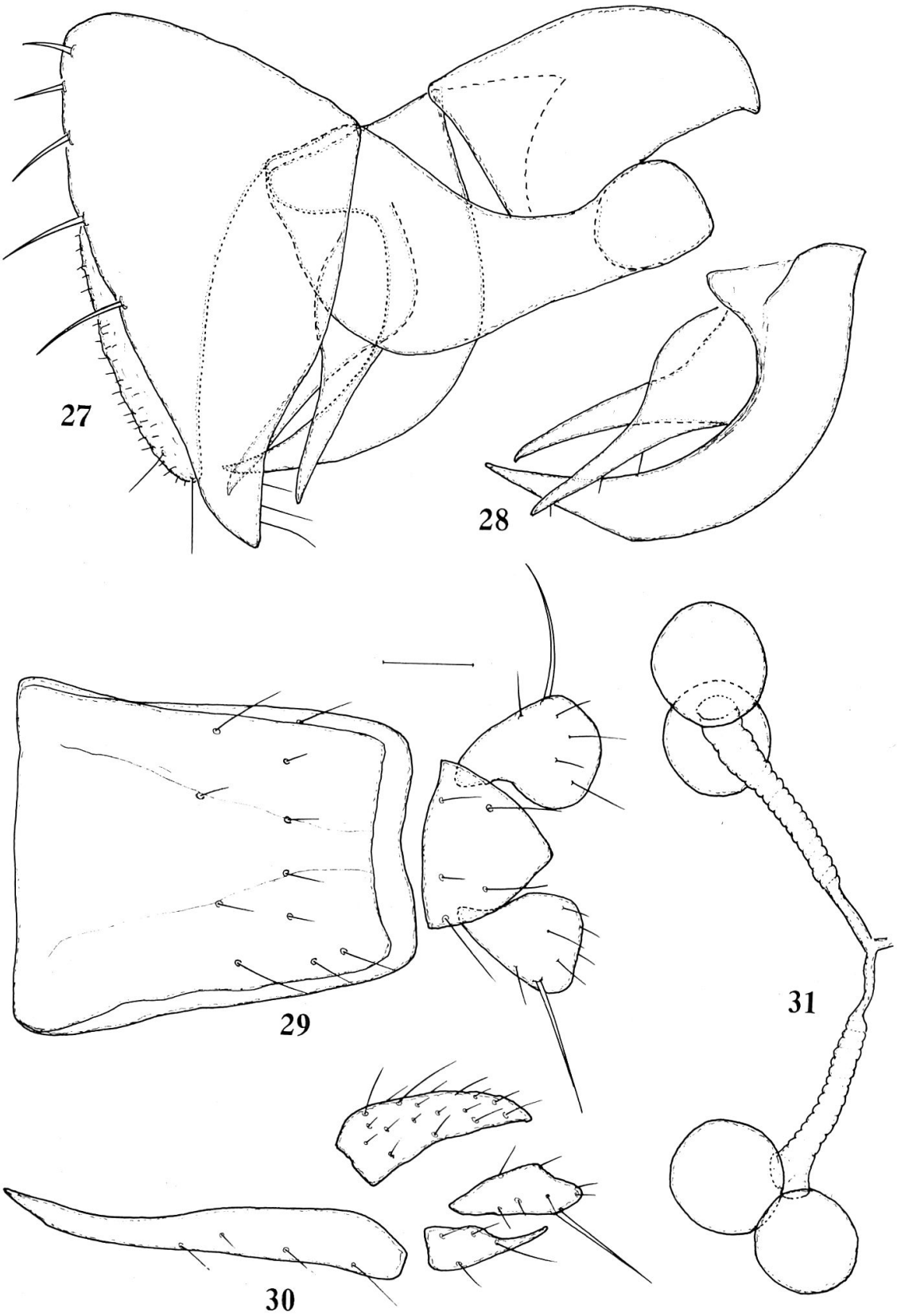
Male: Head: dark grey, comparatively short, dorsally twice as wide as long, and laterally 1.5 times higher than wide. Antennae black, comparatively small, first flagellomere 1.5 times longer than high (measured on the inside), and only a little higher than pedicel. Arista brown-black, short, apical aristomere twice as long as the base. Face wider than high, antennal bases close together: their distance about half the width of the antennal bases. Frons dark, about half as wide as head, with short setae. Orbital plates not prominent, almost of the same colour as the frons. Ocellar triangle not well outlined. Gena with a short bristle in the middle, wide, 1.5 times wider than height of the first flagellomere. Eye rounded, comparatively small, only twice as high as gena.

Thorax: grey. Mesonotum uniformely densely covered with black hairs, not arranged in regular rows. On the first quarter of the mesonotum two slightly noticeable brownish stripes, each one with 2 irregular acrostichal rows, divided by a grey hairless stripe. Chaetotaxy as typical in the subgenus. Three pairs of dorsocentral bristles are present, of which the anterior is weaker but still longer than surrounding hairs. One pair of prescutellar bristles as typical in the subgenus *Leucopomyia* is present. Wings brownish, with black veins; R_{4+5} and M_{1+2} parallel, the mid sector of M_{1+2} shorter than dm-cu; ultimate sector of CuA_1 1.7 times as long as dm-cu.

Legs: black, only the apex of the femora slightly yellow.

Abdomen: grey, unspotted, only with large, brown patch on the first two tergites.

Terminalia (Figs 27–28): Epandrium large, high; surstyli short; cerci long; hypandrium short and wide (Fig. 27); aedeagus C-shaped, with wide, backwards directed elongated basal part, and pointed apex (Fig. 28). Apodeme comparatively large.



Figs 27–31. *Leucopis latifrons* sp. nov. Figs 27–28: ♂ genitalia of the holotype. 27, general view from lateral side; 28, aedeagus and gonites, lateral view. – Figs 29–31: ♀ genitalia and 8th sternite of the paratype. 29, ventral view; 30, lateral view; 31, spermathecae.

Length: 2.43 mm (Holotype).

Female: like the male, with 1+3 pairs of visible dorsocentrals, the last two pairs longer. The midsector of vein M_{1+2} is equal to dm-cu; ultimate sector of CuA_1 twice as long as dm-cu. Abdomen grey, with black hairs. Genitalia with short cerci, epi- and hypoproct, but large eighth sternite (Figs 29–30). Spermathecae spherical, comparatively large (Fig. 31).

Relationships: The shape of the aedeagus of the new species is rather similar to that of other species of the subgenus *Leucopis*, such as *L. ulmicola* TANASIJTSHUK, and especially *L. (Leucopomyia) alticeps* CZERNY. However, *L. latifrons* can be separated from these species by the very extended epandrium, and the somewhat shorter and C-shaped aedeagus (Fig. 28).

Etymology: The new species is named after the very wide frons in dorsal view.

Subgenus *Leucopis* MEIGEN, 1830
group *argentata*

19. *Leucopis (s. str.) argentata* HEEGER, 1848

Material studied (3 specimens): Switzerland: 1 ♂, VS, Grône-Poutafontana, 18.V.1996, leg. MERZ & BÄCHLI. 1 ♂, VS, Sierre-Finges, 550 m, 18.V.1996, leg. MERZ & BÄCHLI. 1 ♂, ZH, Zürich-Katzensee, 440 m, 25.V.1996, leg. MERZ.

Distribution: Holarctic species, known from former Soviet Union, Mongolia and Afghanistan in the East to France and Italy in the West in Europe. Also known from California in the United States. New for Switzerland.

Taxonomic notes: The species is characterized by the narrow frons, which is only one third of the head's width, the yellow-brownish arista at the base and the well outlined, protruding ocellar plate.

group *steinbergi*

20. *Leucopis (s. str.) formosana* HENNIG, 1938

Material studied (6 specimens): Israel: 1 ♂, Tel-Aviv, Country Club, beach, 14.III.1995, leg. MERZ. 4 ♂♂, Newe Zohar, 19.III.1995, leg. MERZ. 1 ♂, Timna, 18.III.1995, leg. MERZ.

Distribution: This species was known so far only from the oriental region: China, Taiwan and India. New for the palaearctic region and Israel.

Taxonomic notes: The male genitalia of the specimens studied fit rather well the redescription of TANASIJTSHUK (1986: 231), but show some slight differences in the shape of the surstyli and the epandrium (compare Figs 32–35 with Figs 416–420 in TANASIJTSHUK, 1986).

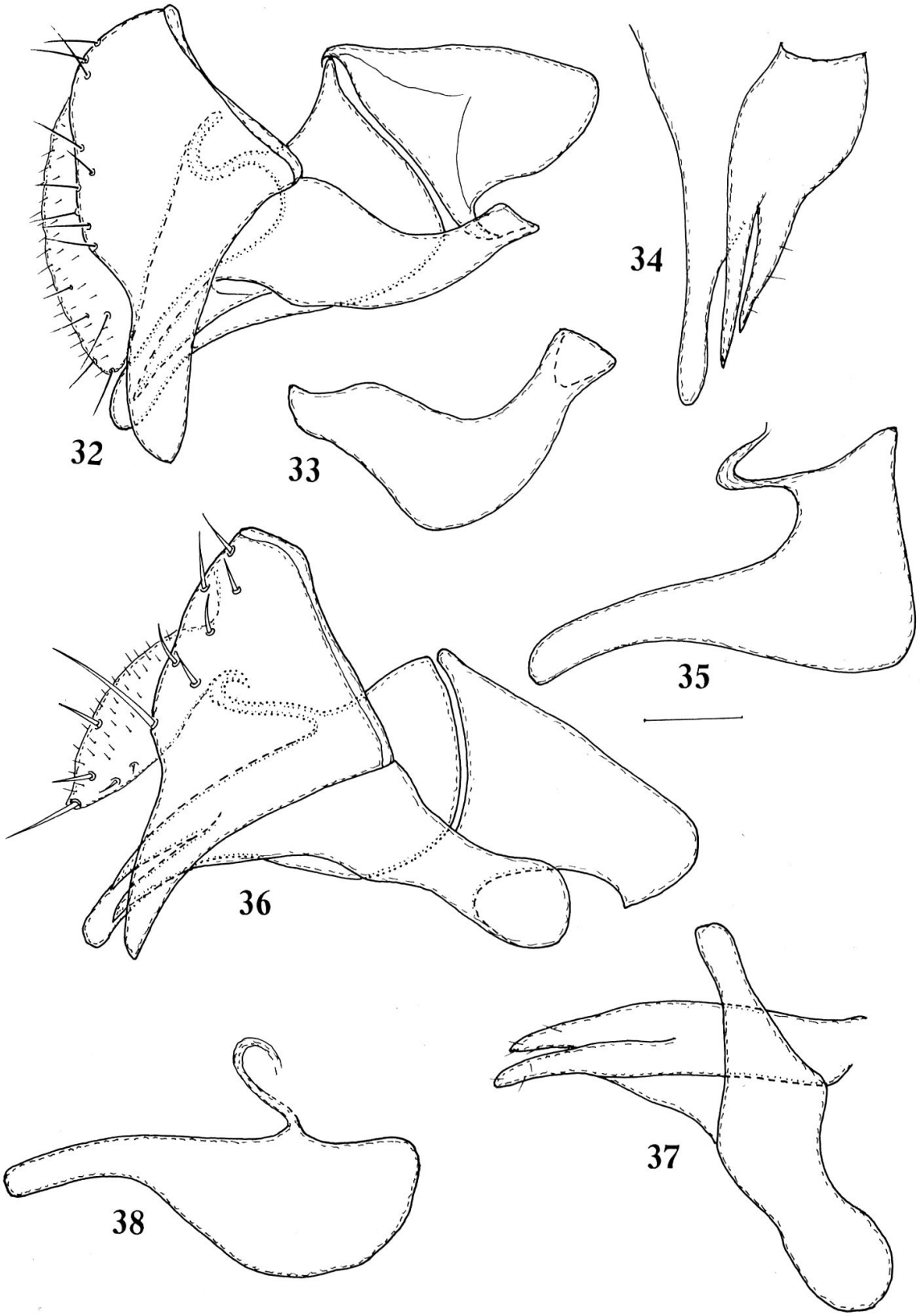
group *aphidiperda*

21. *Leucopis (s. str.) aphidiperda* RONDANI, 1847

Material studied (16 specimens): Switzerland: 1 ♂, TI, Mte. Caslano, 400 m, 20.V.1991, leg. MERZ. 5 ♂♂, 1 ♀, VS, Baltschieder, Rotten-Ufer, 650 m, 17.V.1996, leg. MERZ & BÄCHLI. 1 ♂, VS, Guttet, 29.VII.–6.VIII.1993, leg. BÄCHLI. 8 ♂♂, VS, Leuk-Pfynwald, 19.V.1996, leg. MERZ & BÄCHLI.

Distribution: Transpalaearctic species, known from former Soviet Union and Iran in the East to Italy and Hungary in Europe. New for Switzerland.

Taxonomic notes: The colour of the mesonotum varies from grey to brownish, but the shape of the aedeagus is very characteristic.



Figs 32–38. Figs 32–35: *Leucopis formosana* HENNIG, ♂ genitalia in lateral view. 32, general view; 33, hypandrium; 34, apex of aedeagus and gonites; 35, aedeagus. – Figs 36–38: *Leucopis ninae* TANASIJTSHUK, ♂ genitalia in lateral view. 36, general view; 37, hypandrium and gonites; 38, aedeagus.

group *annulipes*

22. *Leucopis (s. str.) rufithorax* TANASIJTSHUK, 1958

Material studied (7 specimens): Switzerland, 7 ♂♂, VS, Leuk-Pfynwald, 19.V.1996, leg. MERZ & BÄCHLI.

Distribution: France, Hungary, Rumania, European part of Russia, Crimea, Uzbekistan. New for Switzerland.

23. *Leucopis (s.str.) pallidolineata* TANASIJTHSUK, 1961

Material studied (1 specimen): Switzerland: 1 ♂, Baltschieder, Rotten-Ufer, 17.V.1996, leg. MERZ & BÄCHLI.

Distribution: From France and Hungary to the European part of Russia, central Asia and the Russian Far East. New for Switzerland.

24. *Leucopis (s. str.) monticola* TANASIJTSHUK, 1961

Material studied (3 specimens): Switzerland: 1 ♂, VS, Baltschieder, 17.V.1996, leg. MERZ & BÄCHLI. 1 ♂, VS, Guttet, 2.–3.VIII.1993, leg. BÄCHLI. 1 ♂, VS, Visperterminen, 1310 m, 21. VII. 1992, leg. SAUTER.

Distribution: Dagestan, Crimea, Rumania, Italy, France, Spain. New for Switzerland.

25. *Leucopis (s. str.) hennigrata* MCALPINE, 1978

Material studied (1 specimen): Switzerland: 1 ♂, ZH, Zürich-Albisgütli, 530 m, 7.IV.1996, leg. MERZ.

Distribution: Known from France, Germany, Switzerland, Austria, former Yugoslavia, Greece and Turkey in the Old World. Also introduced to Canada.

26. *Leucopis (s. str.) ninae* TANASIJTSHUK, 1966

Material studied (2 specimens): Switzerland: 1 ♂, TI, Biasca-Loderio, 17.VI.1995, leg. MERZ & BÄCHLI. Israel: 1 ♂, Elot, 8.III.1995, leg. MERZ.

Distribution: Italy, Rumania, Ukrainia, Transcaucasus, central Asia, Turkey, Iraq, Iran, Afghanistan and Mongolia. New for central Europe (Switzerland) and Israel.

Taxonomic notes: The species is easily recognized by the wide hypandrium and the short, rounded distal part of the aedeagus (Figs 36–38).

27. *Leucopis (s.str.) impunctata* ROSER, 1840

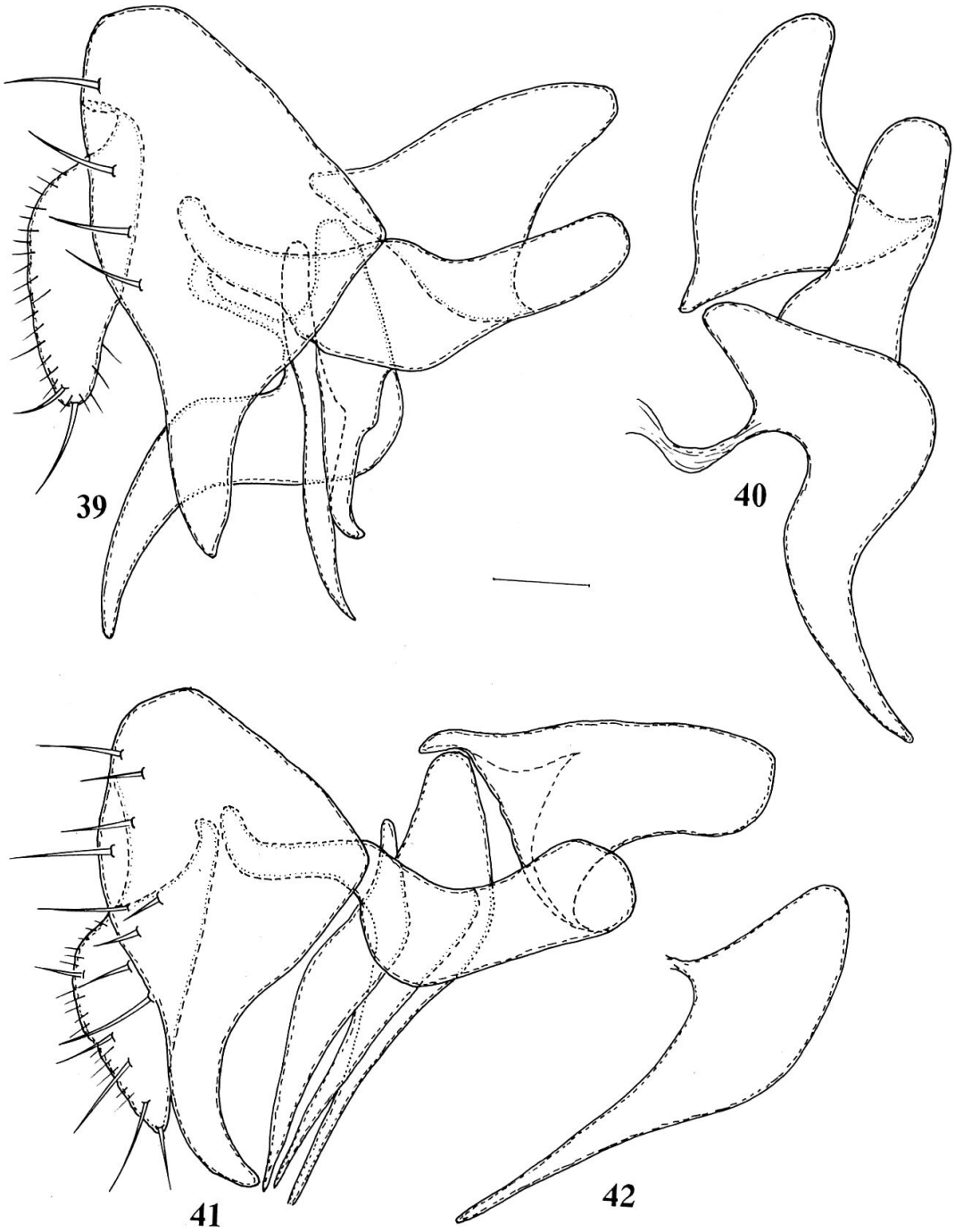
Material studied (13 specimens): 8 ♂♂, 1 ♀, TI, Biasca-Loderio, 17.VI.1995, leg. MERZ & BÄCHLI. 4 ♂♂, VS, Baltschieder, Rotten-Ufer, 17.V.1996, leg. MERZ & BÄCHLI.

Distribution: Estonia, Russia (district of St. Petersburg), Germany. New for Switzerland.

28. *Leucopis (s. str.) melanopus* TANASIJTSHUK, 1959

Material studied (7 specimens): Switzerland: 1 ♂, AG, Würenlingen, 27.VII.1994, leg. BÄCHLI. 3 ♂♂, VS, Leuk-Brentjong, 900 m, 12.VIII.1993, leg. MERZ. 1 ♂, VS, Salgesch, VI.–VII.1995, leg. BESUCHET. 2 ♂♂, ZH, Dietikon, 27.VII.1989, leg. BÄCHLI.

Remark: The specimen from Salgesch was collected with a wine-beer-trap placed at about 5 m heigth above ground level on an oak tree.



Figs 39–42. Figs 39–40: *Leucopis melanopus* TANASIJTSHUK, ♂ genitalia, lateral view. 39, general view; 40, aedeagus with apodeme and hypandrial base. – Figs 41–42: *Leucopis atritarsis* TANASIJTSHUK, ♂ genitalia, lateral view. 41, general view; 42, aedeagus.

Distribution: England, Poland, Romania, Crimea, district of Stavropol, Armenia, Azarbaijdzhan, Uzbekistan, Tadzhikistan and Kirghizia. New for Switzerland.

Taxonomic notes: The shape of the epandrium and hypandrium (Fig. 39) is very similar to that of the previous species, but they differ clearly in the structure of the aedeagus (Fig. 40).

29. *Leucopis (s. str.) grandis* TANASIJTSHUK, 1959

Material studied (1 specimen): Switzerland: 1 ♀, VS, Visperterminen, 1400 m, 18.VII.1993, leg. MERZ.

Distribution: The species is known in Europe only from the Crimea and Armenia. Further recorded from Turkmenia and Kazakhstan (TANASIJTSHUK, 1986). New for Switzerland. This new record enlarges the area of distribution to the west considerably.

Taxonomic notes: The species is even in the female well characterized by the yellow-brown antennae, palpi and proboscis, the 3 pairs of black dorsal spots on the abdominal tergites 3–5, and the comparatively large size of 4.0 mm in length.

group *glyphinivora*

30. *Leucopis (s. str.) glyphinivora* TANASIJTSHUK, 1958

Material studied (20 specimens): Switzerland: 2 ♂♂, GE, Lullier, VIII.1992, leg. HÄCHLER. 1 ♂, JU, Delémont, 2.–6.VIII.1974, leg. BÄCHLI. 1 ♂, TI, Biasca-Loderio, 17.VI.1995, leg. MERZ & BÄCHLI. 9 ♂♂, 1 ♀, VS, Baltschieder, Rotten-Ufer, 650 m, 17.V.1996, leg. MERZ. 1 ♂, 1 ♀, VS, Grächen, 1450 m, 5.VI.1987, leg. MERZ. 2 ♂♂, VS, Leuk-Pfynwald, 19.V.1996, leg. MERZ & BÄCHLI. 1 ♂, VS, Visperterminen, 1310 m, 21.VII.1992, leg. SAUTER. Israel: 1 ♂, Bor Mashash, 16.III.1995, leg. MERZ.

Distribution: Holarctic species, known in the Palaearctic region from Spain and France to Israel, Central Asia, Afghanistan and the Far East. Further recorded in the Nearctic region from California. New for Switzerland.

31. *Leucopis (s. str.) atritarsis* TANASIJTSHUK, 1958

Material studied (7 specimens): Switzerland: 2 ♂♂, TI, Biasca-Loderio, 17.VI.1995, leg. MERZ & BÄCHLI. 3 ♂♂, VS, Guttet, 2.–3.VIII.1993, leg. BÄCHLI. 1 ♀, VS, Visperterminen-Giw, 1300–1900 m, 15.VII.1995, leg. MERZ. 1 ♂, VS, Visperterminen-Gebidempass, 2200 m, 16.VII.1995, leg. MERZ.

Distribution: Transpalaearctic species, widely distributed from France and England to the Far East. New for Switzerland.

Taxonomic notes: The species is similar to *L. hennigrata* with regards to the shape of the aedeagus, but it differs from the latter by the specific, wide hypandrial arch and the right dorsoapical side of the aedeagus (Figs 41–42).

32. *Leucopis (s. str.) pseudomelanopus* TANASIJTSHUK, 1961

Material studied (15 specimens): Switzerland: 1 ♂, GE, Russin, 400 m, 5.IX.1993, leg. MERZ. 1 ♂, GR, Ftan-Clünas, 5.VIII.1995, leg. MERZ & BÄCHLI. 1 ♂, JU, Delémont, 2.–6.VIII.1974, leg. BÄCHLI. 2 ♂♂, SH, Merishausen, 19.VIII.1992, leg. BÄCHLI. 4 ♂♂, VS, Guttet, 29.VII.–6.VIII.1993, leg. BÄCHLI. 1 ♂, VS, Hohtenn-Bahnhof, 1250 m, 3.IX.1991, leg. MERZ. 2 ♂♂, Leuk-Pfynwald, 17.V.1996, leg. MERZ & BÄCHLI. 1 ♂, VS, Visperterminen, 1530 m, 23.VII.1991, leg. SAUTER. Israel: 1 ♂, 1 ♀, Har Ramon, 1000 m, 17.III.1995, leg. MERZ.

Distribution: Transpalaearctic species, known from Hungary to the Far East. New for Switzerland and Israel.

33. *Leucopis (s. str.) celsa* TANASIJTSHUK, 1979

Material studied (5 specimens): Switzerland: 3 ♂♂, VS, Baltschieder, Rotten-Ufer, 650 m, 17.V.1996, leg. MERZ; 2 ♂♂, VS, Leuk-Pfynwald, 600–650 m, 19.V.1996, leg. MERZ & BÄCHLI.

Distribution: Known only from Tadzhikistan and Hungary. According to TANASIJTSHUK (1986), the distribution is not disjunct as it may be suggested from the known localities, but it is just a rare species which is only seldom collected. The

present findings confirm this opinion and extend the area of the species remarkably to the west.

Taxonomic notes: The species is best characterized by the high epandrium and the trapeziform basal part of the aedeagus (Figs 13–14), as was noted by TANASIJTSHUK (1986).

34. *Leucopis (s. str.) curtisetosa* spec. nov.

Material studied (1 specimen): **Holotype** ♂, Israel, Timna, 18.III.1995, leg. MERZ. It is deposited in the ETHZ.

Diagnosis: Head short, wide, first flagellomere wider than genae, bristles short, veins of wings yellow, aedeagus comparatively short and wide, rounded at the apex.

Male: Head: dark grey, comparatively short, dorsally 2.33 times wider than long, laterally 1.66 times higher than wide and in front 1.4 times wider than high. Antennae black, first flagellomere 1.66 times wider than long, arista short, equal in length to the height of the first flagellomere. Face in the middle below the antennae concave, and in the lower part well projecting with conical, small protuberance. Palpi black, wide, extending beyond the epistom. Frons dark brown, 1.15 times wider than long, ocellar plate wide; Lunule wide and short, 6 times wider than high, the distance between antennal bases wider than the diameter of one base. Outer vertical bristles comparatively short, inner even shorter and seta-like. Gena comparatively narrow, the first flagellomere 1.3 times wider than gena. Eye large, vertical, 2.7 times higher than gena.

Thorax: brown-grey, but the specimen is somewhat greasy and the original colour is obscured. Mesonotum with two wide lateral dark-brown stripes from humeri to the scutellum, uniformly covered with whitish short hairs, not arranged in rows. Two pairs of short dorsocentral bristles present, of which the first pair is very short, seta-like. Other chaetotaxy as usual in the genus, but the bristles are generally shorter and more robust. Scutellum brown like the lateral bands of the mesonotum, with a pair of apical and lateral bristles, these shorter than the length of the scutellum. Wings widest at the basal part at the level of the anal angle; colour light lemon with yellow veins; only apical part of the Costa, R_{2+3}, R_{4+5} and M_{1+2} dark brown; mid-part of M_{1+2} 1.66 times longer than dm-cu; apical part of CuA_1 1.75 times longer than dm-cu. Halteres with brown base and yellow knob.

Legs: predominantly black, knees yellow, tarsi brown but metatarsi yellow-brown.

Abdomen: With a pair of brown sports on tergites 3–5.

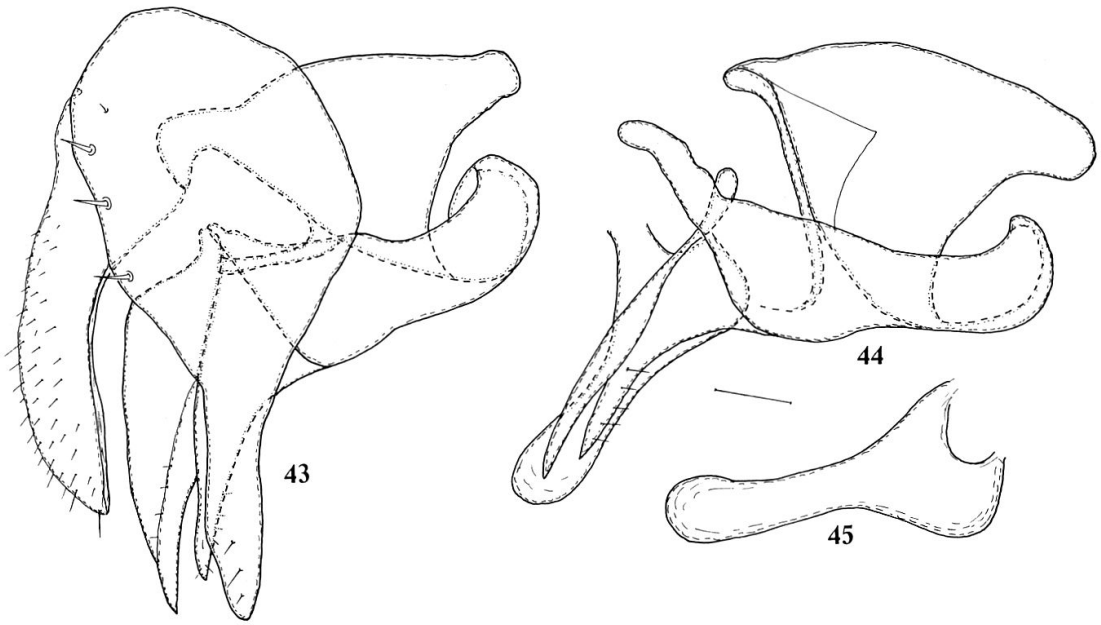
Genitalia (Figs 43–45): Surstyli characteristically elongated (Fig. 43); Aedeagus comparatively short, with wide, rounded apex in profile (Fig. 45); this latter character is unique in known palaearctic species. Apodeme with very wide basal part (Fig. 44).

Length: 3.05 mm; wing 2.3 mm.

Female: unknown.

Differential diagnosis: The large size of the body and the dorsal abdominal spots on tergites 3–5 are also present in *L. grandis*. But *L. curtisetosa* is well distinguishable by the wider first flagellomere, the shorter bristles, the dark-brown scutellum and stripes on the mesonotum, and most characteristically by the specific shape of the genital structures.

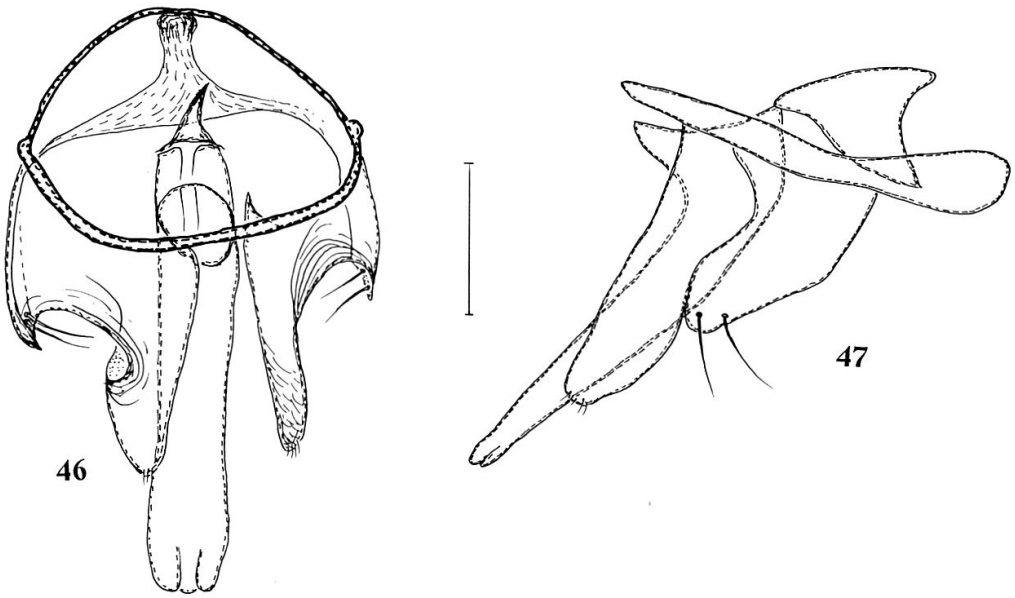
Etymology: The species is named after the short bristles and hairs on the head and thorax.



Figs 43–45. *Leucopis curtisetosa* sp. nov., ♂ genitalia in lateral view of the holotype. 43, general view; 44, hypandrial complex; 45, shape of aedeagus.

CONCLUSIONS

Although only 204 specimens were studied in the present paper, they belong to 34 species in 3 genera. Their geographical origin is demonstrated in Tab. 1. It is noteworthy that 26 of the 28 species mentioned from Switzerland are new for this country, thus raising the number of species known to 30. Similarly, most records of the other species are new for the respective countries. This fact highlights very well



Figs 46-47. *Parochthiphila nigrolineata* sp. nov. ♂ paratype from Leuk-Pfynwald. 46, hypandrium, gonites and aedeagus in dorsal view. Gonites drawn at different angles to show their structure. 47, aedeagus and gonites in lateral view.

Tab. 1: Origin of the Chamaemyiidae specimens studied.

Nr.	Species	Countries				
		Switzerland	France	Italy	Croatia	Israel
1	*Parochthiphila spectabilis*		x			
2	*P. nigrolineata*	x				
3	*P. coronata*	x	x			
4	*P. nigripes*		x			
5	*P. decipia*			x		
6	*P. ruderalicola*				x	
7	*Chamaemyia polystigma*	x				x
8	*C. submontana*	x				
9	*C. sylvatica*	x				x
10	*C. aridella*	x				
11	*C. aestiva*	x				
12	*C. elegans*	x				
13	*C. nataliae*	x				
14	*C. geniculata*	x				
15	*C. juncorum*	x				
16	*Leucopis atratula*	x				
17	*L. silesiaca*	x				
18	*L. latifrons*	x				
19	*L. argentata*	x				
20	*L. formosana*					x
21	*L. aphidiperda*	x				
22	*L. rufithorax*	x				
23	*L. pallidolineata*	x				
24	*L. monticola*	x				
25	*L. hennigrata*	x				
26	*L. ninae*	x				x
27	*L. impunctata*	x				
28	*L. melanopus*	x				
29	*L. grandis*	x				
30	*L. glyphinivora*	x				x
31	*L. atritarsis*	x				
32	*L. pseudomelanopus*	x				x
33	*L. celsa*	x				
34	*L. curtisetosa*					x
	Total	28	3	1	1	7

the poor knowledge of the family even in the comparatively well studied Western Palaearctic region. Four species are new to science of which two belong each to *Parochthiphila* and *Leucopis*.

From a biogeographical point of view, the following species deserve special attention: *P. decipia*, known previousely only from Moldavia and Central Asia, was found also in Southern Italy; *Ch. nataliae* and *L. grandis*, so far thought to occur only from the Crimea eastwards, are now known also from Switzerland; *L. monticola* is a Mediterranean element with a remarkable extension in Switzerland towards the north; the previous records of *Ch. sylvatica* covered only the European territory, but the species is now known also from Israel; *L. celsa* was previousely only mentioned from Hungary in Europe and *L. formosana* is a new species for the Palaearctic region.

A short analysis of the Swiss fauna reveals that most species are known from lower altitudes (Tab. 2), whereas the species richness diminishes dramatically with

Tab. 2: Number of species of Chamaemyiidae in different altitudinal belts in Switzerland.

Altitude	Belt	Nr. of species
200- 700 m	collin	21
700-1500 m	montane	15
1500-2000 m	subalpine	7
> 2000 m	alpine	5

increasing altitude. This is especially the case in the largest genus, *Leucopis*, where all species except for *L. atritarsis*, *L. atratula* and *L. pseudomelanopus* could be found only up to 1500 m. Conversely, members of *Chamaemyia* seem to have less specific ecological requirements, as they are regularly also found at high altitudes. *C. juncorum*, *C. nataliae* and *C. submontana* seem to have their major distribution in subalpine and alpine regions. Within Switzerland, most species (20 of 28) were found in the canton Valais. This central alpine valley is characterized by its hot and dry climate with steppe vegetation and pine forests. It is noteworthy that all species of *Leucopis* except for *L. hennigrata*, *L. ninae* and *L. argentata* were found in that area. The Chamaemyiidae in that region could be swept normally in open grassland on sandy soil (localities of Baltschieder and Leuk-Pfynwald). Although collecting of Chamaemyiidae was more extensive in the Valais-region than in other parts of Switzerland, this area is probably the most diverse. Northern Switzerland seems to have a somewhat poor fauna, because around Zürich, another well studied area, only 7 species of Chamaemyiidae could be collected in the last 10 years.

ACKNOWLEDGEMENTS

We express our best thanks to Dr. G. BÄCHLI (Dietikon) and Dr. L. PAPP (Budapest) for putting some Chamaemyiidae at our disposal and to Dr. K. TSCHUDI-REIN for her careful comments on the English style of the manuscript.

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