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ANNALES

de la
SOCIÉTÉ SUISSE DE ZOOLOGIE
et du
MUSÉUM D'HISTOIRE NATURELLE
de la Ville de Genève

tome 116
fascicule 3-4
2009

REVUE SUISSE DE ZOOLOGIE

TOME 116—FASCICULE 3-4

Publication subventionnée par:
ACADÉMIE SUISSE DES SCIENCES NATURELLES (SCNAT)
VILLE DE GENÈVE
SOCIÉTÉ SUISSE DE ZOOLOGIE

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***Papiliolebias hatinne*, a new annual fish species
(Cyprinodontiformes: Rivulidae) from Salta, Argentina**

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***Papiliolebias hatinne*, a new annual-fish species (Cyprinodontiformes: Rivulidae) from Salta, Argentina.** - *Papiliolebias hatinne* sp. n. is described from a temporary pond, 5 km north of Embarcación, in the río Bermejo basin, Province of Salta, Argentina. *Papiliolebias hatinne* sp. n. is distinguished from the only congener, *P. bitteri*, from the río Paraguay basin, by a combination of characters: 26-28 vertebrae, with 8-10 being pre-caudal; second proximal radial of anal fin located between vertebrae 9 and 10 or 10 and 11; 1-2 vomerine teeth; an elongation of jaw suspensorium; first epibranchial somewhat triangular; 7-8 pelvic-fin rays; 12-13 pectoral-fin rays; 20-23 caudal-fin rays; males with anal fin turquoise blue, dorsal and caudal fins bluish, pelvic fin blue, and humeral spot metallic bluish green; females without dark dots on flanks. The chromosome formula is $2n= 28$, the $FN= 36$, integrated by two pairs of metacentric, two pairs of submetacentric and ten pairs of subtelocentric chromosomes.

Keywords: new *Papiliolebias* - Bermejo basin - karyogram of *Papiliolebias hatinne*.

INTRODUCTION

The tribe Plesiolebiasini Costa (1998a; 2007) includes members of the genera *Papiliolebias*, *Pituna*, *Plesiolebias*, *Maratecoara*, and *Stenolebias*. Among those genera, only the *Papiliolebias* Costa, 1998 is endemic to the Chaco subregion. The genus *Papiliolebias* was monotypic including only *Papiliolebias bitteri* (Costa, 1989). This species is common in environments of the Paraguayan Chaco, included in the lower Paraguay river basin, together with further rivulid species such as *Austrolebias chacoensis* (Amato, 1986), *A. vandenberghi* (Huber, 1995), and *Trigonectes balzanii* (Perugia, 1891) among others.

One of the longer southernmost affluent into Paraguay river in Argentinean Chaco subregion is the río Bermejo. Some collections close to the río Bermejo yielded specimens of a new rivulid species which has been included in the genus *Papiliolebias*.

The objective of the present paper is the description of *Papiliolebias hatinne* sp. n. collected in one temporary pond close to the río Bermejo, in the province of Salta, Argentina.

MATERIAL AND METHODS

The measurements were taken with a dial caliper, following Costa (1988). Proportions are expressed as percentages of different lengths (SL and HL), or otherwise as specified. Counts indicated the total number of fin rays in all fins. Specimens were cleared and counterstained following Taylor & Van Dyke (1985). Bivariate and multivariate analyses were performed with Statistica 5.5 and SPSS, respectively. Measurements of *Papiliolebias bitteri* were taken from Costa (1998a). Institutional acronyms follow Fricke & Eschmeyer (2008).

COMPARATIVE MATERIAL EXAMINED: *Papiliolebias bitteri* (Costa, 1989): ANSP 170422, 2 males, 2 females, Paraguay (not measured); MCP 12794, paratypes, 1 male, 1 female (photographs), Paraguay.

CYTOGENETIC METHODS: Eleven individuals (6 males, 5 females) belonging to natural populations were analyzed. Metaphases were studied following the protocols of Kligerman & Bloom (1977) with modifications proposed by Bertollo *et al.* (1978). The better metaphase preparations from spleen, kidney, and gill epithelium were selected under a microscope Nikon Microphot-Fx with an immersion objective. Photographs were taken with Kodalith (25 asms). Chromosome nomenclature follows Levan *et al.* (1964) and Denton (1973) for fishes. Based on arm relation (AR), chromosomes were classified as metacentric (M), submetacentric (SM), subtelocentric (ST), and acrocentric (A). The diploid number (2n) and the number of chromosome arms (FN) were also established.

RESULTS

Papiliolebias hatinne sp. n.

Figs 1, 3-5, Tables 1-3

Holotype: FML 4000, male, 32.4 mm SL, Argentina, Province of Salta, río Bermejo basin, temporary pond at the side of Ruta Nacional 34, 5 km north of Embarcación, close to 23° 15'S - 64° 07'W, coll. C. Butí, F. Cancino, and E. Lavilla, May 1999 (Fig. 1).

Paratypes: The thirty four specimens studied came from Argentina, Province of Salta, and were collected in the same locality of the holotype by C. Butí, F. Cancino, and E. Lavilla. FML 4501, 5 ♂, 26.3-32.7 mm SL, 5 ♀, 28.1-30.4 mm SL, collected with the holotype. FML 4502, 3 ex. C&S, 2 ♂, 29.15-30.5 mm SL, 1 ♀, 27.8 mm SL, March 1999. FML 2786, 4 ♂, 22.8-25.8 mm SL. FML 2963, 1 ♂, 35.3 mm SL, 10 ♀, 26.6-35.6 mm SL. MHNG 2704.014, 1 ♂, 24.8 mm SL, 5 ♀, 24.4-26.1 mm SL, May 1999. Genetic samples were obtained from FML 2963 specimens and stored at the Sección Genética Evolutiva, Facultad de Ciencias, Universidad de la República, Uruguay, catalogue number R35-44.

DIAGNOSIS: *Papiliolebias hatinne* sp. n. is distinguished from *P. bitteri* –the sole species of the genus– by a combination of characters: 26-28 vertebrae with 8-10 of them precaudal; second proximal radial of anal fin located between vertebrae 9 and 10 or 10 and 11; 1-2 vomerine teeth; an elongation of jaw suspensorium; first epibranchial somewhat triangular; 7-8 pelvic-fin rays; 12-13 pectoral-fin rays; 20-23 caudal-fin

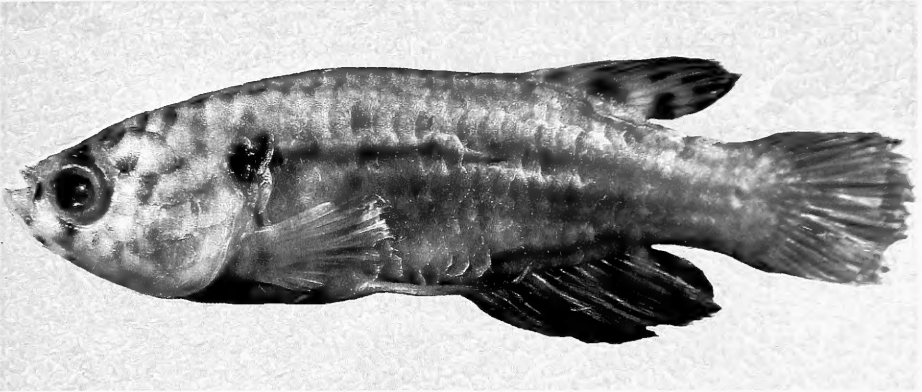


FIG. 1. *Papiliolebias hatinne* sp. n., holotype, male, FML 4000.

rays; males with anal fin turquoise blue, dorsal and caudal fins bluish, pelvic fin blue, and humeral spot metallic bluish green; females without dark dots on their flanks.

DESCRIPTION: Morphometric and meristic data of the holotype and 10 paratypes are presented in Tables 1-3. Females are larger than males in studied specimens (47.6 mm, 35.3 mm maximum of SL respectively). Dorsal profile of body convex from tip of snout to dorsal-fin origin; gently concave caudal peduncle in males, almost straight in females. Anteroventral profile of head gently rounded. Ventral profile of body very gently convex, caudal peduncle ventrally convex in males and almost straight in females. Some males with concavity on frontal and supraoccipital areas; females always straight.

Dorsal-fin rays 11-12 (iii,8,i or iii,8, one specimen with iii,7) in both sexes. Tip of dorsal fin rounded in both sexes without filamentous rays; dorsal fin origin in a vertical through 6th to 9th anal-fin rays. Caudal fin with 20-23 rays (iv,12-14,iv-vi); caudal-fin margin rounded, central rays longer than upper and lowermost rays. Anal-fin rays with 17-19 (iii,14-16 or iii,15,i) in males; in females, 16-18 rays (ii,14-16). Anal fin rounded, anterior and posterior portions of fin with similar length in both sexes. Pectoral fin with 12-13 rays (i,10,i or i,11,i); distal margin of pectoral fin rounded, with three middle rays notably longer, falling in a vertical through pelvic-fin base and urogenital papillae in males; in females, tip of pectoral fin reaching base of pelvic fin. Pelvic fin with 7-8 rays (i,5,i or i,6 or i,6,i), with 3rd ray extended as filament, finishing between 7th and 11th anal-fin rays in males; in females, longest ray reaching 2nd to 4th anal fin ray.

Scale pattern variable; most specimens with E-scales overlapping; frontal squamation circularly ordered; A-scale without free margins, situated between eyes or completely posterior to them. Sometimes, A-scale at lower level than remaining scales. Both sides of body with one predorsal longitudinal obtuse keel; series of scales forming keel with soft central region, especially developed in live males. Longitudinal series with 26-28 scales; transverse series with 11 scales; fourteen scales around caudal peduncle. Supraorbital neuromasts 7-8+4.

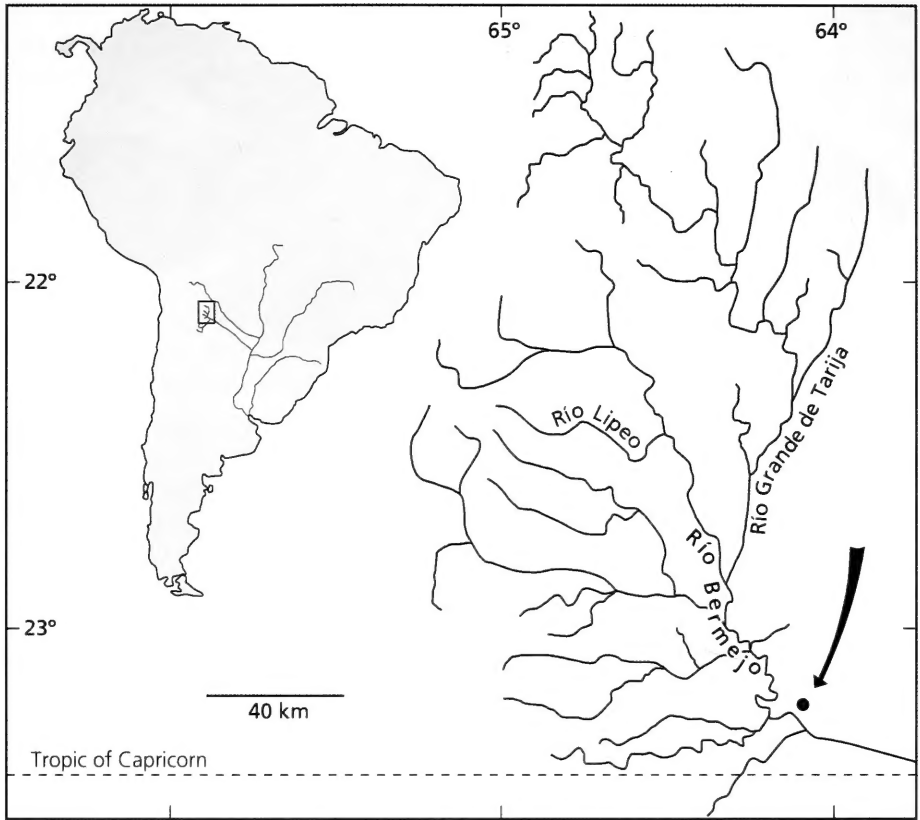


FIG. 2

Map indicating the type locality of *Papiliolebias hatinne* sp. n., close to 23° 15' S - 64° 07' W, rio Bermejo basin, Province of Salta, Argentina.

COLOUR IN LIFE: Male: Background iridescent gold excluded dorsal and peduncular areas iridescent bluish. Flanks with 5 to 8 oblique irregular black stripes, some of them forming a V with vertex oriented ventrally. Dorsum and side of head golden beige, with dark spots; iris orange; dark wide suborbital bar, reaching isthmus; opercular region golden. Humeral spot metallic bluish green on 2-4 scales. Dorsal and caudal fins bluish and iridescent; sometimes both fins with dark gray margins; three large black spots on dorsal-fin base; small dots scattered over complete surface of fin. Anal fin turquoise blue, distal margin white; 5-6 dark large basal spots alternating with white spots. Pectoral fins hyaline, pale yellowish. Pelvic fins blue. Chromatophores concentrated on posterior scale margin, forming a reticulate pattern.

Female: Flanks of body and head pale beige, iridescent, without dark spots. Unpaired fins hyaline; some specimens with those fins grayish or yellowish. Paired fins hyaline; in some specimens, pelvic fins yellowish. Iris pale orange; suborbital bar dark, slender and short; opercular and humeral areas golden; a translucent portion on gill

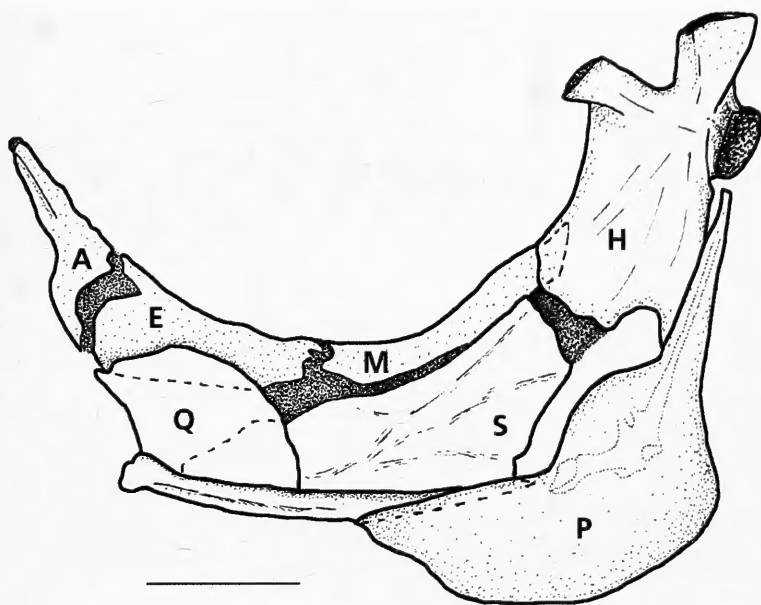


FIG. 3

Suspensorium of *Papiliolebias hatinne* sp. n., FML 4002, 27.8 mm SL. A= autopalatine; E= ectopterygoid; H= hyomandibula; M= metapterygoid; P= preopercle; Q= quadrate; S= symplectic.

rakers. Chromatophores concentrated on central scale portion, forming a cobblestone-like surface.

ETIMOLOGY: The specific epithet *hatinne* means nice in the indigenous Chorote language. The word is used as an adjective in apposition.

DISTRIBUTION: *Papiliolebias hatinne* sp. n. is known to be present in only the type locality, one temporary pond close to río Bermejo basin, at the side of Ruta Nacional 34, 5 km north of Embarcación (close to 23° 15'S - 64° 07'W), Salta, Argentina (Fig. 2).

HABITAT: The pond was 20 m long, 6 m wide, and 1.2 to 1.5 m deep with clear water; its surface was almost completely covered by duckweed (*Lemna* sp.), floating fern (*Salvinia* sp.), water lettuce (*Pistia*), and water hyacinth (*Eichornia* sp.). The margins of the pond had terrestrial macrophyts. The composition of vegetation on the surface of ponds along different periods of the year in the Chaco form the "pastizal de los madrejones" (pasture of the swamps; Morello & Saravia Toledo, 1959) at the beginning of the rainy season to the "camalotal" (place with the aquatic *Eichornia*; Burkart, 1957) at the end of that period.

The Chaco area has a subtropical climate with warm summers and temperate winters; annual mean temperature varies between 14 to 26 °C; the annual rainfall reaches 500-1,000 mm, but with a marked rainy season from October to March followed by a relative dry period. The water of many temporary ponds completely evaporates during dry season (Cabrera, 1971; Morello & Adamoli, 1974).

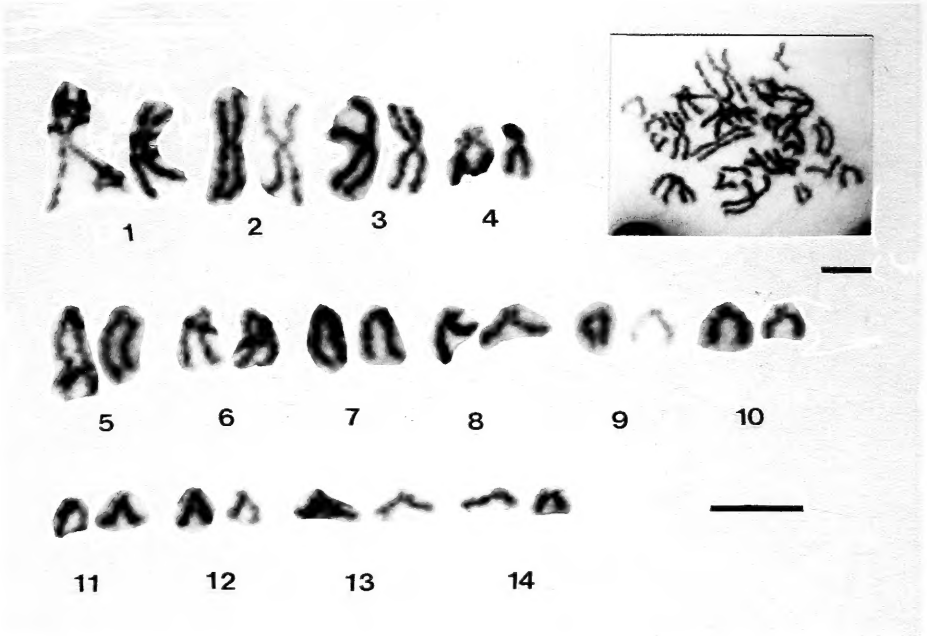


FIG. 4

Conventional karyograms of somatic cells of *Papiliolebias hatinne* sp. n., $2n=28$, $NF=36$, the chromosome formula was $M-SM=8$, $ST=20$. Bar= 10 μ m.

OSTEOLOGICAL CHARACTERS: Three cleared and stained specimens of *P. hatinne* sp. n. were examined. They have 26-28 vertebrae, 8-10 being precaudal and 16-18 caudal; 9-10 pairs of ribs; dorsal fin with second proximal radial placed between neural spines of vertebrae 13 and 14 or 14 and 15; anal fin with second proximal radial located between vertebrae 9 and 10 or 10 and 11.

First branchial arch with 8 or 9 gill-rakers distributed as follows, 1 on epibranchial and 7-8 on ceratobranchial. Epibranchial 1 somewhat triangular; epibranchials 2 and 3 slender and short. Interarcual cartilage present, very small.

Supraoccipital spine reaching first neural spine by ligaments; first neural spine broad or narrow. Ventral process of posttemporal very well developed but very short. One or two vomerine teeth.

Jaw suspensorium (Fig. 3) relatively long; symplectic long and somewhat rectangular; autopalatine posteriorly slender; quadrate with a long posterior process; deep vertical portion of preopercle with 2-3 pits of the sensory preopercular canal and 3-4 pits on horizontal ramus.

CYTOLOGICAL CHARACTERS: Somatic mitotic metaphase of *P. hatinne* sp. n. presented as $2n=28$ $FN=36$ (Fig. 4). Chromosome complement was composed of two pairs of metacentric, and two pairs of submetacentric chromosomes and ten pairs of subtelocentric chromosomes. Acrocentric chromosomes were not detected.

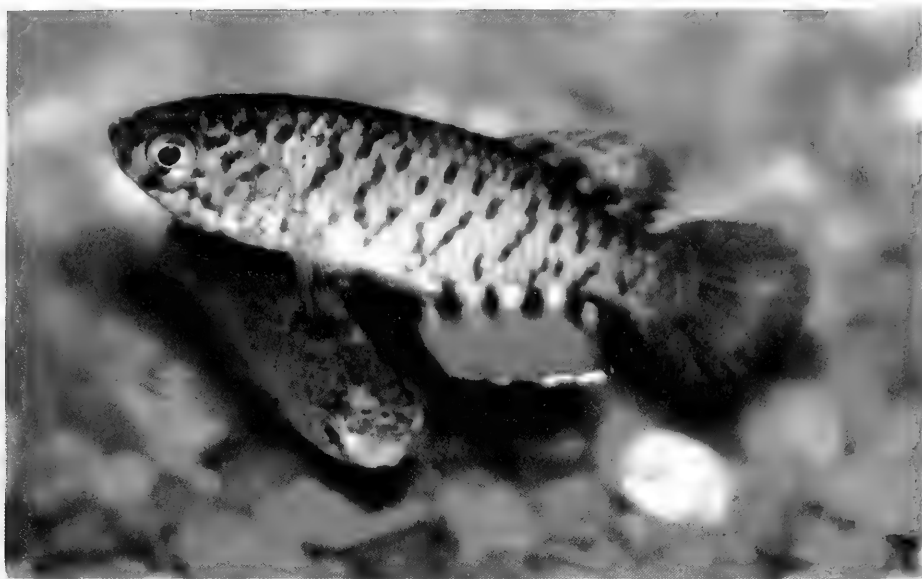


FIG. 5

Papiliolebias hatinne sp. n., paratype male in aquarium, FML 4501, 32.7 mm SL.

DISCUSSION

Costa (1989) described the genus *Plesiolebias* including one new species, *P. bitteri*, based on alive material exported from Paraguay to Germany for the aquarium enthusiasts. Subsequently, the author established the monotypic subgenus *Papiliolebias* (1998a) for this species, which taxonomical category was later raised to the generic level (1998b); the author listed a large number of synapomorphies that differentiate both genera. More recently, Costa (2007) redefined the tribe Plesiolebiasini and included in it the genera *Papiliolebias*, *Plesiolebias*, *Pituna*, *Stenolebias* and *Maratecoara*. The members of the tribe are distinguished from all other rivulids by unique features such as rostral cartilage with a concave anterior edge, a short ventral process of the angulo-articular, nonoverlapping of mesopterygoid and autopalatine, a bent first epibranchial, and a chorion surface covered by hooks.

Huber (1995) undertook a redescription of the species *P. bitteri* [sub *Cynolebias* (*Plesiolebias*) *bitteri*], listing seven localities for *P. bitteri* in the northwest of Paraguay and restricting the type locality to 64 km north of Mariscal Estigarribia, 21°03'S, 60°30'W, Nueva Asunción, Paraguay.

The genus *Papiliolebias* (Costa, 1998b) is diagnosed by four synapomorphies: 1- nine pelvic fin rays, 2- unpaired fins dark blue, 3- presence of a white stripe along the distal margin of the anal fin, and 4- a humeral metallic green spot. Both *Papiliolebias* species share the synapomorphies 3 and 4.

Nine pelvic fin rays are present exclusively in *P. bitteri* since *P. hatinne* has 7-8, a characteristic considered plesiomorphic by Costa (1998a, 1998b). The unpaired fins dark blue only develop in *P. bitteri*, as these fins are simply bluish in *P. hatinne*.



FIG. 6

Papiliolebias bitteri, photograph by F. Bitter. An aquarium male specimen belonging to the original sample imported from Paraguay on which the species was based.

Thus the characters 1 and 2 may be considered as autapomorphies of *P. bitteri*. We have assigned the new species to *Papiliolebias* instead of creating a new genus, since we consider this choice more conservative.

The bivariate and multivariate analyses indicated differences sufficiently large as to enable a discrimination of *P. hatinne* from *P. bitteri*; the values obtained correspond to shorter predorsal length in both sexes (males 62.1-67.7 vs. 67.9-71.4, females 63.9-69.8 vs. 70.4-73.4), shorter prepelvic length in males only (44.9-46.8 vs. 47.4-51.5), and relatively longer head length in females only (27.4-28.9 vs. 26.6-27.8; Table 2).

Comparisons between *P. hatinne* and *P. bitteri* with regard to the number of caudal and pectoral fin rays and pigmentation pattern of scales, also exhibit significant differences between the two species. In both males and females of *P. hatinne*, the caudal fin has 20-23 rays (vs. 25-28 rays) and the pectoral fins have 12-13 (vs. 14-15; Table 3).

With respect to the pigmentation patterns, the anal fin of the males is turquoise blue in *P. hatinne* (Fig. 5) but dark blue in *P. bitteri* (Fig. 6), while the metallic humeral spot of the males is bluish green in *P. hatinne* and very dark blue in *P. bitteri* (Bitter, 1987, page 64). The minute dark-gray dots on the flanks of the *P. bitteri* females, cited by Costa (1989) are absent in the females of *P. hatinne*. The photograph of the original material from the paper in which *P. bitteri* was described (Bitter, 1987), however, does

TABLE 1. Morphometric data of holotype and 10 paratypes (5 ♀, 5 ♂) of *Papiliolebias hatinne* sp. n.

	Holotype	Males		Females	
		min	max	min	max
SL	32.35	26.3	32.7	28.10	30.35
Percents of SL					
Body depth	29.67	24.77	30.61	25.63	28.11
Caudal-peduncle depth	15.15	14.57	15.99	11.86	14.54
Predorsal length	67.23	62.12	67.68	63.92	69.80
Prepelvic length	45.59	44.88	46.86	48.22	51.30
Dorsal-fin base	18.24	17.95	19.58	15.00	17.46
Anal-fin base	27.36	26.60	29.66	22.34	26.02
Head length	29.21	28.54	31.94	27.43	28.90
Percents of HL					
Head depth	94.71	85.12	94.71	78.52	87.65
Head width	64.02	59.52	67.95	63.80	68.83
Eye diameter	32.8	28.11	35.26	33.33	39.61

TABLE 2. Morphometric data of *P. hatinne* sp. n. (5 ♀, 5 ♂) and *P. bitteri* (data taken from Costa 1998a). Discriminant values indicated with an asterisk.

	Males		Females	
	<i>P. hatinne</i>	<i>P. bitteri</i>	<i>P. hatinne</i>	<i>P. bitteri</i>
SL	26.3-32.7	33.0-34.4	28.1-30.3	27.6-30.4
Percents of SL				
Body depth	24.8-30.6	29.2-31.3	25.6-28.1	24.4-29.6
Caudal-peduncle depth	14.6-16.0	14.4-16.1	11.9-14.5	13.5-15.6
Predorsal length	62.1-67.7	67.9-71.4	63.9-69.8	70.4-73.4
Prepelvic length	44.9-46.9	47.4-51.5	48.2-51.3	49.3-51.7
Length of dorsal fin base	17.9-19.6	15.4-20.6	15.0-17.5	14.0-16.3
Length of anal fin base	26.6-29.7	26.9-32.5	22.3-26.0	23.9-27.3
Head length	28.5-32.0	27.3-29.5	27.4-28.9	26.6-27.8
Percents of HL				
Head depth	85.1-94.70	85.4-100.8	78.5-87.7	85.0-88.1
Head width	59.5-68.0	61.1-66.4	63.8-68.8	66.5-71.8
Eye diameter	28.1-35.2	31.9-36.5	33.3-39.6	35.2-37.5

TABLE 3. Meristic data of *P. hatinne* sp. n. (holotype, 5 ♀, 5 ♂) and *P. bitteri* (counts include values taken from Costa, 1989 and Huber, 1995). *The variation in number of longitudinal scale series for *P. bitteri* is 23-26 following Huber (1995).

	Males		Females	
	<i>P. hatinne</i>	<i>P. bitteri</i>	<i>P. hatinne</i>	<i>P. bitteri</i>
Pectoral-fin rays	12 - 13	14 - 15	12 - 13	14 - 15
Pelvic-fin rays	7 - 8	9	7 - 8	9
Dorsal-fin rays	10 - 12	10 - 12	10 - 12	11
Anal-fin rays	17 - 20	18	17 - 18	17 - 18
Caudal-fin rays	21 - 22	25 - 28	20 - 23	25 - 28
Longitudinal scales*	26 - 30	28 - 29	27 - 28	27 - 28
Transverse scales	11	9 - 11	11	9 - 11
Peduncular scales	14	13 - 15	14	13 - 15

not have dark-gray dots on the flanks; we did not examine fresh specimens of *P. bitteri*. Bitter (1987) commented that some specimens had parasites on the flanks, a condition that is, in fact, evident on examination of the flanks of MCP 12794.

Examination of the jaw suspensorium of *P. hatinne* reveals an elongation relative to that of *P. bitteri* (See Fig. 4 present paper and Fig. 2a, in Costa 1998a), a more slender autopalatine, a relatively longer symplectic, and a quadrate with a longer posterior process than that of *P. bitteri*. Furthermore, *P. hatinne* has 1-2 vomerine teeth, *P. bitteri* 1-4.

In *P. hatinne* the first epibranchial has a wide posterior portion, being somewhat triangular as opposed to one that is completely wide in *P. bitteri*, whereas epibranchials 2 and 3 are slender in *P. hatinne* but wide in *P. bitteri*.

Papiliolebias hatinne has 8-10 precaudal vertebrae (vs. 12-13 in *P. bitteri*) and the second proximal radial of anal fin is located between pleural ribs of vertebrae 9-10 or 10-11 (vs. 10-13 in *P. bitteri*).

The present study constitutes the first report providing chromosome data of the genus *Papiliolebias*. Noteworthy is the observation that the diploid number of *P. hatinne* is the lowest found among rivulid genera (Elder *et al.*, 1993; García *et al.*, 2001). The karyotype of *P. hatinne* with the extra-large biarmed metacentric-submetacentric chromosomes is consistent with the previously proposed chromosome-evolution hypothesis (Scheel, 1972; García *et al.*, 2001).

ACKNOWLEDGEMENTS

The authors thank E. Lavilla and F. Cancino (FML) for help in collecting trips; L. Buoto (Instituto de Arqueología de Tucumán, Argentina) for help with aborigin names; M. Mirande (FML) for help with statistical analysis and photographs; T. Carvalho and C. Lucena (MCP) for photographs of type material; M. Sabaj (ANSP) for loan of specimens; J. Huber (MNHN) for suggestions on the draft; F. Bitter for permit to publish his colour figure of *P. bitteri* original material; S. Koerber for translations of German literature and comments on the manuscript; W. J. M. Costa (UFdRJ) for gift of *P. glaucopterus*; two anonymous reviewers and D. F. Haggerty improved the manuscript; Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina, for permanent financial support to MMA and CB, CSIC-Universidad de la República, Uruguay, for financial support to GG (DT-Project); Killi Data Organization for two grants applied in molecular research (2006-2007 to GG), and the Japanese Government for donation of equipment.

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***Topobates helveticus* sp. n. and some other remarkable moss mites from Switzerland (Acari: Oribatida).**

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***Topobates helveticus* sp. n. and some other remarkable moss mites from Switzerland (Acari: Oribatida).** - The description of a new *Topobates* species, *T. helveticus*, and an overview of the genus *Topobates* Grandjean, 1958 with a key to the European *Topobates* species, are given. Taxonomical and morphological notes on three further rare or little known oribatids (*Miracarus similis* Subías & Iturrondobeitia, 1978, *Lamellocephus personatus* (Berlese, 1910), with their relationships, and *Jugatala angulata* (C. L. Koch, 1839) from Switzerland are added. 19 figures are presented.

Keywords: Mites - new and rare species - description - redescription - identification keys.

INTRODUCTION

In continuing our study of oribatids of Switzerland (e.g. Mahunka and Mahunka-Papp, 2003), we now examine some little known species belonging to different families. Among them we found a new species of the genus *Topobates* Grandjean, 1958 and three other, rare or little known species as *Lamellocephus personatus* (Berlese, 1910), *Miracarus similis* Subías & Iturrondobeitia, 1978 and *Jugatala angulata* (C. L. Koch, 1839). These species have not been recorded until now from Switzerland.

The first thorough revision of the genus *Topobates* was completed by Weigmann & Miko (1998). However, they discussed mainly the European species, with the exception of some species of the genus *Setobates* Balogh, 1961 (in the synonym of *Topobates*). Their conclusions, both in the evaluation of the morphological characteristic and in the analysis of the degree of relationships, are probably correct. The only debatable fact is whether *Topobates* is a subgenus of *Scheloribates* Berlese, 1908, or an independent genus. The latter view was supported by Subías (2004), in his catalogue, who accepted the genus as independent. In accordance with other authors, he relegated the listed species here, and a further synonym (*Flagellobates* Mahunka, 1978) was also established, most likely correctly, in this group.

Thus the known distribution of the genus *Topobates* has become much enlarged. Subías considers it to be cosmopolitan, but even his own data do not confirm this opinion. However, it can be stated that the species known so far (except for *T. holsaticus* Weigmann, 1969) have a small range, because all of them have been collected at one or two localities only. This holds true also for the species of Switzerland. Together with the recently discovered new species, two *Topobates* species are currently known from the territory of Switzerland. I agree with Subías in placing also *Hemileius umbraili* Schweizer, 1956 in the genus *Topobates*.

Regarding the other three species not previously known from Switzerland, *Miracarus similis* is known from Spain and France, while *Lamellocephus personatus* so far only from South and East Europe, and *Jugatala angulata* from the montane regions of Europe. All three species are rare.

MATERIAL AND METHODS

As far as the terminology in describing the new species is concerned, we heavily relied upon the work of Weigmann (2006), Weigmann & Miko (1998) and Grandjean (1936, 1962).

All material examined is deposited in the Muséum d'histoire naturelle de Genève (MHNG) and in the Hungarian Natural History Museum, Budapest (HNHM).

DESCRIPTION OF THE NEW SPECIES AND COMPLEMENTARY DESCRIPTIONS OF SOME OTHER ORIBATIDS

FAMILY SCHELORIBATHIDAE JACOT, 1935

Topobates helveticus sp. n.

Figs 1-3

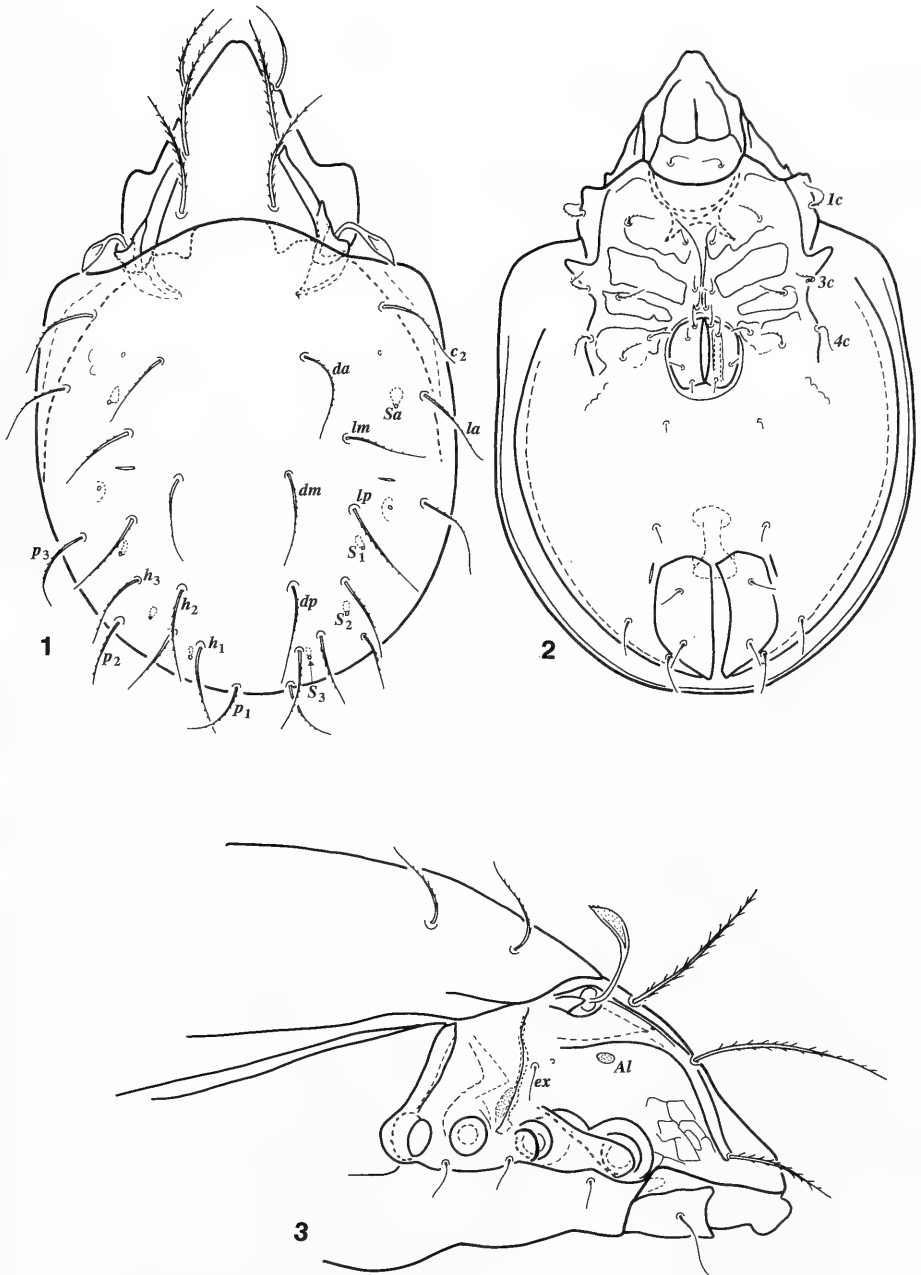
MATERIAL EXAMINED: Holotype: **VS-11:** Switzerland: Valais: Grammont, sifting of mosses, 2000 m; 30.VI.1989; leg. C. Besuchet. – 1 paratype from the same sample. Holotype deposited in MHNG, paratype (1708-P0-05) in HNHM.

ETYMOLOGY: The species is named after the country of its origin.

DIAGNOSIS: Typical scheloribatoid species. Rostral apex obtuse, lamella, sublamella and prelamella present. Prodorsal setae long and strong, distinctly ciliate. Head of sensillus clavate and foveolate, directed outwards and backwards. Dorsosejugal suture gradually convex. Thirteen pairs of simple, rarely pilose and long notogastral setae, four pairs of small sacculi observable. Epimeral setal formula: 3-1-3-3, anogenital setal formula: 4-1-2-3, all simple, short.

MEASUREMENTS: Length of body: 464-503 μm , width of body: 295-302 μm .

DESCRIPTION: *Prodorsum:* Apical part of rostrum triangular, rostral apex obtuse. Whole surface of notogaster finely punctate. Lamellar complex well developed, lamella, sublamella strong, reaching the lamellar setae, prelamella slightly thinner (Fig. 1). All prodorsal setae comparatively long, distinctly pilose, their ratio: *le* = *in* > *ro* > *ex*. Peduncle of sensillus short, curved, its head small, asymmetric, with some very small spicules on its distal margin.



FIGS 1-3

Topobates helveticus sp. n. (1) Body in dorsal view. (2) Body in ventral view. (3) Podosoma in lateral view.

Notogaster: Dorsosejugal suture distinct, convex, pteromorphae small, blade-like. Whole surface finely punctate. Thirteen pairs of simple, distinctly and finely barbed, long notogastral setae and four pairs of small sacculi present, *Sa* slightly larger than the others.

Lateral part of podosoma: Sublamellar area porosa small. Lateral region under prelamella ornamented with weak polygonal pattern (Fig. 3). Pedotecta 1 narrow.

Ventral parts: Surface of infracapitulum, epimeral and ventral plates nearly smooth. Epimeral fields well framed laterally and medially (Fig. 2). Discidium weakly developed, not protruding. All ventral parts with the usual numbers of setae, i.e. epimeral setal formula: 3 – 1 – 3 – 3, anogenital setal formula 4 – 1 – 2 – 3. Except for setae *ad*₁ and *ad*₂, all others short and simple.

Legs: All legs tridactylous and heterodactylous.

REMARKS: The new species is well characterised by the thirteen pairs of very long notogastral setae and by the finely punctate notogastral sculpture. On this ground it stands nearest to *T. comatus* (Pérez-Iñigo, Herrero & Pérez-Iñigo, 1987).

Thus, the currently known European *Topobates*-fauna comprises eight species. On the basis of their main characters (length of notogastral setae, number of notogastral setae and sculpture of notogaster), they can be arranged into three groups. Weigmann & Miko (1998) compiled an identification key for the previously known species, we here add the two Swiss species *T. umbraili* and *T. helveticus* sp. n.

KEY TO EUROPEAN TOPOBATES SPECIES

- 1a Surface of notogaster granular *granifer* Grandjean, 1958
- 1b Surface of notogaster smooth, or finely punctate 2
- 2a Twelve pairs of notogastral setae present
. *carpathicus* Weigmann & Miko, 1998
- 2b Thirteen or fourteen pairs of notogastral setae present 3
- 3a Fourteen pairs of notogastral setae and five pairs of sacculi present
. *alvaradoi* Pérez-Iñigo, 1969
- 3b Thirteen pairs of notogastral setae and four pairs of sacculi present 4
- 4a Notogastral setae long, distance between the insertion of *dm* and *dp*
about as long as the length of setae *dm* 5
- 4b Notogastral setae short, distance between the insertion of *dm* and *dp*
much longer than the length of setae *dm* 6
- 5a Interlamellar setae very long, reaching far over the rostral cusp. Setae *dp*
much longer than the distance between setae *dm* and *dp*
. *comatus* (Pérez-Iñigo, Herrero & Pérez-Iñigo, 1987)
- 5b Interlamellar setae ending far from the rostral cusp. Setae *dp* shorter than
the distance between setae *dm* and *dp* *helveticus* sp. n.
- 6a Sensillus long, reaching lateral margin of pteromorphae
. *umbraili* (Schweizer, 1956)
- 6b Sensillus short, not reaching lateral margin of pteromorphae 7
- 7a Notogaster with a semicircular band running parallel to margin of body.
Setae *c*₂ shorter than posterior notogastral setae
. *circumcarinatus* Weigmann & Miko, 1998

- 7b No semicircular band on notogaster. Setae c_2 not shorter than posterior notogastral setae *holsaticus* Weigmann, 1969

FAMILY MICROZETIDAE Grandjean, 1936

Miracarus similis Subías & Iturrondobeitia, 1978 Figs 4-8

LOCALITY: **VS-48**: Switzerland: Valais: Vouvry, layer of mosses from a rocky slope on the trail to the cave „Grotte de la Pierre Perret” (B), 460 m; 10.VIII.1989; leg. B. Hauser.

REMARKS: The genus *Miracarus* Kunst, 1959 so far comprises five species, all from the Mediterranean region of Europe. However, according to Subías (2004, 2008), *M. abeloosi* Lions, 1979 is conspecific with the above species, therefore the genus would have only four species. As far as we are concerned, the synonymy of *similis* and *abeloosi* needs further proof, also because Pérez-Iñigo (1997) made no mention of this opinion. By comparing the published figures of the two species, significant differences can be established, although the figure of *similis* is highly simplified, and we do not know whether the authors have studied the types of both species.

The lamellar apices of *M. similis* described from Arratia (Vicaya) are very wide and touching each other medially. A well-developed sejugal line is present, which is not interrupted medially. *M. abeloosi* was described by Lions (1979) from specimens collected in France, in the region of “Alpes Maritimes”, in the environs of “Le Chens” and “Sainte Baume”. His description is perfect, covering all the details, but differs from the original description of *M. similis*. The Swiss specimens, the figures of which are given hereunder (Figs 4-8), may be conspecific with the ones from France. The shape of the lamellar apices in the Swiss specimens is different, and the dorsosejugal line is clearly interrupted.

The known localities in France are quite close to those of the Swiss specimens, therefore it is not surprising that they belong to the same species. We accept the opinion of Subías, with the reservation that a further study of the types is necessary.

KEY TO THE SPECIES OF *MIRACARUS*

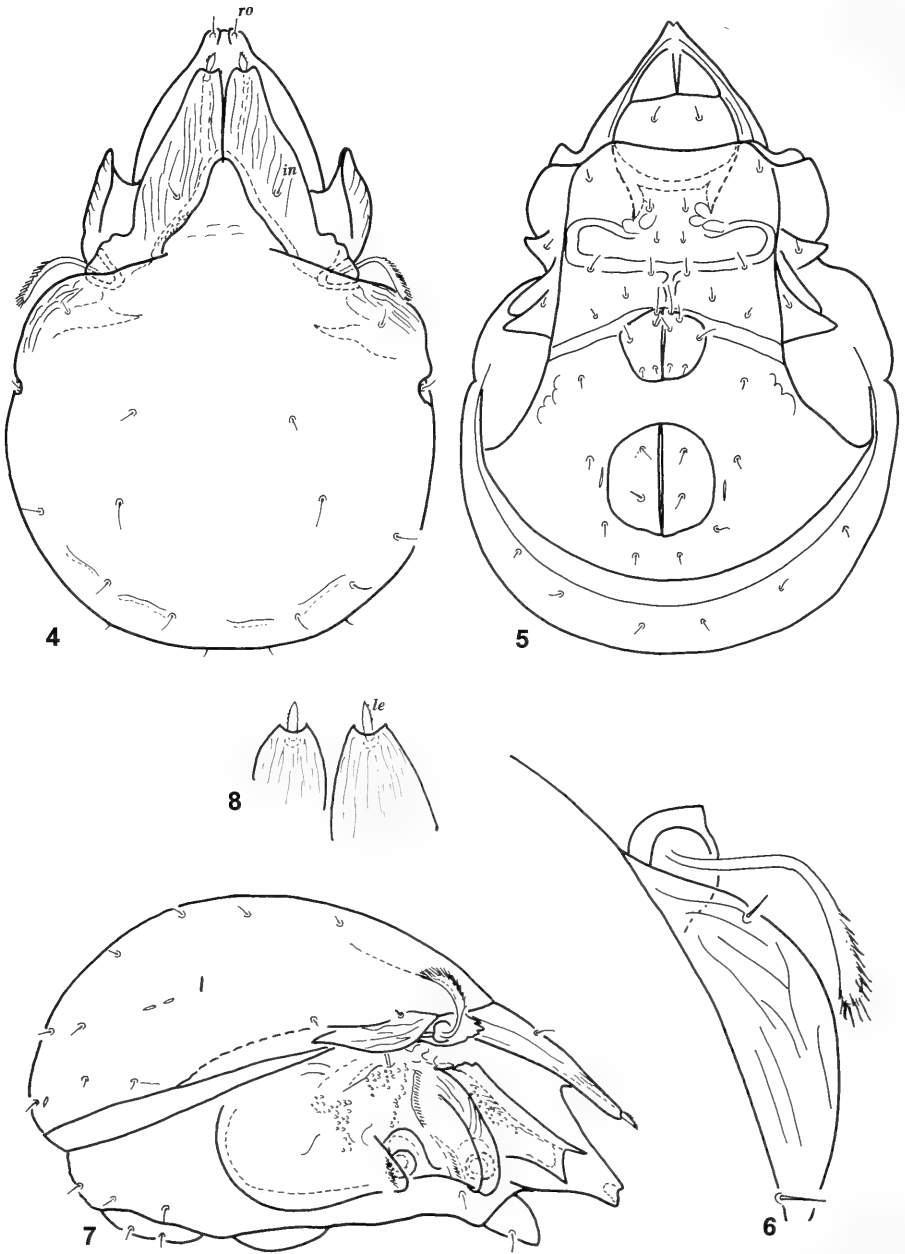
- 1a Outer cusps of lamellae four to five times longer than the inner cusps 2
 1b Both lamellar cusp nearly equal in length 3
 2a Head of sensillus long, with spiniform distal end *hurkai* Kunst, 1958
 2b Head of sensillus rounded distally *discrepans* Mahunka, 1966
 3a Distal end of lamellae wide, lamellar setae located in the middle
 *similis* Subías & Iturrondobeitia, 1978
 3b Distal end of lamellae narrowed, lamellar setae located laterally
 *senensis* Bernini, 1975

FAMILY NOSYBEIDAE Mahunka, 1993

Lamellocephus personatus (Berlese, 1910) Figs 9-14, 19

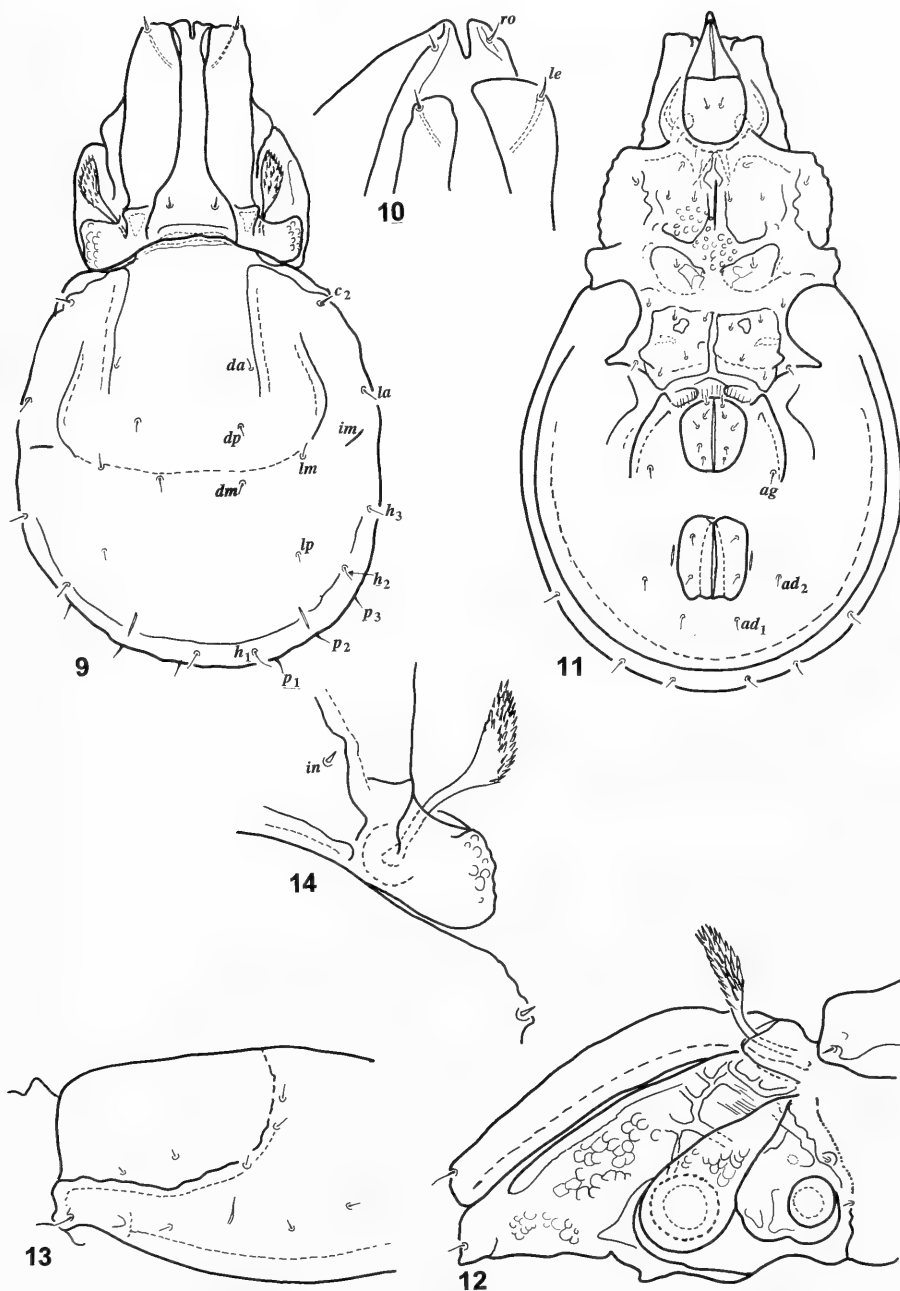
LOCALITIES: **VS-40**: Switzerland: Valais: above Vernayaz, 700 m; 7.X.1980; leg. C. Besuchet (221). – **TI-42**: Switzerland: Ticino: Cortascio above Brissago, sifting of mosses, 900 m; 20.V.1998; leg. C. Besuchet (229).

REMARKS: This species was studied and redescribed by Weigmann & Murvanidze (2003) on the basis of Georgian specimens. They gave a thorough histori-



FIGS 4-8

Miracarus similis Subías & Iturrondobeitia, 1978. (4) Body in dorsal view. (5) Body in ventral view. (6) Sensillus and pteromorpha. (7) Body in lateral view. (8) Lamellar cusps.



FIGS 9-14

Lamellocepeus personatus (Berlese, 1910). (9) Body in dorsal view. (10) Rostral apex. (11) Body in ventral view. (12) Podosoma in lateral view. (13) Anterior part of notogaster. (14) Trichobothrium.

cal survey of the morphological and nomenclatural problems of the genus and species. The species, now also known from Switzerland, has been found in the Mediterranean region, particularly at alpine localities. These specimens are easily identifiable with the description and figures published by Weigmann and Murvanidze (*cf.* our Figs 9-14 made from the Swiss specimens.).

The present study gave us the opportunity to review the taxa belonging to the genera *Lamellocephus* Balogh, 1961 and *Nosybea* Mahunka, 1993. Soon after the publication of the paper of Weigmann and Murvanidze (2003), Subías (2004) accepted the validity of the family *Nosybeidae*, but synonymised the two genera, without having studied their types. A fairly recent study and the re-examination of the type specimens of *Nosybea genavensis* Mahunka, 1993 and *Lamellocephus personatus* by Mahunka (1993) clearly show that Subías made a mistake, so the validity of the genus name *Nosybea* is herewith re-established.

DISTINCTION BETWEEN *LAMELLOCEPHEUS* AND *NOSYBEA*

Lamellocephus

1. Middle of anterior half of notogaster with a U-shaped, undivided suture.
2. Epimeral region without annulate structure.
3. A pair of ridges along the genital aperture.
4. Five pairs of genital setae present.

Nosybea

1. Anterior part of notogaster in the middle with a longitudinal crest.
2. Epimeral region with 12 robust structures.
3. No pairs of ridges along the genital aperture.
4. Four pairs of genital setae present.

FAMILY CERATOZETIDAE JACOT, 1925

Jugatala angulata (C. L. Koch, 1839)

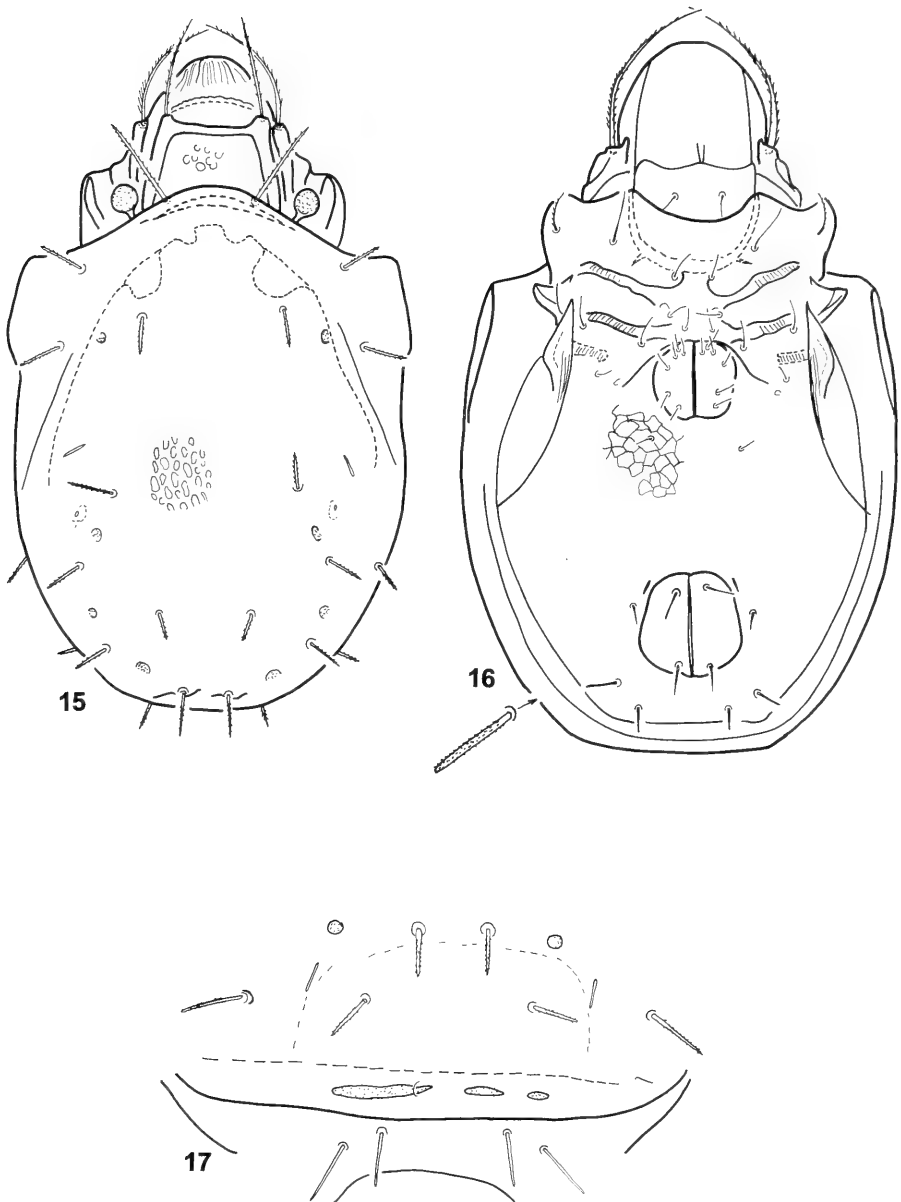
Figs 15-18

MATERIAL EXAMINED: **VS-44**: Switzerland: Valais: Saas-Almagell, waterlogged mosses, 1650 m; 5.VII.1997; leg. C. Besuchet (225).

MEASUREMENTS: Length of body: 505-520 μm , width of body: 351-363 μm .

DESCRIPTION: *Prodorsum*: Rostrum rounded, without rostral apex. Surface of rostral part striated longitudinally. Other parts of surface polygonate. A distinct transversal, arched lath present in front of the lamellae. Lamellar complex well developed, wide, typical for this genus. Lamellae and translamella nearly equal in width, lamellar setae arising on distinct lamellar cusps. Interlamellar setae strong, straight, distinctly pilose. Bothridium cup-shaped, covered by dorsosejugal tectum. Sensillus short, rounded in dorsal view, hemispherical in lateral view, its surface finely aciculate.

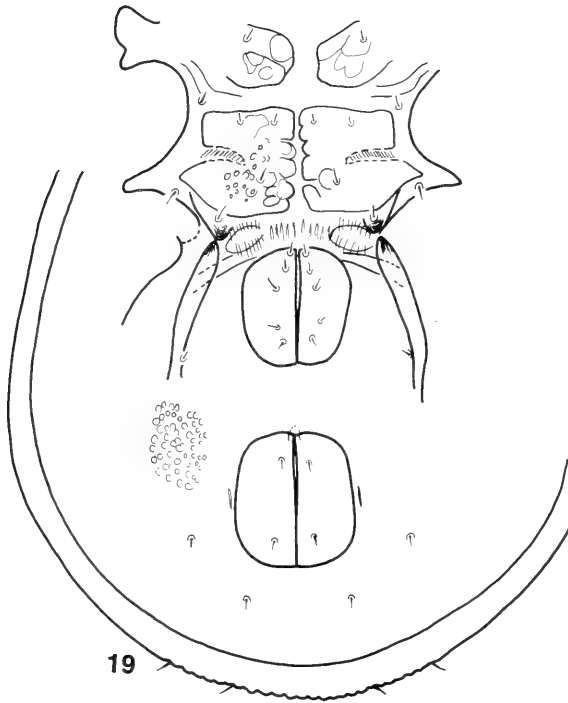
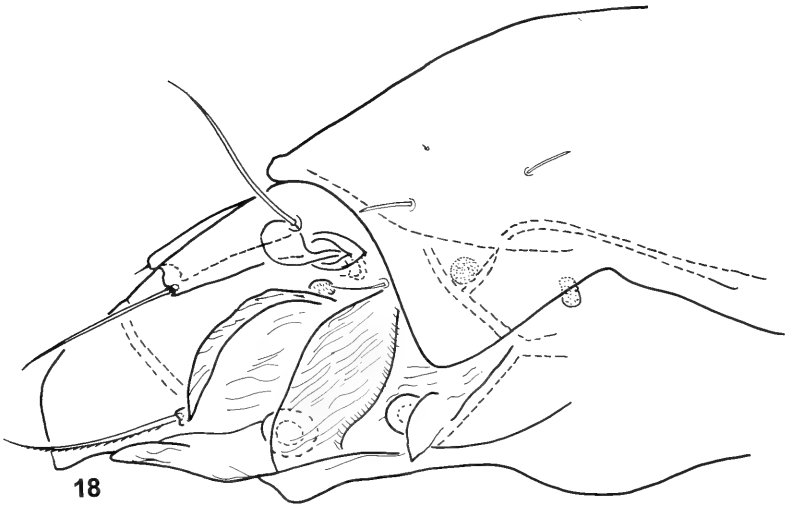
Notogaster: Dorsosejugal suture distinct, strongly convex, whole surface with distinct polygonate ornamentation. Pteromorphae small, triangular, a hinge line partly observable. Eleven pairs of short, mostly bacilliform, dark notogastral setae present, all finely barbed. Four pairs of small and round porose areas and 5 pairs of lyrifissures present. All porose areas nearly equal in length.



FIGS 15-17

Jugatala angulata (C. L. Koch, 1839). (15) Body in dorsal view. (16) Body in ventral view. (17) Posteromarginal part of notogaster.

Lateral part of podosoma: Genal tooth wide, elongate. Tutorium narrow, striate, conspicuously arched ventrally, with small apex. Rostral setae arising on rostral surface. Pedotectum I large, wide, distinctly striate. Pedotecta II-III covering posterior



FIGS 18-19

(18) *Jugatala angulata* (C. L. Koch, 1839), lateral part of podosoma. (19) *Lamellocephus personatus* (Berlese, 1910), ventral plate and posterior part of epimeral region.

half of acetabulum. Three humerosejugal porose areas present. Sublamellar porose area distinctly visible. Circumpedial carina present.

Ventral regions: Apodemes 2 and *ap. sej.* connected medially. Surface of infracapitulum smooth, epimeres and genital plate with very fine striation. Ventral and anal plate with polygonate sculpture. All epimeral setae thin, setiform, finely barbed. Custodian short, discidium large. Genito-anal setal formula: 6-1-2-3, anterior 3 pairs arising close to each other, along the anterior margin. Genital, aggenital and anal setae thin, simple, setiform, except for the anterior adanal setae *ad*₃; all other setae bacilliform, barbed, like the notogastral setae. Lyrifissures *iad* located at anterior corner of anal plates. Postanal porose area narrow, divided into 2-4 small parts.

Legs: All legs tridactylous, with equally large claws.

REMARKS: The type species of the genus *Jugatala* Ewing, 1913 is *J. tuberosa* Ewing, 1913. Sellnick (1928, 1960) transferred the species *Oribata angulata* C.L. Koch, 1939 to this genus. The position of the genus *Jugatala* was several times misinterpreted by different authors, so at times it was placed in the families Ceratozetidae and Mycobatidae. Having studied immature specimens, Behan-Pelletier (2000) placed *Jugatala* in the family Ceratozetidae. On the other hand, Subías (2004, 2008) ranged *angulata* again in the subgenus *Calyprozetes* Thor, 1930 of the genus *Mycobates* in the family of Mycobatidae, although *Jugatala tuberosa* was placed by him in the family Ceratozetidae.

This latter point of view obviously needs to be revised. Although Behan-Pelletier (2000) redescribed the type species, he did not deal with *J. angulata*, neither did Subías carry out a new study. On the basis of our recent study of the Swiss specimens, we state that *angulata* belongs in the genus *Jugatala*, and we accept the conclusions of Behan-Pelletier that this genus belongs in the family Ceratozetidae. We cannot deal with the other described species. *J. (?) rotunda* Willmann, 1953, described from Europe, is possibly a member of the genus *Jugatala*, but this supposition needs confirmation as noted by Willmann himself in 1953. A part of the species listed by Subías may not be members of the genus *Jugatala*, but rather of *Calyprozetes*. Of course, the taxonomic position of that genus is dubious.

On the basis of the Swiss specimens examined we can provide the complementary description given above.

Jugatala angulata is well distinguished from the type species of the genus by the form of the body, by the form of the notogastral setae and, most importantly, by the number and form of the porose areas of the notogaster. The only specimen of this species previously known from Switzerland was collected by Schweizer (1948) in the canton of Graubünden. A recent redescription of this species was given by Bayartogtokh & Schatz (2008).

ACKNOWLEDGEMENTS

We like to thank the collectors of the material examined, mainly Dr C. Besuchet (Geneva), and Dr P. Schwendinger and Dr B. Hauser for the opportunity to study these specimens in the Geneva Museum. For linguistic revision and editorial help with the manuscript we extend our sincere thanks to Dr P. Schwendinger and Dr L. Zombori. This project was partly sponsored by the Hungarian Scientific Research Fund (OTKA, number T45889).

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Oribatids from Madagascar IV (Acari: Oribatida)

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Oribatids from Madagascar IV (Acari: Oribatida). - Oribatida material collected in Madagascar by a scientist of the Muséum d'histoire naturelle, Genève was studied. Twenty species are listed, six of them are new to science: *Mesoplophora (P.) madegassica*, *Masthermannia hauseri*, *Caveremulus foliaceus*, *C. salicinus*, *Ambrobates translamellatus* and *Vilhenabates ambohitra*. The new genus *Ambrobates* gen. n. is established in the family Scheloribatidae. Taxonomical notes on rare or little known species and a key for identification of *Caveremulus* species are given.

Keywords: New taxa - list of identified species - taxonomical and zoogeographical notes - key - Malagasy Republic.

INTRODUCTION

The special and peculiar fauna of Madagascar is nowadays quite well known, however, the soil mesofauna, characterised by species with minute size and unspectacular life style, and especially the mites are an exception. Research on them has been carried out with high intensity recently (Mahunka 2002), and lately Dr Csaba Csuzdi, a well-known expert of earthworms, collected soil samples there in 2008 (Mahunka 2009).

Earlier, at the end of the 20th century, the soil fauna of Madagascar was systematically studied by Swiss taxonomists (Dr Bernd Hauser and Dr Charles Lienhardt of the Muséum d'histoire naturelle, Genève) and Hungarian (the associate co-workers of the Hungarian Natural History Museum, Dr Dénes Balázs and Dr Tamás Pócs) scientists. Due to these exploratory activities, the oribatid fauna of Madagascar, the former Malagasy Republic, is now quite well known. However, some regions of the island and the taxa expected to be found there - which constitute the majority of oribatids - are still considerably less well known and hence severe gaps in our knowledge exist.

In this paper I continue my study of the material collected by researchers of the Muséum d'histoire naturelle, Genève (Mahunka 1993, 1994, 1997), publish the results of my taxonomic investigation and give further notes on the geographic distribution of oribatid species. Hereunder I list twenty species, six of which are new to science. Six

species are for the first time indicated in the Madagascan fauna: *Epilohmannia pallida* Wallwork, 1962, *Hoplophorella vitrina* (Berlese, 1913), *Hoplophora hamata* (Ewing, 1909), *Tectocepheus velatus velatus* (Michael, 1880), *Ramusella clavipectinata* (Michael, 1885) and *Berlesezetes africanus* (Balogh, 1958). I give notes on the Madagascan specimens of two species.

MATERIAL AND METHODS

As in my earlier papers, I follow the system of Marshall *et al.* (1987), based on that of Grandjean (1954, 1965), with some modifications introduced by Woas (2002), Weigmann (2006) and Subías (2004, 2008). In the descriptions the morphological terminology of Grandjean (in several publications) was used with some modifications concerning the studied groups or organs (e.g. Mahunka & Zombori, 1985; Norton *et al.*, 1997; Mahunka & Mahunka-Papp, 2001; Niedbala, 2001, 2004) and the above mentioned publications).

All material examined is deposited in the Muséum d'histoire naturelle de Genève (MHNG) and in the Hungarian Natural History Museum, Budapest (HNHM).

LIST OF COLLECTING SITES

Mad-89/8: Madagascar (Prov. Antsiranana [anciennement Diego-Suarez], Sous-préf. Antsiranana): Parc National „Montagne d'Ambre" (=Ambohitra), au début du chemin vers la "Petit Cascade", après la pénultième, forêt primaire, prélèvement de sol dans les angles formés par les contreforts d'un grand arbre vivant et d'un grand arbre mort, 980 m; 23.XI.1989, leg. B. Hauser.

Mad-89/29: Madagascar (Prov. Antsiranana [anciennement Diego-Suarez], Sous-préf. Andonay [anciennement Hell-Ville]): île Nosy Be, Réserve naturelle intégrale „Lokobe", forêt primaire près d'Ampasindava, prélèvement de sol dans les angles formés par les contreforts d'un grand arbre, 14 m; 28.XI.1989, leg. B. Hauser.

Mad-89/45: Madagascar (Prov. Toliara [Tulear], Sous-préf. Tôlenaro [Fort-Dauphin]): 73 km de Tôlenaro route vers Amboasary, plantation de sisal, prélèvement de sol au pied d'un baobab mort, env. 100 m; 4.XII.1989, leg. B. Hauser (extraction Berlese à Genève).

LIST OF STUDIED SPECIES

EPILOHMANNIIDAE Oudemans, 1923

Epilohmannia pallida Wallwork, 1962

Locality: Mad-89/8. First record for Madagascar.

MESOPLOPHORIDAE Ewing, 1917

Mesoplophora (Parplophora) madegassica sp. n.

EUPHTHIRACARIDAE Jacot, 1930

Microtrititia tropica Märkel, 1964

Locality: Mad-89/8.

STEGANACARIDAE Niedbala, 1986

Hoplophorella vitrina (Berlese, 1913)

Locality: Mad-89/29. First record for Madagascar.

Hoplophora hamata (Ewing, 1909)

Locality: Mad-89/45. First record for Madagascar.

NANHERMANNIIDAE Sellnick, 1928

Masthermannia hauseri sp. n.*Nanhermannia milloti* Balogh, 1960

Locality: Mad-89/8.

ZETORCHESTIDAE Michael, 1898

Zetorchestes (Phyllorchestes) phylligerus Mahunka, 1983

Locality: Mad-89/8.

EREMULIDAE Grandjean, 1965

Caveremulus foliaceus sp. n.*Caveremulus cordisetus* Mahunka, 1983

Locality: Mad-89/29.

Caveremulus salicinus sp. n.

TECTOCEPHEIDAE Grandjean, 1954

Tectocepheus velatus velatus (Michael, 1880)

Locality: Mad-89/8. First record for Madagascar.

OPPIIDAE Sellnick, 1937

Ramusella (Ramusella) clavipectinata (Michael, 1885)

Locality: Mad-89/8. First record for Madagascar.

Ramusella (Insculptoppia) aepyornis Mahunka, 1994

Locality: Mad-89/45.

Oppiella nova (Oudemans, 1902)

Locality: Mad-89/8.

Fossoppia calcarata Mahunka, 1994

Locality: Mad-89/8.

MICROZETIDAE Grandjean, 1936

Acaroceras (Malgoceras) helleri Mahunka, 1993

Locality: Mad-89/29.

Berlesezetes africanus (Balogh, 1958)

Locality: Mad-89/8. First record for Madagascar.

SCHELORIBATIDAE Grandjean, 1933

Ambrobates translamellatus gen. n., sp. n.

HAPLOZETIDAE Grandjean, 1936

Vilhenabates ambohitra sp. n.

DESCRIPTIONS AND REMARKS

Hoplophorella hamata (Ewing, 1909)

REMARKS: Judging from my study of types, the new specimens collected appear clearly conspecific with *H. schauenbergi* Mahunka, 1978 and *H. ligulifera* Mahunka, 1987, which were treated by Niedbała (2001) as synonyms of *H. hamata*. *H. ligulifera* and *H. schauenbergi* were described from the Ethiopian region, *H. hamata* from the USA.

The main characteristics of this species are: a slightly dilated, lanceolate lamellar seta and spiniform interlamellar setae, notogastral ornamentation consisting of finely punctulate small foveolae, and the long peduncle of the median adanal setae (ad_2).

Mesoplophora (Parplophora) madegassica sp. n.

Figs 1-4

MATERIAL EXAMINED: Holotype: Madagascar, Prov. Antsiranana; 23.XI.1989; leg. B. Hauser (Mad-89/8); 3 paratypes from the same sample. Holotype and 2 paratypes deposited in MHNG, 1 paratype (1785-PO-2009) in HNHM.

DIAGNOSIS: Rostrum triangular, apex pointed. Rostral and lamellar setae setiform, ciliate, interlamellar setae filiform, smooth. Sensillus long, head small, dilate. Among the notogastral setae c_3 shorter and thinner than others. Latter setae finely ciliate. Eight pairs of ventral setae, one pair of them very long. Seven (5+2) pairs of genital, three pairs of anal setae present, all finely ciliate.

MEASUREMENTS: Length of aspis 196-216 μm , height of aspis 148-152 μm , length of notogaster 270-286 μm , height of notogaster 182-197 μm .

DESCRIPTION: *Prodorsum*: Rostral apex sharply pointed. Prodorsal surface distinctly punctulate. Prodorsal setae of different lengths and sizes, rostral and lamellar setae much thicker than interlamellar and exobothridial setae, rostral and lamellar setae well ciliate, setiform, interlamellar setae very thin, filiform, smooth, exobothridial setae also smooth and filiform, the latter shortest of all, but longer than the diameter of the cup-shaped bothridium. Peduncle of sensillus conspicuously long, head small, lanceolate, with irregular velum and some small cilia.

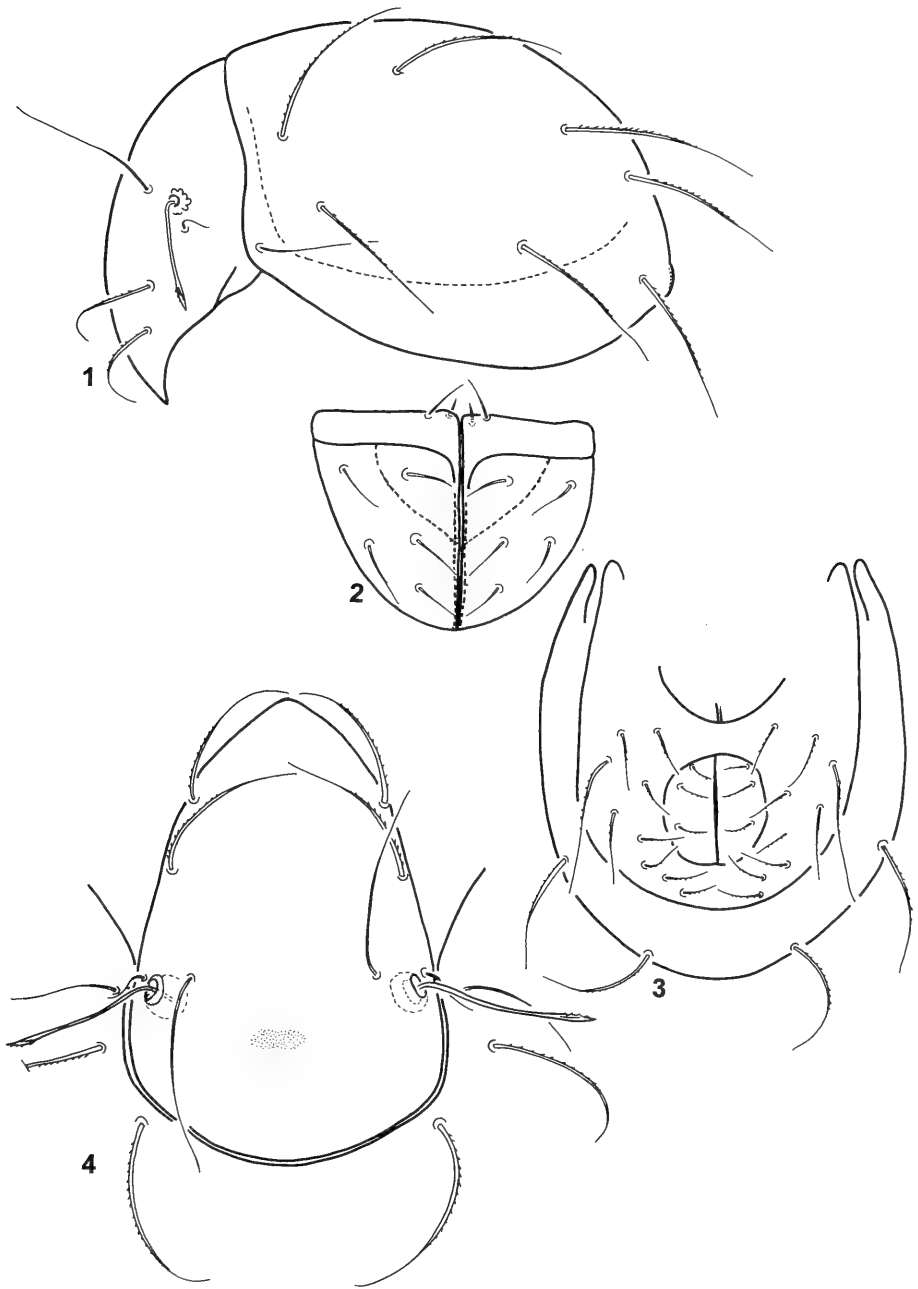
Notogaster: With eight pairs of long setae, one (setae c_3) much shorter and slightly thinner than others, smooth. Remaining setae with small cilia or spines, nearly equal in length. Setae c_1 and c_2 arising far from notogastral border, setae c_3 located very close to this border.

Ventral parts: Genital plates with seven (5+2) pairs of simple setae, all setiform and smooth. Anal plates with three pairs of thinner but longer setae, finely roughened. Nine pairs of thin ventral setae of different lengths, all slightly ciliate. Lateral setae longest of all.

Legs: Typical for the genus.

REMARKS: On the basis of the number of anal setae, the new species belongs to the subgenus *Parplophora* Niedbała, 1985. The new species is well characterised by the striking shape of the sensillus, which was previously unknown for *Mesoplophora* taxa from the Ethiopian Region (Niedbała 1985).

ETYMOLOGY: Named after its country of origin.



FIGS 1-4

Mesoplophora (Parplophora) madegassica sp. n. (1) Body in lateral view. (2) Genital plates. (3) Ventral parts. (4) Aspis in dorsal view.

***Masthermannia hauseri* sp. n.**

Figs 5-7

MATERIAL EXAMINED: Holotype: Madagascar, Prov. Antsiranana; 3.XI.1989; leg. B. Hauser (Mad-89/8); 2 paratypes from the same sample. Holotype and 1 paratype deposited in MHNG, 1 paratype (1786-PO-2009) in HNHM.

DIAGNOSIS: *Rostrum* rounded. Postbothridial condyles situated near to each other. Rostral setae dilated, lamellar and interlamellar setae T-shaped, exobothridial setae filiform. Sensillus bacilliform. Notogastral surface with five pairs of round elevations, ornamented with irregular foveolae. All setae T-shaped. Epimeral seta formula: 3 - 2 - 3 - 4, all except median setae setiform. Nine pairs of genital, two pairs of aggenital, two pairs of anal and three pairs of adanal setae. All legs monodactylous.

MEASUREMENTS: Length of body 418-433 μm , width of body 191-202 μm .

DESCRIPTION: *Prodorsum:* Rostral part narrowing anteriorly. Prodorsal surface with anterolateral thickening, lamellar lines not visible. Median part punctate. Bothridium distinctly protruding, cup-shaped, sensillus comparatively short, bacilliform. Its distal end roughened with a very narrow velum. Posterobothridial condyles triangular, situated close to each other. Their interdistance not longer than distance between lateral ridge. Rostral setae dilated basally (Fig. 7), narrowed anteriorly. Lamellar and interlamellar setae T-shaped, with very long, filiform branches.

Notogaster: Dorsosejugal margin convex, one pair of posterolateral, and one pair of posterior projections present, these and three pairs of elevations on the antero-median surface well framed and separated from the other surface. All five pairs with round and smooth median field bearing one notogastral seta each. Remaining notogastral surface ornamented with irregular foveolae. Fifteen pairs of notogastral setae present, all T-shaped, size and length of the branches strongly variable. Their surfaces finely roughened.

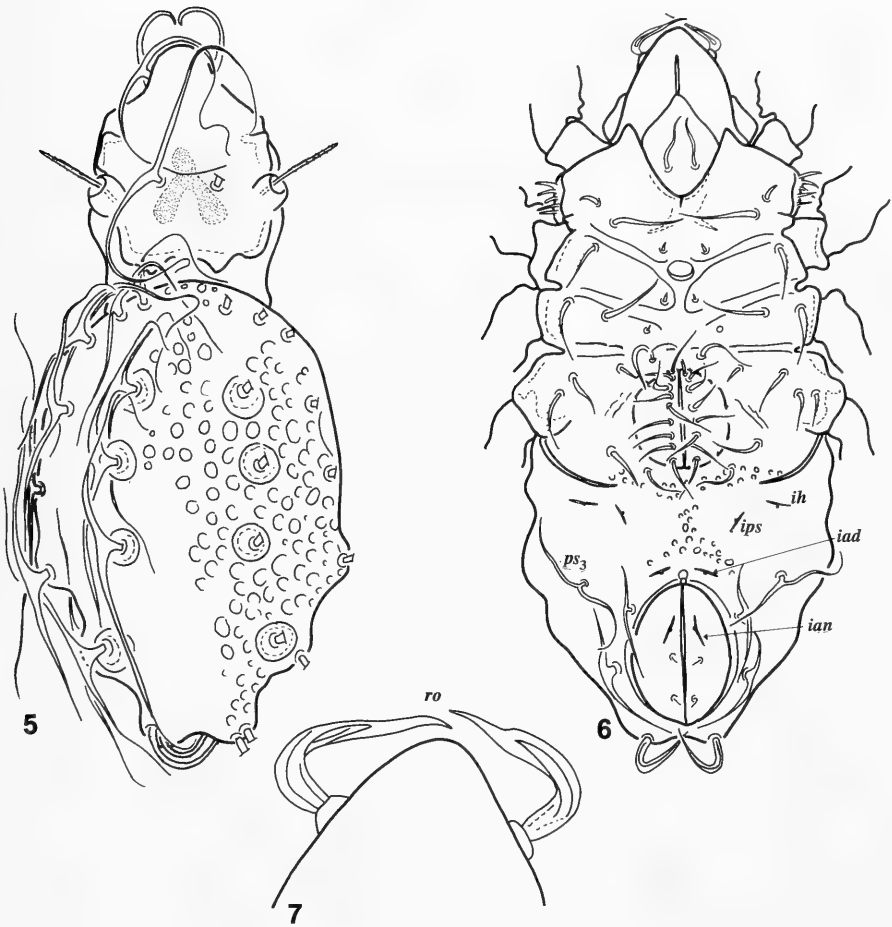
Gnathosoma: Typical for the family (Grandjean 1954). Setae h of the infracapitulum very long, S-shaped.

Ventral parts: Surface of the epimeres punctate. Epimeral setae (except the minute, spiniform 1a and 2a setae) long, setiform, distinctly roughened. Diagastry well visible. Ventral plate typical, as shown by Grandjean (1954), only ornamented with minor foveolae. Genito-anal setal formula: 9 - 2 - 2 - 3; four pairs of lyrifissures (*ih*, *ips*, *iad* and *ian*) present. Genital setae long, dilated basally. Aggenital setae also long, setiform. Anal setae minute, spiniform, adanal ones T-shaped, much smaller than notogastral setae.

Legs: Well corresponding to Grandjean's drawings and descriptions, not studied in detail.

REMARKS: The new species is close to the type species (*M. mammillaris* Berlese, 1913) of the genus, which was redescribed by Grandjean (1954). It is distinguishing from *M. mammillaris* by the interdistance of the posterobothridial condyles, the shorter sensillus, the absence of the wide epimeral setae (some bacilliform in *M. mammillaris*) and by the dilate genital and setiform, long aggenital setae (very short and minute in *M. mammillaris*).

ETYMOLOGY: Named after my friend Dr Bernd Hauser (Geneva), collector of this very interesting material, for his continuous help in my work on oribatids.



FIGS 5-7

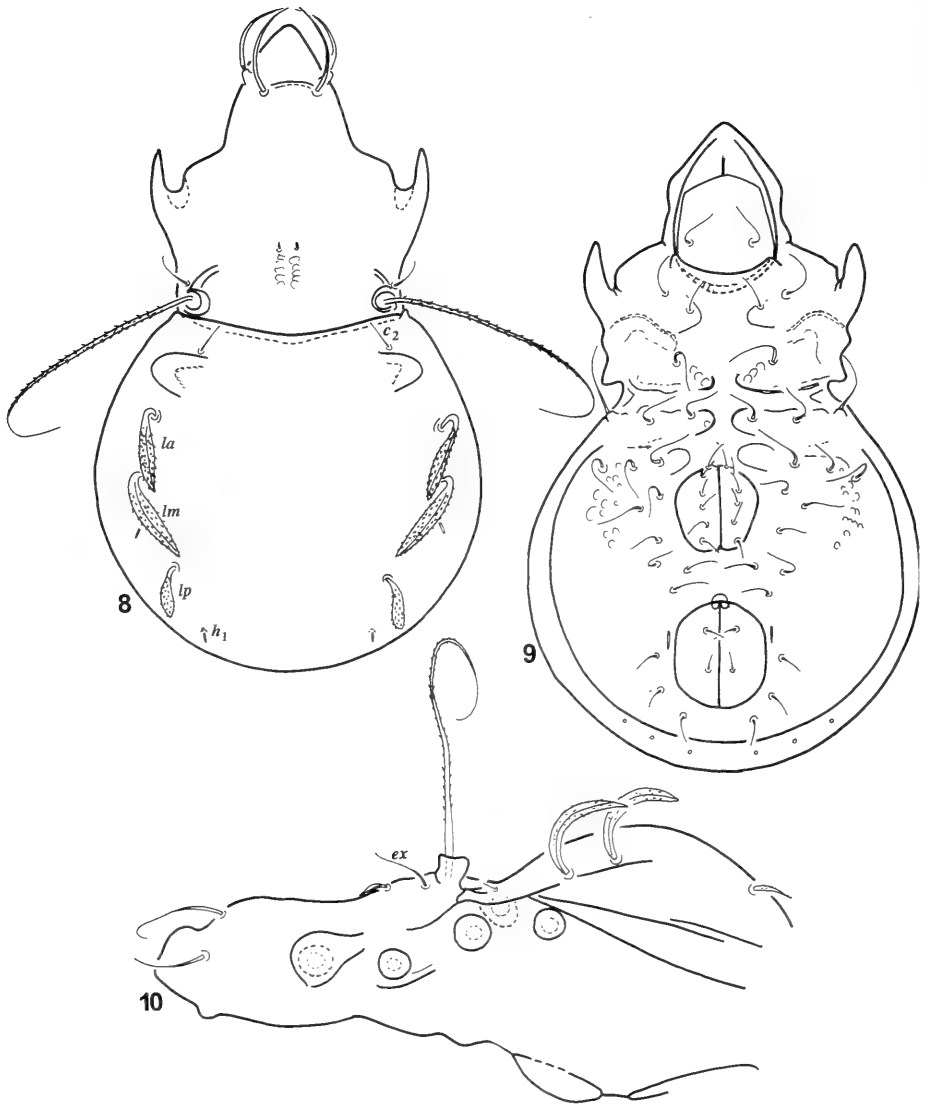
Masthermannia hauseri sp. n. (5) Body in lateral view. (6) Body in ventral view. (7) Rostral setae.

Caveremulus foliaceus sp. n.

Figs 8-10

MATERIAL EXAMINED: Holotype: Madagascar, Prov. Antsiranana; 3.XI.1989; leg. B. Hauser (Mad-89/8); 6 paratypes from the same sample. Holotype and 4 paratypes deposited in MHNG, 2 paratypes (1787-PO-2009) in HNHM.

DIAGNOSIS: Median part of prodorsal surface without costulae. Rostral setae arising from distinct tubercles, between the lamellar setae a weak transcostula present. Interlamellar setae minute, arising near to each other. Some small maculae present behind them. Sensillus very long, setiform. Notogaster with eight pairs of notogastral setae, among them three pairs large, phylliform. Epimeral setal formula 3 - 1 - 3 - 3. Six pairs of genital and two pairs of anal setae. Nine pairs of setae on ventral plate, mostly in preanal position.



FIGS 8-10

Caveremulus foliaceus sp. n. (8) Body in dorsal view. (9) Body in ventral view. (10) Anterior part of podosoma in lateral view.

MEASUREMENTS: Length of body 358-405 μm , width of body 186-237 μm .

DESCRIPTION: *Prodorsum*: Rostral apex elongated, conical. Rostral setae arising laterally, from distinct tubercles. lamellar setae situated near to them, their bases connected by a transversal ridge. Both pairs of setae long, setiform. Median part of prodorsum smooth, in its posterior third 5-6 small, indistinct maculae present. In front of

this sculpture a pair of minute interlamellar setae. Exobothridial setae fine, setiform, much longer than interlamellar ones. Bothridium round, a short crest directed inwards from it. Sensillus very long, ciliate, its distal end filiform, curved.

Notogaster: Dorsosejugal suture concave. A pair of characteristic deep hollows present laterally. Setae c_2 short, setiform, arising at the anterior margin of the hollows. Only eight pairs of notogastral setae visible, three of them large, phylliform, covered by small cilia. Setae h_1 very short (or broken), setae p represented only by their alveoli in a posteromarginal position.

Lateral part of podosoma: Rostral part of prodorsum with deep hollow. Bothridium distinctly protruding from the prodorsal surface (Fig. 10). Pedotecta I large, pedotecta II-III absent.

Ventral parts: Apodemes and borders weakly developed. Sternal ones only partly visible, sejugal ones well sclerotised, wide. Posterior border of epimeral region absent. Epimeral surface with irregular polygonal pattern. All epimeral setae long and thin, mostly setiform or filiform. Ventral plate with some round alveoli laterally, remaining surface smooth. Six pairs of genital setae arranged in longitudinal rows, two pairs of anal and three pairs of adanal setae well distinguishable, neotrichy present in aggenital region, consisting of six pairs setae. All setae simple, thin, epimeral setae much longer than the ventral ones.

REMARKS: See remarks after the next species.

ETYMOLOGY: The name refers to the form of the widened notogastral setae.

Caveremulus salicinus sp. n.

Figs 11-13

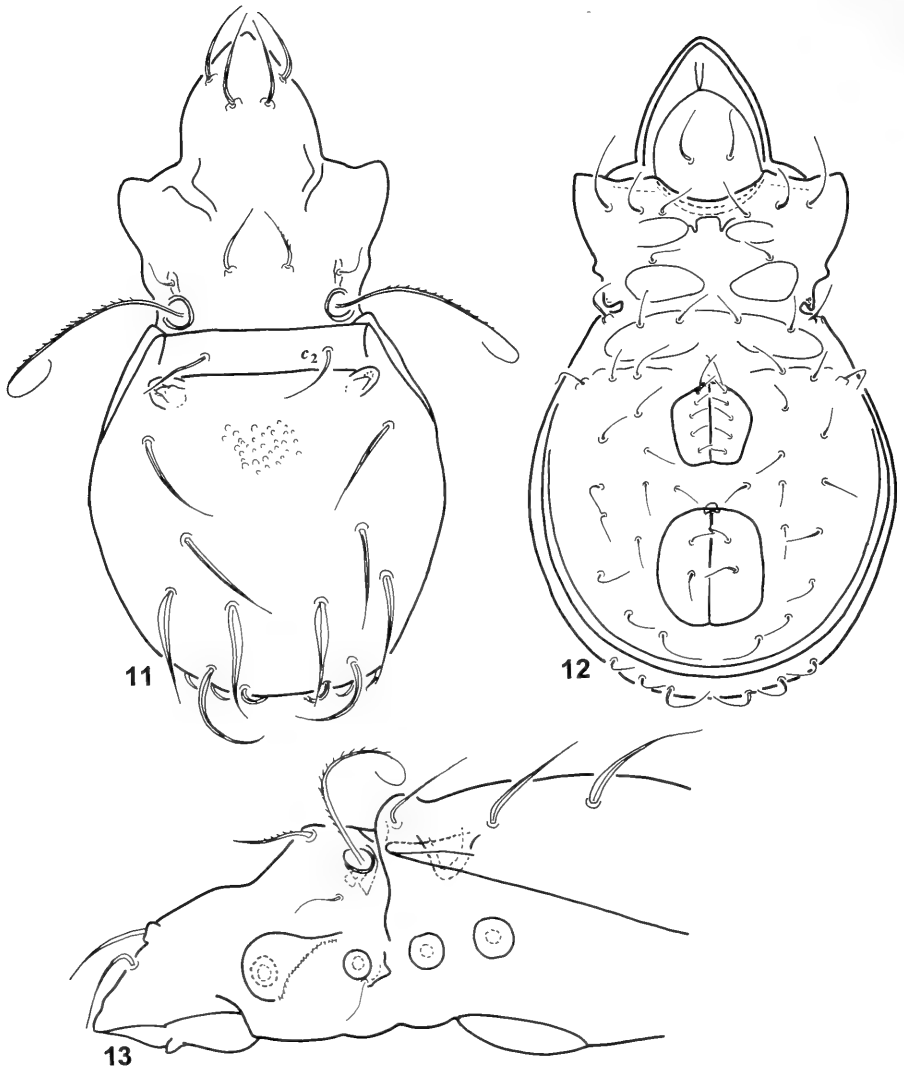
MATERIAL EXAMINED: Holotype: Madagascar, Prov. Antsiranana; 3.XI.1989; leg. B. Hauser (Mad-89/8); 2 paratypes from the same sample. Holotype and 1 paratype deposited in MHNG, 1 paratype (1788-PO-2009) in HNHM.

DIAGNOSIS: Median part of prodorsal surface without costulae. Rostral and lamellar setae arising on small tubercles, lamellar setae located far from each other, between them no transcostula present. Interlamellar setae shorter than the preceding ones, arising also from small, separate tubercles. Sensillus very long, setiform. Notogaster with nine pairs of notogastral setae, six of them much longer than the others, three pairs in the posteromarginal position shortest. All notogastral setae more or less saliciform. Epimeral setal formula 3 - 1 - 3 - 3. Six pairs of genital and two pairs of anal setae. Ten pairs of setae on ventral plate, mostly in a preanal position.

MEASUREMENTS: Length of body 290-306 μm , width of body 157-173 μm .

DESCRIPTION: *Prodorsum*: Rostral apex conical. Anterolateral part of prodorsum with short crest. All prodorsal setae, except exobothridial ones, arising from short tubercles, all setae setiform, finely ciliate. Exobothridial setae arising from short longitudinal crests, originating from anterior margins of bothridia. Interlamellar setae situated far from each other. Sensillus long, setiform, distinctly ciliate, distal part characteristically curved.

Notogaster: Whole surface foveolate. Dorsosejugal suture straight. A pair of characteristic deep hollows present, these laterally connected by a distinct transversal line. Setae c_2 arising far medially from the hollows, short, setiform, much shorter than



FIGS 11-13

Caveremlus salicinus sp. n. (11) Body in dorsal view. (12) Body in ventral view. (13) Anterior part of podosoma in lateral view.

setae *la*. Nine pairs of notogastral setae present, among them five pairs large, narrow, phylliform, resembling *Salix* leaves. Their surface smooth, a median vein well observable. Setae *p* much shorter than the others.

Lateral part of podosoma: Pedotectum I large, pedotecta II-III absent.

Ventral parts: Apodemes and borders partly developed, a part of sternal apodemes reduced. Sternal apodemes forming a transversal band, *ap. 3* also obser-

vable. Posterior border of epimeral region absent. Epimeral surface smooth. All epimeral setae long and thin, mostly filiform, setae *Ic* longest. Ventral plate smooth. Six pairs of genital setae arranged in longitudinal rows, two pairs of anal and three pairs of adanal setae distinguishable, neotrichy present in aggenital region, consisting of seven pairs of setae. All setae simple, thin, epimeral setae much longer than the ventral ones.

ETYMOLOGY: The new species is named after the form of its notogastral setae.

REMARKS: All species of the genus *Caveremulus* Mahunka, 1985 are known from Madagascar. They are well distinguishable from each other by the following key:

- 1 All notogastral setae, including setae *c*₂ wide, phylliform 2
- Setae *c*₂ thin, setiform, much thinner than the other phylliform notogastral setae 3
- 2 All notogastral setae equal in length. Adanal setae short, thin, much shorter than the aggenital setae *serratus* (Mahunka, 1985)
- One pair of phylliform notogastral setae much smaller than the others. Adanal and aggenital setae equal in length *cordisetus* Mahunka, 1983
- 3 Interlamellar setae minute, arising very near to each other. Three pairs of well dilated notogastral setae present *foliaceus* sp. n.
- Interlamellar setae long, arising far from each other. Notogaster without wide phylliform setae, all setae saliciform *salicinus* sp. n.

It is necessary to be aware that some *Hymenobelba* Balogh, 1962 species seem to be closely related to *Caveremulus* species. A further investigation is desirable.

***Tectocephus velatus velatus* (Michael, 1880)**

REMARKS: The two studied specimens correspond to the nominate subspecies on the basis of the cusps of the lamellae and the longitudinal pattern composed of lines in the interbothridial region, although according to Weigmann (2006) the longitudinal lines are characteristic of the subspecies *sarekensis* Trägårdh, 1910. The position of the *iad* lyrifissures is also as in *T. v. velatus*, and so is the body shape. The only difference is the excavate anterior border of the aspis, but this alone does not justify the proposal of a new species or subspecies.

MEASUREMENTS: Length of body 250-255 μ m, width of body 146-150 μ m.

***Ambrobates* gen. n.**

DIAGNOSIS: Belonging to the family Haplozetidae. Lamellae normal, anterior part of prelamella absent, sublamella present. Tutorium weakly developed. Sensillus short, head round. Pteromorphae large, partly movable. Nine pairs of small, notogastral setal alveoli and one pair of short distinct notogastral setae (*p*₁). Four pairs of round sacculi also well visible. Epimeral region without posterior border, sternal apodeme reduced. Epimeral setal formula: 3 - 1 - 3 -3. Three pairs of genital, one pair of aggenital, two pairs of anal and three pairs of adanal setae. All legs monodactylous.

TYPE SPECIES: *Ambrobates translamellatus* sp. n.

REMARKS: The new genus is well characterised by the form of the prelamella, the presence of a translamella, the reduced notogastral setae and by the three pairs of genital setae. This combination of features was previously unknown in the family.

***Ambrobates translamellatus* sp. n.**

Figs 14-16

MATERIAL EXAMINED: Holotype: Madagascar, Prov. Antsiranana; 23.XI.1989; leg. B. Hauser (Mad-89/8); 10 paratypes from the same sample. Holotype and 6 paratypes deposited in MHNG, 4 paratypes (1789-PO-2009) in HNHM.

DIAGNOSIS: Rostral apex blunt. Lamellae not reaching the prodorsal margin. Translamella present. Sensillus short, its head round. Epimeral borders and apodemes weakly developed, all epimeral setae minute, simple. Genito-anal setal formula: 3 - 1 - 2 - 3. All legs monodactylous.

MEASUREMENTS: Length of body 241-295 μm , width of body 148-182 μm .

DESCRIPTION: *Prodorsum*: Rostral apex blunt at tip. Lamellae in normal position, narrow, with small rounded apices bearing the lamellar setae. A narrow, but distinctly developed translamella connecting the lamellar apices. Rostral, lamellar and interlamellar setae long, setiform; rostral setae densely pilose, lamellar and interlamellar setae moderately pilose. Sensillus conspicuously short, directed laterad, head round, surface with rounded alveoli.

Notogaster: Dorsosejugal suture distinct. Pteromorpha large, movable, suture (hinge) sometimes hardly visible, especially in the anterior part. Nine pairs of alveoli (vestigial setae), one pair of true setae (p_1) and four pairs of minute, round sacculi present. All four pairs equal in size.

Lateral part of podosoma: Pteromorpha large, rounded. Tutorium very simple. Pedotecta I normal, dorsal margin nearly straight. Exobothridial setae short, fine. Porose area located very near to sublamella.

Ventral parts: Apodemes and borders weakly developed, sternal apodeme absent or hardly observable. *Ap. 2* and *ap. sej.* not reaching the genital aperture and not connected with each other. *Ap. 4* absent. Epimeral surface smooth, only some large foveolae present. All epimeral setae short and fine. Three pairs of simple genital, one pair of aggenital, two pairs of anal, three pairs of adanal setae present. Setae ad_3 in preanal position. Lyrifissures *iad* located near the anal aperture.

Legs: All legs monodactylous.

REMARKS: See the remarks after the genus description.

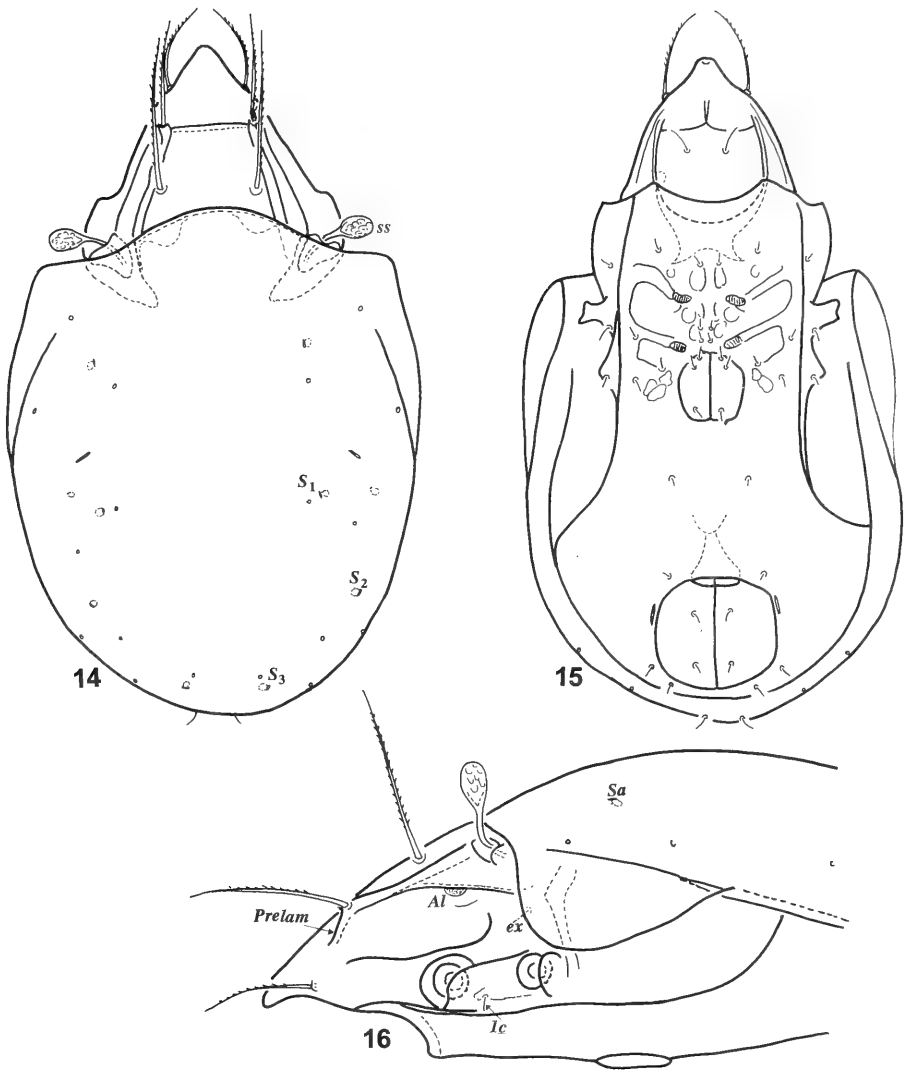
ETYMOLOGY: The name refers to the presence a distinct translamella.

***Vilhenabates ambohitra* sp. n.**

Figs 17-19

MATERIAL EXAMINED: Holotype: Madagascar, Prov. Antsiranana; 23.XI.1989; leg. B. Hauser (Mad-89/8); 10 paratypes from the same sample. Holotype and 6 paratypes deposited in MHNG, 4 paratypes (1790-PO-2008) in HNHM.

DIAGNOSIS: Rostral apex tripartite. Lamellae running laterally, their apices bearing lamellar setae. Sensillus extraordinarily long, directed backwards, head fusiform. Pteromorphae movable, sejugal margin convex, with a pair of porose areas. Notogaster with ten pairs of alveoli and with three pairs of porose areas. Epimeral



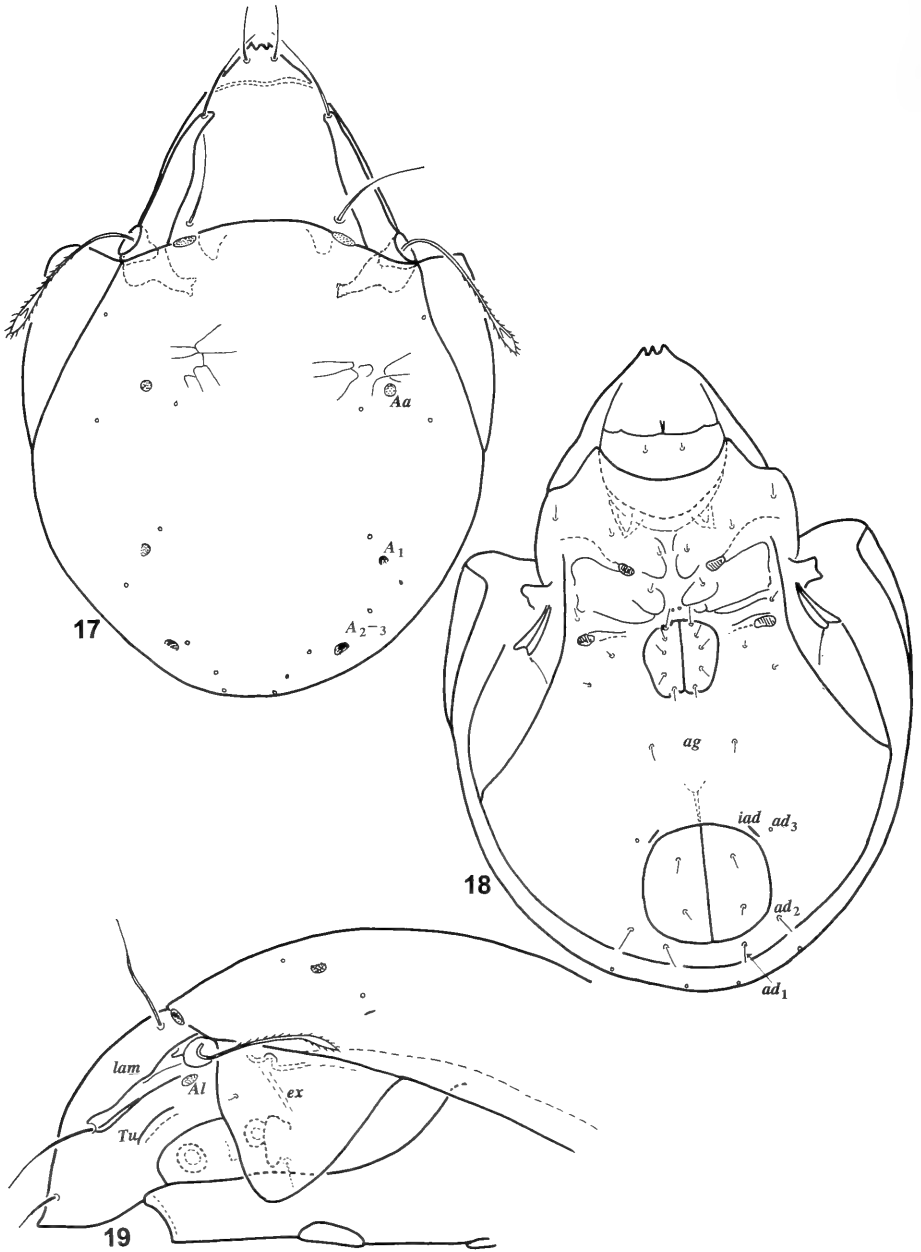
FIGS 14-16

Ambrobates translamellatus gen. n., sp. n. (14) Body in dorsal view. (15) Body in ventral view. (16) Anterior part of podosoma in lateral view.

borders and apodemes weakly developed, partly absent. Genito-anal setal formula: 5 - 1 - 2 - 3. All legs monodactylous.

MEASUREMENTS: Length of body 291-312 μm , width of body 206-221 μm .

DESCRIPTION: *Prodorsum*: Rostral part wide, with trifurcate rostral apex. Lamellae long, narrow, slightly dilated distally, directed inwards, lamellar setae located



FIGS 17-19

Vilhenabates ambohitra sp. n. (17) Body in dorsal view. (18) Body in ventral view. (19) Anterior part of podosoma in lateral view.

on their apices. Prelamellae absent, sublamellae short, weakly developed. All prodorsal setae comparatively short, finely ciliate. Sensillus very long, directed backwards, with small, lanceolate head, ciliate along the whole length. One pair of very small dorso-sejugal porose areas present basally, near the lamellae.

Notogaster: Dorsosejugal suture well developed, convex. Pteromorphae large, round, tongue-shaped. Three pairs of small, round porose areas well observable. Ten pairs of alveoli of notogastral setae, probably two pairs in posteromarginal position.

Lateral part of podosoma (Fig. 19): Tutorium short, without true apex. Pedotectum 1 long, with straight margin. A small porose area lamellaris (*la*) visible. Circumpedal carina long, reaching lateral margin of ventral plate.

Ventral parts: Apodemes and borders weakly developed. *Bo. 2* and *bo. sej.* reaching the genital aperture and connected with each other. Epimeral surface smooth, without pattern. All epimeral setae short, not ciliate. *Bo. 4* absent. Five pairs of simple genital, one pair of aggenital, two pairs of anal and three pairs of short adanal setae present. Setae *ad*₃ and lyrifissures *iad* in preanal position, both located very near to the anterior corner of the anal aperture.

Legs: All legs monodactylous. Femora of leg II-IV with distinct blade-like shape basally.

REMARKS: The new species is well distinguishable from the previously known *Vilhenabates* species by the shape of the rostral apex.

ETYMOLOGY: Named after the type locality of this species on Madagascar, the Parc National Montagne d'Ambre (= Ambohitra).

ACKNOWLEDGEMENTS

This research work was partly sponsored by the Hungarian Scientific Research Fund (OTKA 45889 and 72744). I thank Dr Bernd Hauser for collecting this very interesting material, Dr Peter Schwendinger for his help in preparing this manuscript, and my wife, Mrs Luise Mahunka-Papp, for doing the drawings. I also like to thank Dr Tibor Fuisz for translating part of the English text of this paper.

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Species of *Hybos* Meigen from Ningxia, Palaeartic China (Diptera, Hybotidae)

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Species of *Hybos* Meigen from Ningxia, Palaeartic China (Diptera, Hybotidae). - Only one species of the genus *Hybos* was known to occur in Ningxia of Northwest China, Palaeartic Region. Here five species are reported. One species, *Hybos liupanshanus* sp. nov., is described as new to science. A key to the five species of the genus from Ningxia is presented for the first time.

Keywords: Diptera - Hybotidae - *Hybos* - new species - Ningxia.

INTRODUCTION

Within the Hybotidae *Hybos* Meigen is characterized by the following traits: long spine-like proboscis, anal cell longer than basal cell, Rs rather short, R₄₊₅ and M₁ divergent apically (Chvála, 1983; Yang & Yang, 2004). It is distributed worldwide with 164 known species, of which 12 species are from the Palaeartic Region and 130 species from the Oriental Region (Yang *et al.*, 2007). The species of *Hybos* from China were revised by Yang & Yang (2004) who mentioned 85 known species. The major references dealing with *Hybos* in the Old World are Brunetti (1920), Frey (1953), Smith (1965), Saigusa (1963, 1965), Chvála (1983), Yang & Yang (2004), and Yang *et al.* (2006).

Ningxia is a semi-humid to arid region with a temperate climate and belongs to Northwest China, Palaeartic Region. Up to now, only one *Hybos* species, *Hybos grossipes* (Linnaeus, 1767), has been described from this region (Yang & Yang, 2004). In the present paper, four species of *Hybos* are added to the fauna of Ningxia, supplementing Yang & Yang (2004). One species is described as new to science. A key to separate these five species of the genus from Ningxia is presented for the first time.

MATERIAL AND METHODS

The specimens for this study are deposited in the following collections: CAU = Entomological Museum of China Agricultural University, Beijing, China. MHNG = Muséum d'histoire naturelle, Genève, Switzerland.

Basic terminology follows McAlpine (1981) and Steyskal & Knutson (1981). The following abbreviations are used: acr = acrostichal, ad = anterodorsal, av = anteroventral, dc = dorsocentral, h = humeral, npl = notopleural, oc = ocellar, pd = postero-dorsal, presc = prescutellar, psa = postalar, pv = posteroventral, v = ventral.

KEY TO SPECIES (MALES) OF *HYBOS* FROM NINGXIA

- | | | |
|---|--|--|
| 1 | Legs partly or mostly yellow | 2 |
| | Legs entirely black | 4 |
| 2 | Fore and mid legs mostly black | 3 |
| | Fore and mid legs mostly yellow | <i>Hybos liupanshanus</i> sp. n. |
| 3 | Hind tibia with 2 dorsal setae at middle . | <i>Hybos hubeiensis</i> Yang et Yang, 1991 |
| | Hind tibia without dorsal setae at middle . | <i>Hybos joneensis</i> Yang et Yang, 1988 |
| 4 | Hind coxa with 3 spine-like anterior setae at tip; fore and mid tibiae and tarsomere 1 with long setulae | <i>Hybos grossipes</i> (Linnaeus, 1767) |
| | Hind coxa without spine-like anterior setae at tip; only fore tarsomere 1 with long setulae | <i>Hybos wudanganus</i> Yang et Yang, 1991 |

TAXONOMIC PART

Hybos liupanshanus sp. n.

Figs 1-4

MATERIAL: Holotype male, Ningxia, Longde, Liupanshan Mountain, Sutai (2100 m), 24. VI. 2008, Jingxian Liu (CAU). Paratypes 3 males 1 female, same data as holotype (CAU & MHNG).

ETYMOLOGY: The species is named after the type locality Liupanshan.

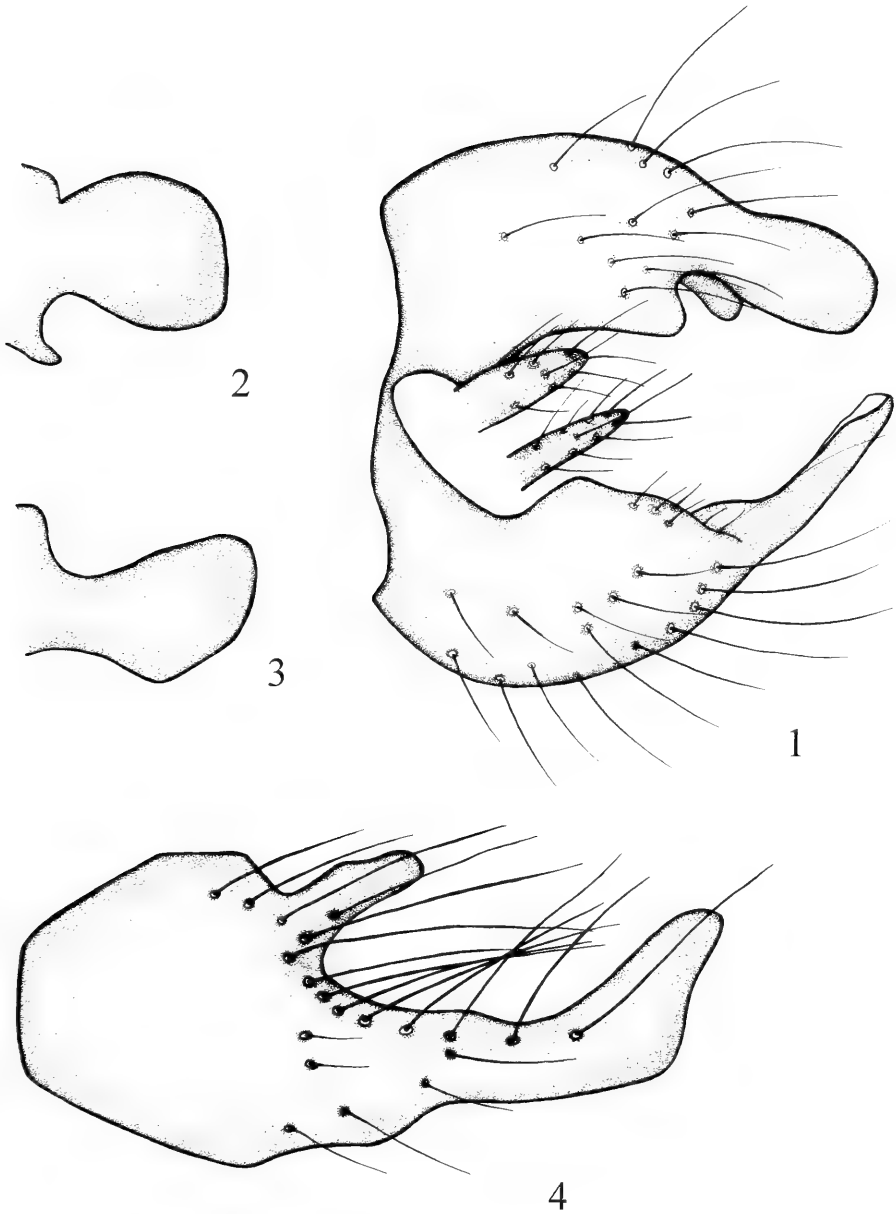
DIAGNOSIS: Setulae and setae on body pale. Legs yellow except hind coxa dark yellow, hind femur black, hind tibia partly blackish; all tarsomeres 3-5 black (not in dried specimens: tarsomeres yellow or brownish). Hypandrium with long narrow apical portion and a finger-like lateral process near base.

DESCRIPTION: MALE. Body length 4.7-4.9 mm, wing length 4.7-5.0 mm.

Head: black, pale gray microtrichose. Eyes brownish, contiguous on frons (but narrowly separated in dried specimens); upper facets indistinctly enlarged. Setae and setulae on head pale; ocellar tubercle weak, with one pair of long brownish oc. Antenna black; scape bare; pedicel with a circle of subapical setulae; first flagellomere without dorsal setulae, about 3 times as long as wide; arista black, about 3.5 times as long as first flagellomere, short pubescent except apical 1/4 thin and bare. Proboscis black; palpus black with 4 long ventral setulae.

Thorax: black, pale grey microtrichose. Setae and setulae pale; postpronotal lobe with pale setulae; h absent, 2 npl (anterior npl short), acr more or less in two rows, 1 distinct posterior dc and 8 setulae anteriad, 2 weak presc, 1 long psa; scutellum with 6 or 8 short lateral setulae and 2 long subapical setae.

Legs yellow except hind leg with coxa varying from yellow to blackish, femur black, tibia brown to blackish; tarsomeres 3-5 yellow or slightly brownish, but rarely tarsomeres 1-2 also dark brown. Setae and setulae on legs pale except tibiae and tarsi with some blackish setulae. Hind trochanter with 2 short black ventral spines apically.



FIGS 1-4

Hybos liupanshanus sp. n. (male). (1) genitalia, dorsal view. (2) right surstylus. (3) left surstylus. (4) hypandrium, ventral view.

All femora with long setulae. All tibiae and fore and mid tarsomeres 1-2 with some long and nearly erect setulae. Fore femur 1.1 times as wide as mid femur; mid femur with 1 blackish preapical anterior seta; hind femur 2.4 times as wide as mid femur, with 1 brownish yellow preapical anterior seta, and with 9 av (longer than v and pv), 15 v (3 sparse v on basal 1/2 and 12 dense v on apical 1/2), 5 pv on basal 1/3, which are spine-like and inserted on weak tubercles. Fore tibia apically with 1 blackish ad and 1 brownish yellow av; mid tibia with 1 long blackish ad at base and 1 long blackish ad at middle, apically with 1 brownish yellow av; hind tibia apically with 1 brownish yellow av. Fore tarsomere 1 with 1 black av and 1 black pv which are located at same level near extreme base; mid tarsomere 1 with two rows of black v; hind tarsomeres 1-2 with short black ventral spines. Wing slightly tinged with grayish; stigma dark brown; veins dark brown, R_{4+5} and M_1 divergent apically. Squama pale yellow, bordered with pale setulae. Halter pale yellow.

Abdomen: weakly curved downward, blackish, grey microtrichose. Setulae and setae on abdomen pale, but those on hypopygium sometimes black.

Male genitalia (Figs 1-4): left epandrial lobe with convex inner margin, left surstylus slightly constricted basally and obtuse apically; right epandrial lobe with slightly concave inner margin, right surstylus short and broad, with a short finger-like inner process at base; hypandrium much longer than wide, basally wide, apically narrow and slightly curved, and with a finger-like lateral process near base.

FEMALE: Body length 3.8 mm, wing length 4.6 mm. Similar to male, but hind trochanter without short black ventral spines apically, fore and mid tarsomere 2 without long and nearly erect setulae.

DISTRIBUTION: China (Ningxia).

REMARKS: The new species is similar to *Hybos minutus* Yang & Yang, 1997 from Hubei in the coloration of the legs, but it can be easily separated from the latter by having the first flagellomere without any dorsal seta, hind femur with 3 rows of ventral spines and hypandrium much longer than wide without the furcate apex. In *H. minutus*, the first flagellomere has 1 dorsal seta, the hind femur has one row of ventral spines, the hypandrium is slightly longer than wide, with a furcate apex (Yang & Yang, 2004).

Hybos grossipes (Linnaeus, 1767)

Musca grossipes Linnaeus, 1767: 988. Type locality: "Europa".

MATERIAL: 2 males 1 female, Ningxia, Jingyuan, Liangdianxia 2000 m, 4. VII. 2008, Jingxian Liu (CAU).

DISTRIBUTION: China (Jilin, Ningxia, Gansu, Inner Mongolia, Shanxi, Shaanxi, Hebei, Henan, Sichuan); Europe.

Hybos hubeiensis Yang et Yang, 1991

Hybos hubeiensis Yang et Yang, 1991: 3. Type locality: China: Hubei, Wudangshan Mountain.

MATERIAL: 2 males 1 female, Ningxia, Jingyuan, Longtan 1880 m, 5. VII. 2008, Jingxian Liu (CAU).

DISTRIBUTION: China (Ningxia, Henan, Gansu, Hubei).

***Hybos joneensis* Yang et Yang, 1988**

Hybos joneensis Yang et Yang, 1988: 284. Type locality: China: Gansu, Jone.

MATERIAL: 1 male 1 female, Ningxia, Jingyuan, Heshangpu 2000 m, 26. VI. 2008, Jingxian Liu (CAU).

DISTRIBUTION: China (Ningxia, Gansu).

***Hybos wudanganus* Yang et Yang, 1991**

Hybos wudanganus Yang et Yang, 1991: 5. Type locality: Hubei, Wudangshan Mountain.

MATERIAL: 1 male 1 female, Ningxia, Jingyuan, Longtan 1880 m, 5. VII. 2008, Jingxian Liu (CAU).

DISTRIBUTION: China (Ningxia, Henan, Hubei).

ACKNOWLEDGEMENTS

Our sincere thanks are due to Dr. Jingxian Liu (Zhejiang University, Hangzhou) and Ms. Weina Cui for their help during the study. The research was funded by the National Natural Science Foundation of China (No. 30770259, No. 30225009).

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Variations in sex ratio studied in a single breeding population of an endangered salamander: a long-term study

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Variations in sex ratio studied in a single breeding population of an endangered salamander: a long-term study. - A small population of a rare, xeric-inhabiting salamander *Salamandra infraimmaculata* Martens, 1885, was studied throughout 25 years at the breeding ponds on Mt. Carmel, Israel. The breeding period extended between October and January but most females visited the ponds during November and December. The number of salamanders fluctuated during the study period not showing any particular pattern. The sex ratio was male-biased during most of this period while female numbers dropped during the last few years. Only such long-term observations can illustrate this point in perspective of time leading to the conclusion that the observed drop in female numbers may eventually effect a decline in the species' presence in this fringe habitat. The subject is discussed and reviewed and a general comparison with variation in sex ratio in other urodele species is presented.

Keyword: Amphibian decline - Endangered species - Long-term study - *Salamandra* - Sex ratio.

INTRODUCTION

The salamander, *Salamandra infraimmaculata* Martens, 1885, is a rare and protected species inhabiting mountainous regions in northern Israel where it is limited in its distribution to three disjunct metapopulations. The main population is located in the mountains of the Western and Central Galilee (Degani & Warburg, 1978). In addition there are two smaller ones at about 50 km distance from, and unconnected to the main area. One is in the north-eastern part of Israel at the foot of Mt. Hermon at Tel Dan (Degani & Mendelssohn, 1982), the other is located southwest of the main area in the northern part of Mt. Carmel Warburg (1986, 1994).

This metapopulation of salamanders on Mt. Carmel comprises the southeastern limit of the species' Palaearctic distribution. Therefore, it inhabits a fringe area where conditions are optimal only part of the time to the animals. It seems possible that salamanders in this area may have to cope, at times, with unsuitable conditions not encountered by other populations inhabiting more favorable environments in the Galilee mountains (Degani & Mendelssohn, 1982; Degani & Warburg, 1978), or by other *Salamandra* species in the center of the species' distribution in Central Europe (Joly, 1968; Feldmann & Klewen, 1981; Klewen, 1985, 1988; Thiesmeier, 2004).

The adult salamander is largely a terrestrial animal returning to water only when mature at the age of 3-4 years, and then only the females for a few hours to breed (Warburg, 2009). Males usually remain out of water even during the breeding period as mating takes place on land. Its aquatic life during the larval period lasts only three to four months. Since as adult, the female enters water only for a few hours, the species' aquatic life totals about 1.25% of its lifetime.

The uniqueness of this species is because of two main of reasons:

1. It occupies a fringe habitat at the edge of its Palearctic distribution.
2. It has to survive the weather in a xeric Mediterranean region characterized by a rather short rainy season unpredictable in its duration and magnitude between October and January when about 66% of the average annual rain falls. On Mt. Carmel the average annual rainfall ranged between 440-1160 mm during the 25 years of study (averaging 690 mm annually). Since the rainy season is followed by eight months of hot-dry weather, breeding has to take place by January at the latest or the metamorphosing larvae will die (Cohen *et al.*, 2005, 2006). In these studies it was shown that through both differential growth and cannibalism, half-sib larval cohorts facilitate spacing-out the timing of metamorphosis resulting in spacing-out of both temporal and spatial dispersal in juvenile *S. infraimmaculata* (in preparation). This is an important mechanism for survival eventually enabling colonization of new breeding ponds (Degani *et al.*, 2007).

This long-term study was not planned as such but started as a family project during which the salamanders were observed in their breeding rock-pools on Mt. Carmel, on cold-rainy nights. It developed into this long-term study as ever-more questions arose regarding different aspects of their life history.

The original objective of this long-term study was to learn about the life history and phenology of *S. infraimmaculata* by monitoring adult salamanders during the breeding season in a single breeding metapopulation. It later evolved into a study on breeding pond tenacity (Warburg, 2006), longevity (Warburg, 2007a), phenology (Warburg, 2007b), recapture rates (Warburg, 2008a), dimensions (Warburg, 2008b), growth (Warburg, 2008c), and reproduction (Warburg, 2009), as these salamanders were observed over a long period (25 years). Consequently new questions arose: does the sex ratio studied in this single population show changes over the years? When can a drop in the number of females be interpreted as a decline?

MATERIALS AND METHODS

The study area was located 12 km south of Haifa on the top of Mt. Carmel towards its western slopes. The study site (about 60x100 m) contains four shallow rock-pools which are one of the main breeding sites for the salamanders in this area. There are a few other far apart breeding ponds that are used by the Mt. Carmel *Salamandra* metapopulation. The average annual rainfall based on 25 years of meteorological observations is 690 mm. Since the breeding season when adult salamanders emerge from their aestivation sites starts earliest in September (generally October) and lasts till January, I used data only for these months. The study period lasted from 1974 to 1998 with the exception of one breeding season (1990/91) altogether 24 years of observations.

Adult salamanders were observed near their breeding sites on stormy winter nights throughout the entire breeding season for 10-12 weeks starting at the onset of the rainy season (October or November), continuing until mid-January.

The animals were identified individually by their typical yellow patterns on a black background on the dorsal side of the salamander. These hardly ever change throughout its lifetime (Warburg, 2006 see Fig.1, 2007a, b, 2008a). Consequently the salamanders could easily be identified individually by their photographs throughout the entire study period. Marking animals by toe clipping or subcutaneous insertion of PIT tags were not necessary especially since the first method is only adequate for short-term monitoring due to the high rate of regeneration in amphibians especially in urodeles, and both techniques involve rough handling and molesting this rare, endangered species.

The sex was determined by cloacal examination (see Degani & Warburg, 1978). In this study I have used three different ways to express sex ratio:

1. Male/female ratio when male is always one therefore females may be either larger or smaller than one.
2. I have also used percentage (%) to express the ratio between the genders.
3. For comparing with other data I have also used the male/female ratio where male numbers are divided by the females'.

The animals were then photographed and finally released back to their habitat either during the same night or on the following one.

For the partial review on the subject of changes in sex ratio in urodeles, I was limited in the number of papers I could use since many of the papers describing population structure or dynamics did not provide the original data in the form of Tables but rather in Figures. The urodelan species cited in the text and Tables are listed in the Appendix.

It is of interest to note here that the earliest paper on this subject providing quantitative data was published in this journal (*Revue suisse de Zoologie* 1952) by Fritz Ernst of Zurich Anatomical Institute.

For statistical analysis I have used standard regression analyses since the number of salamanders sampled was rather small.

RESULTS

One hundred and thirty salamanders were captured and about 50% of them were recaptured during the 25 years of study. This paper is based on both captured and recaptured (more than once up to 40 times in males, see Warburg 2006, 2007b, 2008) salamanders.

The number of both males and females did not show significant relation with either years (1974-1998 Fig. 1 A) or rain (Fig.1 B). Nor was there a significant relation between years and rainfall (Fig.1 C).

During the long study the sex ratio (%) fluctuated (Fig. 2 A). Thus, during the first three years (1974-76) there was an increase in the relative number of females which became greater than that of males in the 3rd year (1976). After this, the numbers of males was always greater than those of females. In all but three years (1976, 1980,

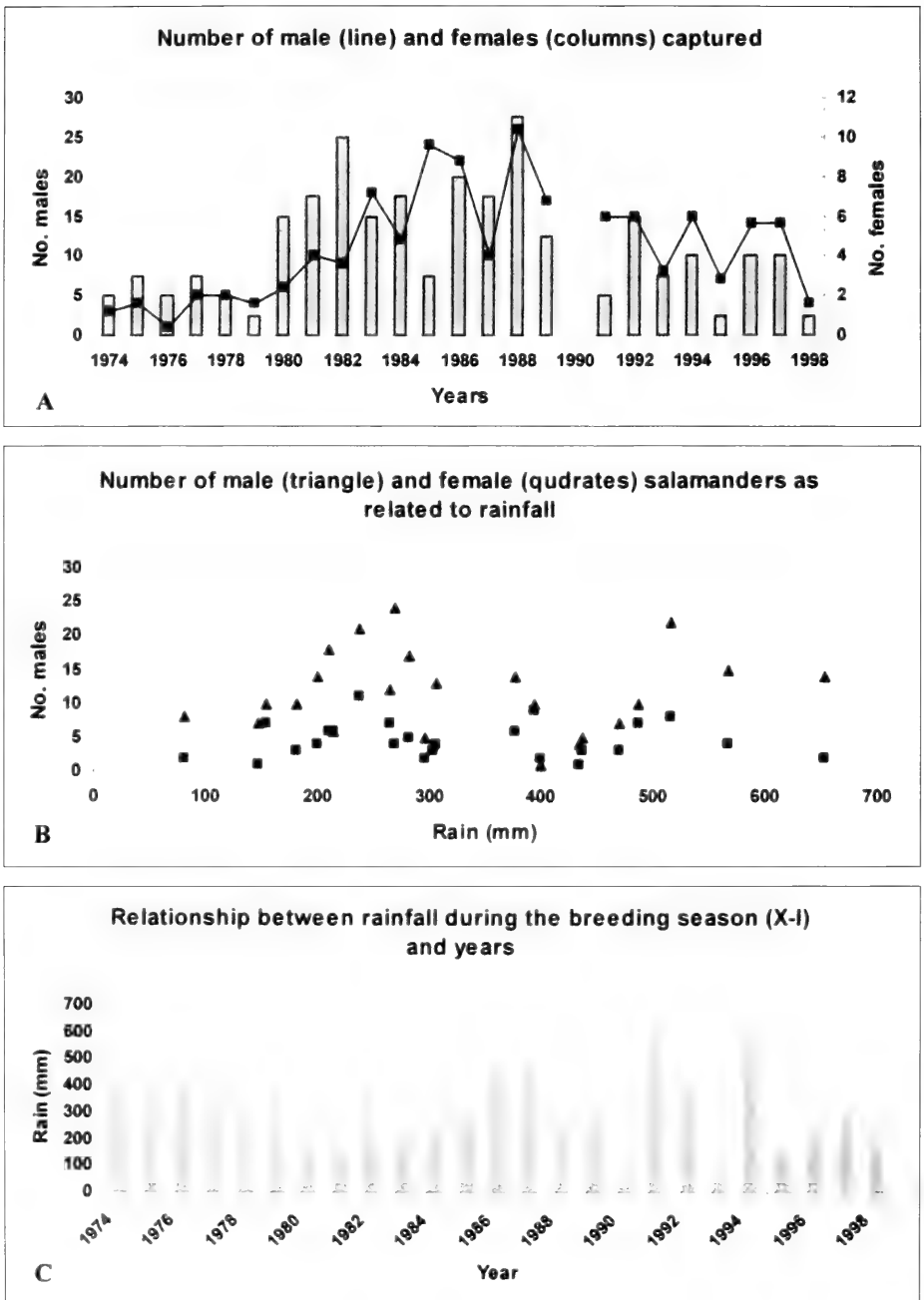


FIG. 1

Number of male and female salamanders captured over the years (A) and in relation to rain (B), and between rain and years (C).

1982) males comprised more than half the population and in most years there were more than 70% males (Fig. 2 A). Sex ratio (M:F ratio) did not relate significantly to years (Fig. 2. C). Sex ratio ranged from 1:0.12 (in 1985) to 1:2 (in 1976) averaging 1:0.4 in 24 years of observations (Table 1). There was no significant relationship between number of males and females (Fig. 2 B).

When the 25-year study period was divided into six 4-year periods (excluding the year 1990 when the site could not be visited during the breeding season), no significant relation was noticed in either females ($R^2 = 0.0495$ Fig. 3 A), males ($R^2 = 0.634$ Fig. 3 B) or rainfall ($R^2 = 0.1127$ Fig. 3 C). However, the M:F ratio was related significantly when arranged in 4-year periods ($R^2=0.9527$) becoming increasingly male biased during the last two 4-year periods (1991-1998) (Fig. 4). The M:F ratio drops gradually from 1:0.64 (M:F) during the first eight years of observation (1974-1981), to 1:0.26 in later years (1995-1998) showing a decline in the percentage of females in this breeding population (Table 2).

DISCUSSION

The data presented here were assembled over a long period of time during which profound changes in the sex ratio within a single salamander population were noticeable. Two main points need to be discussed:

1. Are there any similar data on urodelan sex ratio that can be compared?
2. How can these temporal variations in the sex ratio be explained?

Regarding comparable data: Similar studies on sex ratio in the genus *Salamandra* show that the sex ratio ranged between 1:0.29 to 1:1.14 M:F ratio (Table 3). In only three of the 12 studies reviewed, the sex ratio was female-biased. On the other hand, in one 5-year long study of *S. s. terrestris*, there was a significant relation ($R^2=0.7174$) between M:F ratio and years. The proportion of males continuously increased with years (from 2.31 to 3.52 M:F ratio, see Klewen, 1985).

Reviewing 51 studies on 34 urodele species studying sex ratio (Table 4) the sex ratio in 22 species was about 1:1 (M:F). In eight *Ambystoma* spp. and in five *Plethodon* spp. sex ratio ranged between 1:0.35 to 1:3. In seven *Triturus* spp. sex ratio ranged between 1:0.58 to 1:3.3.

The reason for a higher proportion of males in the populations close to the breeding sites could be because of early maturity in males (Flageole & Leclair, 1992; Leclair & Caetano, 1997). Moreover, their greater activity extending over much of the breeding season arriving at the breeding ponds earlier than females and leaving later, can also contribute to apparent unbalanced sex ratios in adult urodeles (Caetano & Leclair, 1996) thereby explaining some of the spatial and temporal variation in the sex ratio of newts during the season as was suggested by Arntzen (2002). Observations on *S. salamandra* (Linnaeus, 1758) similarly indicated the early activity of males (Warburg, 1994), and Beneski, Zalisko & Larsen (1986) found more males than female *A. macrodactylum* Baird, 1849 at the beginning of the breeding period, the females only being active later on.

Previous studies were concerned with both spatial and temporal changes in sex ratio.

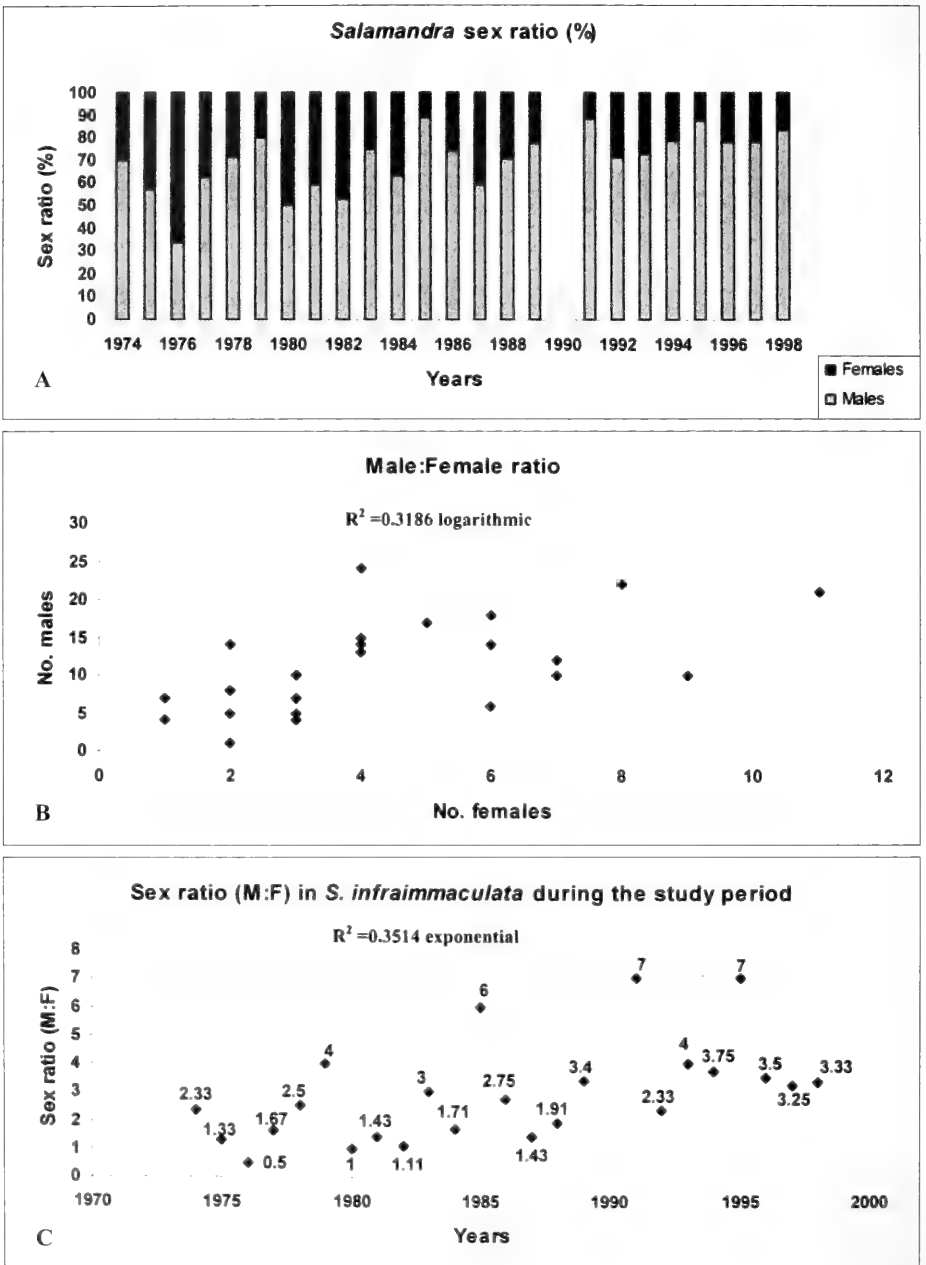


FIG. 2

Sex ratio (M:F) (A), the relationship between the number of males and of females (B) and changes in sex ration during the study period (C).

TABLE 1. Sex ratio.

Year	Males	Females	M : F
1974	7	3	1 : 0.43
1975	4	3	1 : 0.75
1976	1	2	1 : 2
1977	5	3	1 : 0.6
1978	5	2	1 : 0.4
1979	4	1	1 : 0.25
1980	6	6	1 : 1
1981	10	7	1 : 0.7
1982	9	10	1 : 1.1
1983	18	6	1 : 0.33
1984	12	7	1 : 0.58
1985	24	3	1 : 0.12
1986	22	8	1 : 0.36
1987	10	7	1 : 0.7
1988	26	11	1 : 0.42
1989	17	5	1 : 0.29
====		the site was not visited	
1991	15	2	1 : 0.13
1992	15	6	1 : 0.4
1993	8	3	1 : 0.37
1994	15	4	1 : 0.27
1995	7	1	1 : 0.14
1996	14	4	1 : 0.28
1997	14	4	1 : 0.28
1998	4	1	1 : 0.25
	272	109	1 : 0.4

TABLE 2. Sex ratio calculated in 4-year periods.

Years	Nos. captured		M : F
	M	F	
1974-77	17	11	1 : 0.65
1978-81	25	16	1 : 0.64
1982-85	63	26	1 : 0.41
1986-89	75	31	1 : 0.41
=====			
1991-94	53	15	1 : 0.28
1995-98	39	10	1 : 0.26
Total	272	109	1 : 0.4

SPATIAL CHANGES

The sex ratio in salamanders varied between localities. In *Salamandra atra* Laurenti, 1768 it ranged between 1:0.49 and 1:0.84 M:F ratio (Klewen, 1986), in *Batrachoseps attenuatus* (Eschscholtz, 1833) M:F sex ratio ranged between 0.17-1.78, and in *Aneides lugubris* between 0.73-1 depending on the locality (Anderson, 1960). Likewise, in *Notophthalmus viridescens* (Rafinesque, 1820), differences in the sex ratio were found in populations from different localities ranging from 1:0.6 to 1:2 M:F

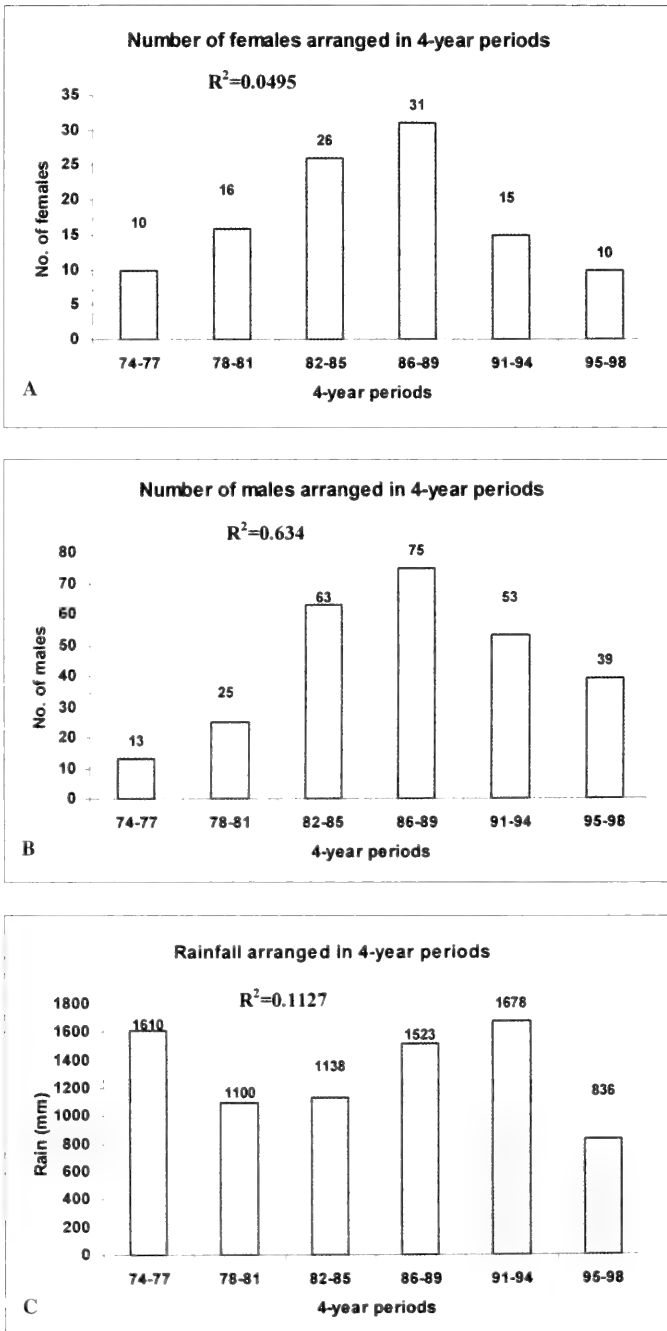


FIG. 3
Number of males, females and rainfall arranged in 4-year periods.

TABLE 3. Sex ratios in *Salamandra*.

Species	M:F	Source
<i>Salamandra salamandra</i>	1:0.55	Geiler, 1974
<i>S. salamandra</i>	1:1	Degani & Warburg, 1978
<i>S. salamandra</i>	1:0.6	Degani & Mendelssohn, 1982
<i>S. salamandra</i>	1:0.29	Warburg, 1994
<i>S. salamandra</i>	1:1.08	Rebello & Leclair, 2003
<i>S. s. terrestris</i>	1:0.55	Feldmann & Klewen, 1981
<i>S. s. terrestris</i>	1:0.38	Klewen, 1985
<i>S. s. terrestris</i>	1:0.81	Seifert (see Thiesmeier, 2004)
<i>S. s. gallaica</i>	1:1.04	Rebello & Caetano, 1995
<i>S. salamandra</i>	1:1.14	Catenazzi, 1998 (see Thiesmeier, 2004)
<i>S. infraimmaculata</i>	1:0.41	This study
<i>S. atra</i>	1:0.67	Klewen, 1986
<i>S. atra atra</i>	1:1	Luiselli <i>et al.</i> , 2001

ratio Gill (1978, a,b) and 1:0.53 to 1:1.7 M:F ratio (Leclair & Caetano, 1997). Similar differences in sex ratios among populations of this species were also described by Hurlbert (1969).

In the eastern Galilee population of *S. salamandra*, Degani (1980) found 161 specimens 54.4% of them were males, and in a later study 55% were males (Degani & Mendelssohn, 1982).

Sex ratio in *Desmognathus ochrophaeus* Cope, 1859 changed with altitude: at high elevation it was 1:0.59 M:F ratio and at low elevation 1:0.74 M:F ratio (Tilley, 1973).

SEASONAL CHANGES

Seasonal changes in the sex ratio in a population of *Desmognathus fuscus* (Green, 1818) were studied by Danstedt (1975). He stressed that they may be a consequence of a decline in the frequency of females in the area he studied. Similar seasonal differences in sex ratio of *Triturus vulgaris* (Linnaeus, 1758) were described: in autumn and winter it was 1:2 M:F, in spring and summer 1:0.77 M:F. The terrestrial phase of the newt showed a 1:3.3 M:F averaging 1:1.26 (Griffiths, 1984). In breeding newts Harrison *et al.* (1983) found a sex ratio of 1:1.1 in *Triturus helveticus* Razumowski, 1789 and 1:2.6 in *T. vulgaris*. The sex ratio in outward migrating newts from the ponds was 1:1.4 M:F in *T. helveticus* and 1:0.7 in *T. vulgaris*. In *N. viridescens* the sex ratio was biased towards males inside the ponds (1:08 M:F), and towards females outside the ponds 1:1.2. During the spring migration it ranged from 1:0.88 to 1:2 M:F ratio; during the fall migration it ranged between 1:1.37 to 1:0 M:F ratio (Hurlbert, 1969). Finally, the sex ratio in *Ambystoma texanum* (Matthes, 1855) was different in migrating salamanders (1.5 males to 1 female), and in breeding ones (2.2 males to one female) (Petranka, 1984).

ANNUAL CHANGES

Not only spatial and seasonal variations in sex ratios were described in several urodeles, but sex ratio also appears to vary from year to year and in some cases this variability is rather high.

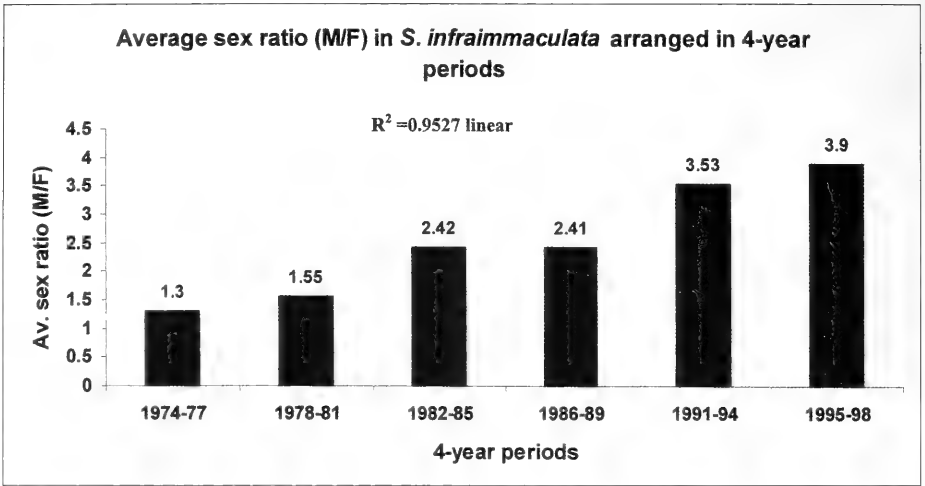


FIG. 4

Average sex ratio (M:F) in *S. infraimmaculata* arranged in 4-year periods.

TABLE 4. Sex ratios in other urodeles.

Species	M:F	Source
<i>Cryptobranchus allageniensis</i>	1:0.85	Humphries & Pauley, 2005
<i>C. allageniensis</i>	1:0.77 to 1:1.35	Nickerson & Mays, 1972
<i>Ambystoma maculatum</i>	1:0.53	Husting, 1965
<i>A. maculatum</i>	1:1	Blackwell <i>et al.</i> , 2004
<i>A. maculatum</i>	1:0.5	Flageole & Leclair, 1992
<i>A. macrodactylum</i>	1:3	Fukumoto & Herrero, 1998
<i>A. opacum</i>	1:1	Parmelee, 1993 (vide Petranka, 1984)
<i>A. opacum</i>	1:1	Stenhouse, 1987
<i>A. talpoideum</i>	1:1.06	Hardy & Raymond, 1980
<i>A. talpoideum</i>	1:1	Raymond & Hardy, 1990
<i>A. texanum</i>	1:0.45	Petranka, 1984
<i>A. tigrinum</i>	1:0.76	Rose, 1976
<i>A. annulatum</i>	~ 1:1	Briggler <i>et al.</i> , 2004
<i>A. cingulatum</i>	1:0.35	Palis, 1997
<i>Desmognathus fuscus</i>	1:1.27	Orser & Shure, 1975
<i>D. fuscus</i>	1:1	Hall, 1977
<i>D. ochrophaeus</i>	1:0.6	Martof & Rose, 1963
<i>D. ochrophaeus</i>	1:0.68	Tilley, 1973
<i>D. ochrophaeus</i>	1:1	Hall, 1977
<i>Enastina eschscholtzii platensis</i>	1:0.99	Staub <i>et al.</i> , 1995
<i>Plethodon wehleri</i>	1:0.35 to 1:1.3	Hall & Stafford, 1972
<i>P. websteri</i>	1:1	Semlitsch & West, 1983
<i>P. larselli</i>	~ 1:1	Herrington & Larsen, 1987
<i>P. vehiculum</i>	~ 1:1	Ovaska & Gregory, 1989
<i>P. kentucki</i>	1:0.8	Marvin, 2001
<i>P. cinereus</i>	1:3	Marsh & Goicochea, 2003
<i>Gyrinophilus porphyriticus</i>	1:0.77 to 1:1.19	Bruce, 1978
<i>Eurycea l. longicauda</i>	1:1	Anderson & Martino, 1966

<i>E. quadridigitata</i>	1:1	Semlitsch & McMillan, 1980
<i>Stereochilus marginatus</i>	1:1	Bruce, 1971
<i>Triturus vulgaris</i>	1:0.66	Hagström, 1979
<i>T. vulgaris</i>	1:0.58	Bell, 1977
<i>T. vulgaris</i>	1:2.6	Harrison <i>et al.</i> , 1983
<i>T. vulgaris</i>	1:2-3.3	Griffiths, 1984
<i>T. vulgaris</i>	1:0.92	Verrell & Francillon, 1986
<i>T. vulgaris</i>	~ 1:1	Arntzen, 2002
<i>T. vulgaris meridionalis</i>	1:1	Kleteäki, 1995
<i>T. cristatus</i>	1:0.61	Hagström, 1979
<i>T. cristatus</i>	1:1.03	Arntzen & Teunis, 1993
<i>T. a. alpestris</i>	1: 0.8	Ernst, 1952
<i>T. alpestris</i>	1:1	Kleteäki, 1995
<i>T. alpestris</i>	1:1	Arntzen, 2002
<i>T. helveticus</i>	1:0.93	Gelder, 1973
<i>T. helveticus</i>	~ 1:1	Arntzen, 2002
<i>T. helveticus</i>	1:3	Harrison <i>et al.</i> , 1983
<i>T. marmoratus</i>	~ 1:1	Arntzen, 2002
<i>T. m. pygmaeus</i>	1:1	Diaz-Paniagua, 1998
<i>T. vittatus</i>	1:0.91	Geffen <i>et al.</i> , 1986/87
<i>T. carnifex</i>	1:1	Kleteäki, 1995
<i>Chioglossa lusitanica</i>	1:0.43 to 1: 1.14	Arntzen, 1981
<i>Euproctus platycephalus</i>	1:1	Bovero <i>et al.</i> , 2003
<i>Mertensiella luschani</i>	1:0.78	Tzannetatu-Polymeni <i>et al.</i> , 1977 (Klewen, 1988)
<i>Mertensiella caucasica</i>	1:0.66	Franzen & Nicolai, 1989
<i>Notophthalmus viridescens</i>	1:0.91	Hurlbert, 1969
<i>N. viridescens</i>	1:0.45	Gill, 1978 a
<i>N. viridescens</i>	1:0.52	Gill, 1978 b
<i>N. viridescens</i>	1:1	Healy, 1974
<i>N. viridescens</i>	1:0.9	Healy, 1975
<i>N. viridescens</i>	1:0.7	Leclair & Caetano, 1997

In *S. salamandra* in the eastern part of the Galilee the sex ratio ranged between 1:0.51 to 1:0.8 M:F ratio during three years of study (Degani & Mendelssohn, 1982). Likewise, it ranged between 1:0.83 to 1:1.68 averaging 1:1.08 M:F ratio over a period of five years of study (Rebelo & Leclair, 2003) (see Tables 3, 5). In *S. s. terrestris* Lacepede 1788) the sex ratio ranged from 1:0.28 to 1:0.68 during six years of study (Klewen, 1985, see Table 6).

In *T. helveticus*, van Gelder (1973) describes differences in the sex ratio during three years: ranging between 1:0.68 to 1:1.47 M:F ratio (Table 6). The sex ratio in *T. vulgaris* ranged from 1:0.47 to 1:1 during a three years study (Hagström, 1979 and Table 5). It changed from 1:0.53 M:F when newts were 8-years old to 1:0.92 M:F at the age of nine years, to 1:1.13 when 10 years, 1:1.6 at 11 years, and when over 12 years old it was 1:3.14 M:F ratio (Bell, 1977). In another study on *T. vulgaris* sex ratio was 1:2 M:F in one year and 1:0.76 in the 2nd year of study averaging 1 M to 0.68 F (Griffiths, 1984). In *T. cristatus* (Laurenti, 1768) it ranged from 1:0.94 to 1:1.22 during a seven years study (Arntzen & Teunis, 1993 and Table 6), and from 1:0.35 to 1:0.82 during a five years study (Hagström, 1979 and Table 6). Finally, in *N. viridescens* (Gill, 1978 b) describes sex ratio ranging between 1:0.35 to 1:1 M:F ratio.

TABLE 5. Yearly changes in sex ratio of some urodeles.

	M:F						
	Species (source)						
	<i>A. talp.</i>	<i>A. macul.</i>	<i>S. sal.</i>	<i>S. sal.</i>	<i>S. s. terrest</i>	<i>N. virid.</i>	<i>N. virid.</i>
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year							
1st	1:1.43	1:0.64	1:0.8	1:1.1	1:0.43	1:0.49	1:0.49
2nd	1:1.64	1:0.35	1:0.5	1:1.68	1:0.48	1:0.82	1:0.77
3rd	1:0.99	1:0.24	1:0.6	1:1.15	1:0.68	1:0.65	1:0.64
4th	1:0.65	1:0.37		1:0.83	1:0.33		
5th	1:0.81	1:0		1:0.93	1:0.32		
6th					1:0.28		

a-Raymond & Hardy, 1990

b-Husting, 1965

c-Degani & Mendelssohn, 1982

d-Rebello & Leclair, 2003

e-Klewen, 1985

f-Gill, 1978a

g-Gill, 1978b

TABLE 6. Yearly changes in sex ratio in *Triturus*.

Species: Source:	M:F				
	<i>T. cristatus</i> (a)	<i>T. cristatus</i> (b)	<i>T. vulgaris</i> (b)	<i>T. vulgaris</i> (c)	<i>T. helveticus</i> (d)
Year					
1st	1:1.22	1:0.57	1:0.5	1:0.59	1:0.68
2nd	1:1.18	1:0.35	1:1	1:0.34	1:1.47
3rd	1:0.94	1:0.8	1:0.47	1:1	1:0.95
4th	1:1.04	1:0.64	1:0.82		1:0.83
5th	1:1	1:0.82	1:0.78		1:1.18
6th	1:1				1:0.8
7th	1:1.12				

a- Arntzen & Teunis, 1993

b- Hagström, 1979

c- Bell, 1977

d- Van Gelder, 1973

In *Ambystoma talpoideum* (Holbrook, 1838) the sex ratio ranged from 1:0.65 to 1:1.64 during a five years study (Raymond & Hardy, 1990). In *Ambystoma maculatum* (Shaw, 1802) the sex ratio studied during five years (Husting, 1965) varied from 1:0.64 M:F when 1st captured, changing later to 1:0.35 M:F ratio on 1st return; 1:0.24 M:F on 2nd return; 1:0.37 M:F on 3rd return and on 4th return it was 1:0 M:F (Table 6). In *Ambystoma californiense* Gray, 1853 sex ratio was in one year 1:1.25 in the next year it was 1:0.12 M:F ratio (Loredo & VanVuren, 1996) and in *Ambystoma cingulatum* Cope, 1868 sex ratio ranged between 1:1.9 to 1:5.1 M:F ratio during a 2-year study by

Palis (1997). In conclusion, a high variability in female proportions in a population was noted in all these studies.

As regards to the second question: How can these temporal variation in the sex ratio be explained? There are three possible ways to explain the temporal changes in sex ratio described here:

- a. These changes could be an outcome of population oscillations which affect one gender to a greater extent than the other.
- b. The change could be the result of partial population migration aiming at colonizing another pond.
- c. It could be a result of a decline in recruitment of juveniles.

All three possibilities can not be proven.

The first possibility was discussed at length in a previous paper (Warburg, 2007b). In that paper changes in the salamander phenology were observed. It was suggested that a low phase in the population oscillations which is likely to change again, took place.

Could the temporal changes in sex ratio be an outcome of a partial population migration aiming at colonizing another pond? The capability of female urodeles to colonize new breeding ponds could help in maintaining a balanced 1:1 sex ratio. It is well known that animal species are capable of moving from one area to colonize another. Nevertheless, such migration does not necessarily imply that an individual animal belonging to a single species does in fact moves from one area to colonize another. In the case of urodeles it could mean that adult urodeles move in-between ponds. However, this is no proof that they actually breed there. The fact that adult urodeles are capable of moving long distances from where they were previously captured is well documented. This movement can be of short duration during the same breeding season or spread over a longer period (more of migratory in nature). The distance an animal is capable of covering is of great significance when establishing artificial ponds.

S. infraimmaculata is known to be able to colonize new ponds (Degani *et al.*, 2007). It was shown that the same female is capable of moving into another site. However, this second possibility was not proven in the breeding site studies.

Indirect evidence supporting the likelihood of movement is based on the observation that a female can skip a year or more not coming to the breeding ponds. Time elapses between subsequent visits by the same female to the same pond (Warburg, 2006).

Can a pond be re-colonized? I believe that a pond can be re-colonized by salamander larvae even after very long intervals, provided at least one male and one female are successful in metamorphosis, in post-metamorphic dispersion, and in their survival to mature adulthood, it will be sufficient for a single female to maintain the species by producing such viable offspring during one breeding season in her long lifetime. However, it does not seem to be very successful during the 25 year study period on the Mt. Carmel population, since the number of females continually dropped.

Finally, can a decline in recruitment of juveniles result in such changes in sex ratio? Recruitment can be affected by a delay in rains affecting the onset of breeding, delay in the metamorphic cycle, resulting in delayed juvenile dispersal which results in

failure to survive to adulthood. Quantitative data on juvenile recruitment are notoriously hard to obtain and in this particular study site more so because of safety factors involved.

The main questions to be addressed are:

1. How far does the percentage of females in a population have to drop in order to be a threat to the species' existence?
2. Does a sex ratio drop to 1:0.25 M:F endanger survival of *S. infraimmaculata*? How long can a population survive at such low female percentage in the population? I shall try to provide some ideas regarding these points.

There is no doubt that the presence of females in a population is essential for the survival of a population but there is no way telling what the minimal threshold could be. *S. infraimmaculata* female is known to survive in nature to the age of 20 years in the field (Warburg, 2006, 2007, 2008c) and is capable of producing about 70 larvae annually from when it matures at the age of 3-4 years for about 15 years. An easy calculation would show that only 0.2% of the larvae born to a single female need to survive to maturity in order to sustain the population. Thus, a female salamander can skip several years without breeding or alternatively a population can survive through a single female even without new juvenile recruitment which may occur as a result of several years of draught (Warburg, 1992, 1997 a, b, 2008). The matter is more fully discussed in Warburg (2009).

The question of longevity is of great importance for the species survival. Small urodele species that are comparatively short-lived (*Plethodon* spp., *Triturus*) will presumably need a higher female percentage in the population compared to long-lived urodeles (*Ambystoma* spp, *Salamandra* spp. living for 15-25 yrs). Thus, the lowest female percentage in *Plethodon* is 1:0.8 M:F ratio, and in *Triturus* 1:0.6 whereas in *Ambystoma* it is 1:0.35 and *Salamandra* 1:0.25. What is the lowest female percentage that a species can survive? The short-lived newts can survive about 37.5% females in a population (with a sex ratio of 1:0.6); a threefold higher threshold than the long-lived urodeles.

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APPENDIX: List of urodele amphibians in which data on changes on sex ratio were available.

Ambystomatidae

- Ambystoma annulatum* Cope, 1886
Ambystoma californiense (Gray, 1853)
Ambystoma cingulatum Cope, 1868
Ambystoma opacum (Gravenhorst, 1807)
Ambystoma maculatum (Shaw, 1802)
Ambystoma macrodactylum macrodactylum Baird, 1849
Ambystoma talpoideum (Holbrook, 1838)
Ambystoma texanum (Matthes, 1855)
Ambystoma tigrinum tigrinum (Green, 1825)

Cryptobranchidae

- Cryptobranchus alleganiensis alleganiensis* (Daudin, 1803)

Plethodontidae

- Desmognathus fuscus* (Green, 1818)
Desmognathus ochrophaeus Cope, 1859
Plethodon vehiculum (Cooper, 1860)
Plethodon larselli Burns, 1953
Plethodon cinereus (Green, 1818)
Plethodon websteri Highton, 1979
Plethodon wehrlei Fowler & Dunn, 1917
Plethodon kentucki Mittleman, 1951

Aneides lugubris (Hallowell, 1849)
Batrachoseps attenuatus (Eschscholtz, 1833)
Ensatina eschscholtzii Gray, 1850
Eurycea quadridigitata (Holbrook, 1842)
Eurycea longicauda (Green, 1818)
Gyrinophilus porphyriticus (Green, 1827)
Stereochilus marginatus (Hallowell, 1856)
Chioglossa lusitanica Bocage, 1864
Euproctes platycephalus (Gravenhorst, 1829)

Salamandridae

Salamandra salamandra (Linnaeus, 1758)
Salamandra infraimmaculata Martens, 1885
Salamandra salamandra terrestris (Lacépède, 1788)
Salamandra atra Laurenti, 1768
Salamandra salamandra gallaica Malkmus, 1983
Mertensiella caucasica (Waga, 1876)
Mertensiella luschani (Steindachner, 1891)
Notophthalmus viridescens (Rafinesque, 1820)
Triturus marmoratus marmoratus (Latreille, 1800)
Triturus marmoratus pygmaeus (Wolterstorff, 1905)
Triturus alpestris alpestris (Laurent, 1768)
Triturus cristatus cristatus (Laurenti, 1768)
Triturus vulgaris (Linnaeus, 1758)
Triturus helveticus (Razumowski, 1789)
Triturus boscai (Lataste, 1879)
T. vulgaris meridionalis Boulenger, 1882
Triturus carnifex (Laurent, 1768)

The linyphiid spiders of Iran (Arachnida, Araneae, Linyphiidae)

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The linyphiid spiders of Iran (Arachnida, Araneae, Linyphiidae). - A checklist of linyphiids from Iran amounting to 67 species is given, based mostly on the extensive collections of A. Senglet and on available literature. Three species are described as new: *Bolyphantes elburzensis* sp. n., *Erigonoplus zagros* sp. n. and *Sengletus latus* sp. n. Twenty-six species are reported from Iran for the first time. The previously unknown male of *Megalephyphantes kuhitangensis* (Tanasevitch, 1989), as well as the females of *Araeoncus mitriiformis* Tanasevitch, 2008, *Archaraeoncus alticola* Tanasevitch, 2008, and *Tenuiphantes perseus* (Helsdingen, 1977) are described. Two new synonyms and a new combination are proposed: *Erigonoplus ayyildizi* Tanasevitch, Topçu & Demir, 2005 syn. n. and *E. galophilus* Gnelitsa, 2007 syn. n. = *E. spinifemoralis* Dimitrov, 2003; *Lepthyphantes sbordonii* Brignoli, 1970 = *Palliduphantes sbordonii* (Brignoli, 1970) comb. n. All records of *Tenuiphantes mengei* (Kulczyński, 1887) in Iran and the East Caucasus actually can be attributed to *Tenuiphantes perseus* (Helsdingen, 1977). Synonymy of *Collinsia* O.P.-Cambridge, 1913 under *Halorates* Hull, 1911 is confirmed. A distribution pattern is indicated for each species. The localities of some species in Iran are mapped. The Iranian fauna is characterised by a high percentage of widespread species (50%), and a small percentage of European-Ancient Mediterranean (14%) and Eastern Ancient Mediterranean (7%) elements; 15% of the species are potentially Iranian endemics. The Caucasian-Iranian relations are weak and represented by five species. The Central Asian-Iranian relations are represented by three species. The relations between the Iranian and the Anatolian faunas are based on widespread species only.

Keywords: New species - new synonymies - new combination - new records - Iran.

INTRODUCTION

Tanasevitch (2008) recently provided a faunistic treatment of the linyphiid spiders collected in Iran by A. Senglet. As a result, four species were described as new and another 24 reported for the Iranian fauna for the first time, increasing this list of Linyphiidae known from Iran from 13 to 41 species. The present paper puts on record the second, larger part of A. Senglet's collection from Iran and a small collection from

Mazandaran, Tehran and Fars provinces provided by Y. Marusik. This material, as well as all available records in the literature, serve as the basis for the results presented here.

MATERIAL AND METHODS

The spider material was collected in 1973-1975 at about 220 localities in different parts of Iran (see Fig. 1).

Unless otherwise stated, all material was collected by A. Senglet and is deposited in the MHNG. Some paratypes and non-type specimens are in the collection of the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU). Senglet's collection numbers are given in square brackets. All locality names have been checked, and some of them corrected by using Google Earth.

The chaetotaxy of Erigoninae is given in a formula (e.g., 2.2.1.1) which refers to the number of dorsal spines on tibiae I-IV. In Micronetinae, the chaetotaxy is given in a different formula, e.g., Ti I: 2-1-1-2(1), which means that tibia I has two dorsal spines, one pro-, one retrolateral spine, and two or one ventral spine (the apical spines are disregarded). The sequence of leg segment measurements is as follows: femur + patella + tibia + metatarsus + tarsus. All measurements are given in mm. All scale lines in the figures correspond to 0.1 mm.

The terminology of genitalic structures in Micronetinae follows that of Saaristo & Tanasevitch (1996a). The terminology of palpal structures in Erigoninae follows that of Hormiga (2000). The systematic nomenclature follows Platnick (2009), except for the generic concepts of *Agyneta* Hull, 1911 and *Halorates* Hull, 1911.

European-Ancient Mediterranean species = European species the distribution area of which extends into Central Asia through the southern Palaeartic mountains.

Abbreviations used in the text and figures: ARP - anterior radical process, BC - bursa copulatrix, CAT - personal collection of Andrei Tanasevitch, DAT - dorso-apical tooth on palpal tibia, E - embolus, EP - embolus proper, EG - entrance groove, Fe - femur, LEM - lateral extension of middle part of scape, LEP - lateral extension of pro-scape, MHNG - Muséum d'histoire naturelle, Geneva, MNHNP - Muséum national d'Histoire naturelle, Paris, NUAM - Arachnology Museum of the Niğde University, Niğde, Turkey, Mt - metatarsus, PMP - posterior median plate, PS - pseudoscape, Pt - patella, RLT - retrolateral tooth on palpal tibia, Ta - tarsus, Th - thumb, Ti - tibia, ZMMU - Zoological Museum of the Moscow State University, Russia.

RESULTS

Agyneta fuscipalpa (C.L. Koch, 1836)

MATERIAL: IRAN: 2 ♂, 9 ♀ [7301], Western Azarbayjan, Maku, (39°08'N, 44°30'), 23.VI.1973. - 1 ♂ [7502], Qara Kelisa (39°04'N, 44°38'E), 31.V.1975. - 3 ♂, 13 ♀ [7533], Mahabad (36°47'N, 45°45'E), 24.VI.1975. - 2 ♂, 1 ♀ [7507], Eastern Azarbayjan, Maragheh (37°24'N, 46°16'E), 4.VI.1975. - 1 ♂ [7305], Gilan, Chelvand (38°19'N, 48°51'E), 27.VI.1973. - 2 ♂, 4 ♀ [7534], SE of Nikpey (36°47'N, 48°14'E), 30.VI.1975. - 2 ♂ [7324], Tehran, Gajereh (36°05'N, 51°22'E), 2500 m a.s.l., 13.VII.1973. - 1 ♂ [7327], Rud-e-Hen (35°44'N, 51°55'E) 17.VII.1973. - 2 ♂ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. - 1 ♂ [7522], E of Avaj (35°32'N, 49°11'E), 2200 m a.s.l., 15.VI.1975. - 2 ♂, 1 ♀ [7338], Avaj (35°38'N, 49°13'E), 27.VII.1973. - 1 ♂ [7361], Shemshak (36°01'N, 51°29'E), 2600 m a.s.l., 27.VIII.1973. - 5 ♂, 4 ♀ [7363], Aqa (36°19'N, 49°49'E), 2.IX.1973. - 3 ♂ [7372], Mazan-

daran, near Tang-e-Ram (37°25'N, 55°45'E), 28.VII.1974. – 4 ♂, 7 ♀ [7439], Lorestan, Azna (33°28'N, 49°22'E) 23.VI.1974. – 1 ♂, 9 ♀ [7441], Ma'amulan (33°20'N, 47°54'E), 24.VI.1974. – 2 ♂, 2 ♀ [7443], Malavi-Shihabad (33°35'N, 47°14'E), 25.VI.1974. – 1 ♂, 3 ♀ [7444], Dizgaran (33°43'N, 47°00'E), 25.VI.1974. – 1 ♂ [7582], Veseyan (33°29'N, 48°04'E), 8.IX.1975. – 9 ♂, 10 ♀ [7346], Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 1 ♂ [7350], Bakhtiyari, Dimeh (32°29'N, 50°16'E), 8.VIII.1973. – 2 ♂ [7351], Kuhrang (32°29'N, 50°04'E), dam, 2700 m a.s.l., 9.VIII.1973. – 5 ♂, 3 ♀ [7432], road from Kuhrang (32°23'N, 50°18'E), 17.VI.1974. – 1 ♂, 21 ♀ [7433], dam near Kuhrang (32°26'N, 50°06'E), 18.VI.1974. – 6 ♂, 29 ♀ [7434], Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 1 ♂, 2 ♀ [7352], Farsan (32°17'N, 50°31'E), 11.VIII.1973. – 1 ♂, 2 ♀ [7525], Kermanshah, Behistun (= Bisitum or Bisutun) (34°23'N, 47°26'E), 17.VI.1975. – 10 ♂, 6 ♀ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 1 ♂ [7527], NE of Kunduleh (34°44'N, 47°17'E), 20.VI.1975. – 2 ♂, 1 ♀ [7344], Garavand/Shahabad (33°55'N, 46°47'E), 5.VIII.1973. – 7 ♂, 12 ♀ [7449], Mahi Dasht (34°14'N, 46°42'E), 29.VI.1974. – 2 ♂, 4 ♀ [7348], Esfahan, Eskandari (32°50'N, 50°21'E), 8.VIII.1973. – 1 ♂, 4 ♀ [7353], Riz-e-Landjan (32°24'N, 51°19'E), 1600 m a.s.l., rice fields, 11.VIII.1973. – 1 ♂ [7358], W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 1 ♂, 3 ♀ [7438], Nowghan (33°11'N, 50°04'E), 22.VI.1974. – 4 ♂, 14 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 3 ♂, 2 ♀ [7448], Tchaharmelleh (33°57'N, 46°17'E), 28.VI.1974. – 10 ♂, 32 ♀ [7452], Hamadan, NE of Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 1 ♂ [7523], near Hamadan (34°44'N, 48°27'E), 2600 m a.s.l., 16.VI.1975. – 16 ♂, 14 ♀ [7528], Kordestan, S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 3 ♂, 9 ♀ (ZMMU) [7531], S of Divandarreh (35°45'N, 47°05'E), 23.VI.1975. – 1 ♂, 7 ♀ [7532], Santeh (36°11'N, 46°32'E), 23.VI.1975. – 1 ♂, 3 ♀ [7592], Marivan (35°32'N, 46°09'E), 15.IX.1975. – 2 ♂ [7596], Hoseynabad (35°33'N, 47°08'E), 17.IX.1975. – 1 ♂, 2 ♀ [7597], N of Saqqez (36°23'N, 46°12'E), 18.IX.1975. – 3 ♂ [7354], Fars, Izadkhist (31°31'N, 52°09'E), 16.VIII.1973. – 1 ♂ (ZMMU), Haft Barm (29°45'N 52°15'E), 24.V.2000, leg. Y. Marusik.

RECORDS FROM IRAN: Khuzestan: Andimeshk, Shush, Masjed Soleyman. – Kohgiluyeh: Dow Gonbadan, Charam, Yasudj. – Fars: Serizjan. – Bakhtiyari: Qafarokh. – Hamadan: Asadabad. – Khorasan: Zavi (Tanasevitch, 2008).

RANGE: European-Ancient Mediterranean.

Agyneta kopetdaghensis Tanasevitch, 1989

Fig. 2

MATERIAL: IRAN: 1 ♂ [7327], Tehran, Rud-e-Hen (35°44'N, 51°55'E), 17.VII.1973. – 1 ♂ [7539], Asara (36°02'N, 51°14'E), 1900 m a.s.l., 4.VII.1975. – 14 ♂, 28 ♀ (ZMMU), 5 ♂, 5 ♀, Tehran, Protection Organization Park (35.673°N 51.414°E), 7-22.VI.2000, leg. Y. Marusik.

RECORDS FROM IRAN: Mazandaran: Shahpasand (Tanasevitch, 2008).

RANGE: Turkmenian-Iranian.

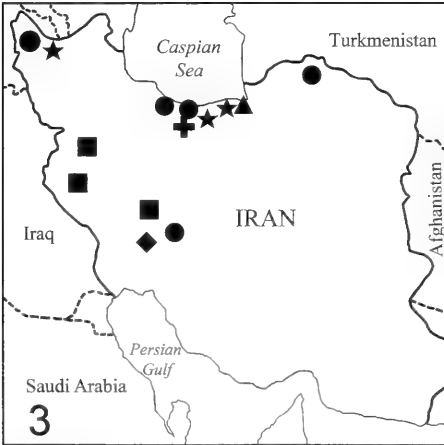
Agyneta mesasiatica Tanasevitch, 2000

Fig. 2

MATERIAL: IRAN: 1 ♂ [7599], Western Azarbayjan, Qarazia-ed-Din (38°56'N, 45°03'E), 1.IX.1975. – 3 ♂ [7598], Eastern Azarbayjan, NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975. – 1 ♂, 1 ♀ [7504a], S of Khoy (38°28'N, 44°56'E), swamp, under stones and trunks, 1.VI.1975. – 1 ♂ [7549], Mazandaran, Kiyasar (36°15'N, 53°29'E), 1100 m a.s.l., 12.VII.1975. – 2 ♂, 1 ♀ (ZMMU), 2 ♂, 1 ♀ [7556], Garmab (37°43'N, 56°18'E), 18.VII.1975. – 1 ♂ [7333], Sari (36°34'N, 53°09'E), 22.VII.1973. – 1 ♂, 2 ♀ (ZMMU) [7321], Tehran, N of Kevdvan Canyon (36°10'N, 51°19'E), 2700 m a.s.l., 12.VII.1973. – 2 ♂ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♂ (ZMMU), Tehran, Protection Organization Park (35.673°N, 51.414°E), 7-22.VI.2000, leg. Y. Marusik.

RECORDS FROM IRAN: Golestan: Tang-e-Rah, Shahpasand. – Khorasan: Chaman Bid (Tanasevitch, 2008).

RANGE: Caucasian-Iranian.



Agynera mollis (O.P.-Cambridge, 1871)

MATERIAL: IRAN: 1 ♂ [7598], Eastern Azarbayjan, NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975. – 1 ♂ [7504a], S of Khoy (38°28'N, 44°56'E), swamp, under stones and trunks, 1.VI.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Palaearctic-Alaskan.

Agynera rurestris (C.L. Koch, 1836)

MATERIAL: IRAN: 1 ♂ [7328], Tehran, Polur (35°51'N, 52°04'E), 2300 m a.s.l., meadow, 17.VII.1973. – 1 ♂ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: West Palaearctic.

Araeoncus caucasicus Tanasevitch, 1987

MATERIAL: IRAN: 5 ♂, 8 ♀ [7302], Eastern Azerbaijan, Khoy (38°41'N, 45°08'E), 24.VI.1973. – 1 ♂ [7504A], S of Khoy (38°28'N, 44°56'E), swamp, under stones and trunks, 1.VI.1975. – 3 ♂, 8 ♀ [7513], Zarjabad (37°38'N, 48°03'E), 8.VI.1975. – 2 ♂, 4 ♀ [7503], Western Azarbayjan, N of Khoy (38°37'N, 45°02'E), 1.VI.1975. – 1 ♀ [7372], Mazandaran, near Tang-e-Ram (37°25'N, 55°45'E), 28.VII.1974. – 1 ♂, 7 ♀ (ZMMU) [7321], Tehran, N of Kendvan Canyon (36°10'N, 51°19'E), 2700 m a.s.l., 12.VII.1973. – 3 ♀ [7338], Tehran, Avaj (35°38'N, 49°13'E), 27.VII.1973. – 4 ♀ [7362], Fasham (35°55'N, 51°32'E), 2000 m a.s.l., 27.VIII.1973. – 2 ♀ [7434], Bakhtiari, Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 1 ♂, 3 ♀ [7438], Esfahan, Nowghan (33°11'N, 50°04'E), 22.VI.1974. – 1 ♂, 5 ♀ [7345], Lorestan, Ma'amulan (33°20'N, 47°54'E), 6.VIII.1973. – 17 ♀ [7441], Ma'amulan (33°20'N, 47°54'E), 24.VI.1974. – 2 ♀ [7596], Kordestan, Hoseynabad (35°33'N, 47°08'E), 17.IX.1975. – 7 ♂, 8 ♀ [7447], Ilam, near Ilam (33°37'N, 46°23'E), sifting of litter, 27.VI.1974. – 2 ♂, 1 ♀ [7451], Kermanshah, Kangavar (34°29'N, 47°55'E), 1.VII.1974. – 2 ♂, 1 ♀ [7452], Hamadan, NE of Asadabad, (34°51'N, 48°12'E), 2.VII.1974. – 2 ♂, 2 ♀ [7579], Fars, S of Fahlyan (30°00'N, 51°35'E), 4.IX.1975.

RECORDS FROM IRAN: Western Azarbayjan: Qareh Zia-od-Din. – Tehran: Nesa, Pol-e-Djadjirad. – Khuzestan: Andimeshk, Masjed Soleyman. – Fars: Kavar (Band-e-Bahman), Serizjan, Sivand. – Esfahan: Pol-e-Kaleh. – Ilam: Ilam (Tanasevitch, 2008).

RANGE: Eastern-Ancient Mediterranean.

FIGS 1-6

Localities in Iran. (1) (⊕) Collecting localities visited by A. Senglet, (●) Same, visited by Y. Marusik. (2) (★) *Agynera kopetdaghensis* Tanasevitch, 1989, (⊕) *A. mesasiatica* Tanasevitch, 2000, (●) *Araeoncus mitriformis* Tanasevitch, 2008. (3) (⊕) *Archaraeoncus alticola* Tanasevitch, 2008, (★) *Bolyphantes elburzensis* sp. n., (●) *Caviphantes dobrogicus* (Dumitrescu & Miller, 1962), (▲) *Diplocephalus transcaucasicus* Tanasevitch, 1990, (◆) *Erigonoplus sengleti* Tanasevitch, 2008, (■) *E. zagros* sp. n. (4) (◆) *E. ninae* Tanasevitch & Fet, 1986, (★) *Megalephyphantes camelus* (Tanasevitch, 1990), (■) *M. kronebergi* (Tanasevitch, 1989), (●) *M. nebulosoides* (Wunderlich, 1977), (⊕) *M. nebulosus* (Sundevall, 1939), (▲) *M. pseudocollinus* Saaristo, 1997, (⊕) *M. nebulosoides* (after Roewer, 1955, as *Lephyphantes nebulosus*). (5) (★) *Oedothorax meridionalis* Tanasevitch, 1987, (●) *Pelecopsis laptevi* Tanasevitch & Fet, 1986, (⊕) *Piniphantes pinicola* (Simon, 1884), (▲) *Walckenaeria alticeps* (Denis, 1952). (6) (●) *Sengletus latus* sp. n., (⊕) *S. longiscapus* Tanasevitch, 2008, (★) *Tenuiphantes perseus* (Heldsingen, 1977), (▲) *Trichoncoides piscator* (Simon, 1884).

Araeoncus humilis (Blackwall, 1841)

MATERIAL: IRAN: 1 ♂ [7503], Western Azarbayjan, N of Khoy (38°37'N, 45°02'E), 1.VI.1975. – 1 ♂, 3 ♀ [7526], Kermanshah, N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 1 ♂, 8 ♀ [7592], Kordestan, Marivan (35°32'N, 46°09'E), 15.IX.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: European-Ancient Mediterranean.

Araeoncus mitriformis Tanasevitch, 2008

Figs 2, 7-11

MATERIAL: IRAN: 3 ♂, 3 ♀ (ZMMU), 18 ♂, 13 ♀ [7523], Hamadan, near Hamadan (34°44'N, 48°27'E), 2600 m a.s.l., 16.VI.1975 (type locality). – 2 ♂ [7434], Bakhtiari, Kuhrang (32°28'N, 50°08'E), 19.VI.1974.

REMARKS: The peculiar shape of the carapace in males from the type locality, Hamadan, is more or less uniform (Fig. 7), only a few of them show the distal part of the carapace bent down a little more than in the type. However, both males from Kuhrang differ in having the distal part of the carapace turned upward (Fig. 8), like in *Savignia frontata* Blackwall, 1833. Most probably, this is an individual variability because the conformation of the male palp in specimens from both localities is identical.

This species has been described from a single male. A description of the female is given below for the first time.

DESCRIPTION OF FEMALE: Total length: 2.15. Carapace unmodified, 0.88 long, 0.70 wide, brown. Chelicerae: 0.38 long, unmodified. Legs pale reddish brown. Leg I 2.48 long (0.70+0.25+0.58+0.55+0.40), IV 2.68 long (0.75+0.25+0.70+0.60+0.38). Chaetotaxy: 2.2.1.1. Metatarsi I-III each with a trichobothrium. TmI 0.57. Abdomen 1.25 long, 0.88 wide, grey. Epigyne and vulva as in Figs 9-11.

RECORDS FROM IRAN: Hamadan: Hamadan (Tanasevitch, 2008).

RANGE: Iranian.

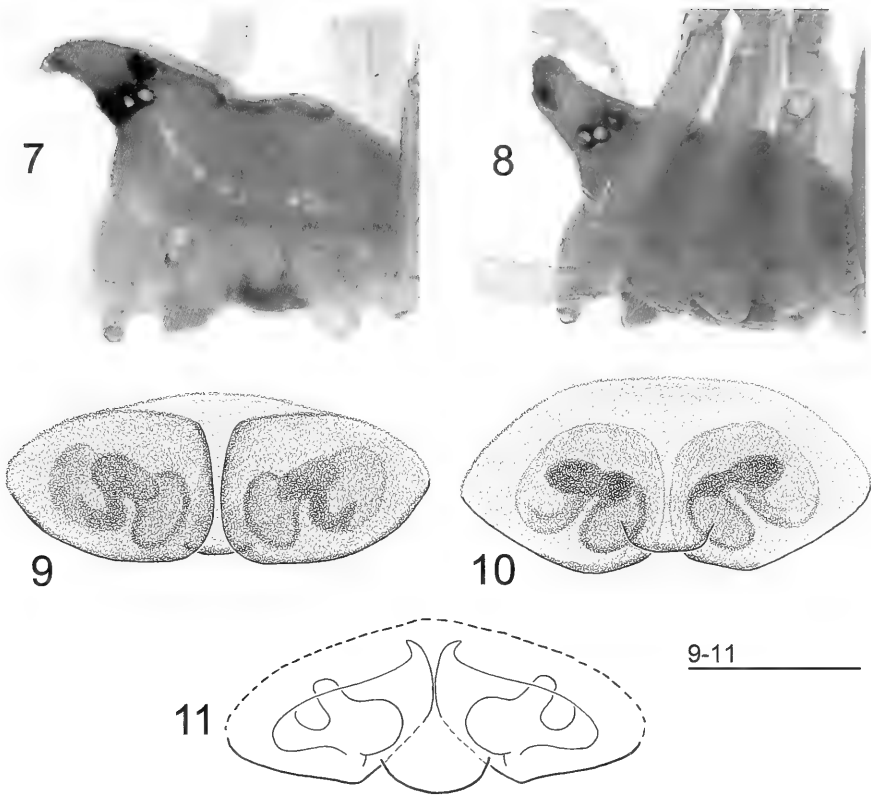
Archaraeoncus alticola Tanasevitch, 2008

Figs 3, 15, 16

MATERIAL: IRAN: 1 ♂, 3 ♀ [7323 – type locality], Tehran, near Dizan (36°02'N, 51°25'E), 3800 m a.s.l., in snow, 13.VII.1973.

REMARKS: This species was hitherto known from two males, both from high-montane localities in Tehran: Shemshak (2600 m a.s.l.) and Dizan (3800 m a.s.l.). Now that female material of *A. alticola* has become available, its description is provided below for the first time.

DESCRIPTION OF FEMALE: Total length: 1.55. Carapace unmodified, 0.60 long, 0.45 wide, pale reddish brown. Chelicerae: 0.25 long, unmodified. Legs pale reddish brown. Leg I 1.39 long (0.40+0.13+0.33+0.28+0.25), IV 1.50 long (0.45+0.15+0.35+0.30+0.25). Chaetotaxy: 2.2.1.1, tibial spines poorly visible (in male chaetotaxy is unclear or diagnosed as 1.1.1.1). Metatarsi I-III each with a trichobothrium. TmI 0.47. Abdomen 0.90 long, 0.68 wide, grey. Epigyne as in Fig. 16.



FIGS 7-11

Araeoncus mitriformis Tanasevitch, 2008. (7, 8) Varieties of ♂ carapace: (7) specimen from Hamadan, Iran, (8) specimen from Kuhrang, Iran. (9, 10) Epigyne, ventral and dorsal view, respectively. (11) Vulva, dorsal view.

TAXONOMIC REMARKS: The epigynes of *A. alticola* and *A. prospiciens* (Thorell, 1875) are very similar to each other and can easily be confused, but the males are well distinguishable by structural details of the palp (see Tanasevitch, 2008).

VARIABILITY: The shape of the carapace in all known males of *A. alticola* is almost identical (Fig. 15), in contrast to that of the very similar *A. prospiciens* (see below under Variability of *A. prospiciens*; Figs 12-14).

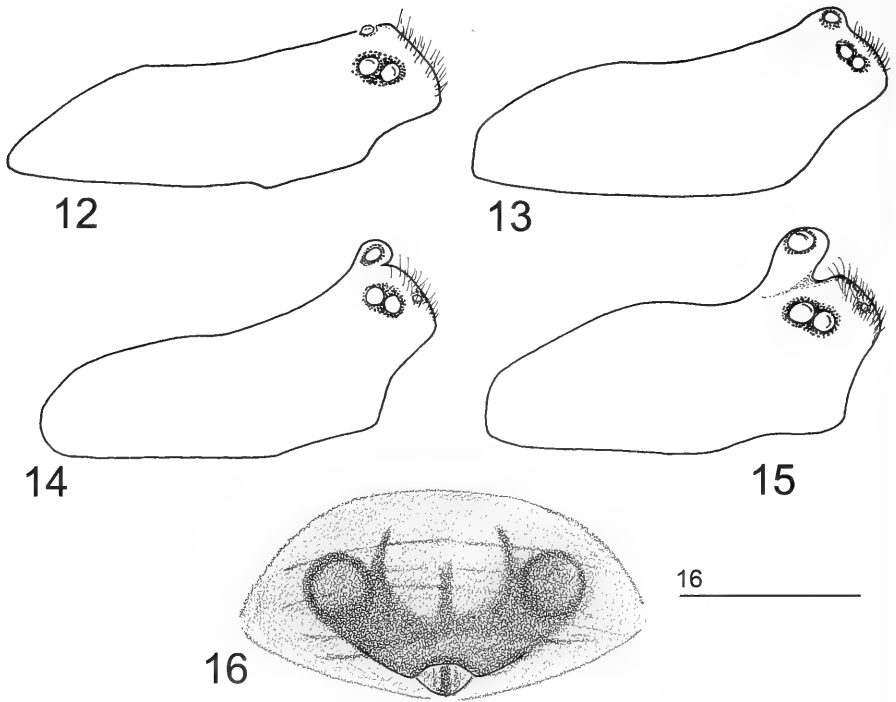
RECORDS FROM IRAN: Tehran: Dizan and Shemshak (Tanasevitch, 2008).

RANGE: Iranian.

***Archaraeoncus prospiciens* (Thorell, 1875)**

Figs 12-14

MATERIAL: IRAN: 2 ♀ [7599], Western Azarbaijan, Qarazia-ed-Din (38°56'N, 45°03'E), 1.IX.1975. – 1 ♂ [7503], N of Khoy (38°37'N, 45°02'E), 1.VI. 1975. – 1 ♂, 1 ♀ [7507], Eastern Azarbaijan, Maragheh (37°24'N, 46°16'E), 4.VI.1975. – 1 ♂, 1 ♀ [7508], N of



FIGS 12-16

Archaraeoncus prospiciens (Thorell, 1875) (12-14) and *A. alticola* Tanasevitch, 2008, paratypes (MHNG) (15, 16). (12) ♂ carapace, lateral view, specimen from Dizgaran, Iran. (13, 14) Same, two specimens from Aqa, Iran. (15) ♂ carapace, lateral view, specimen from Dizan, Iran. (16) Epigyne, ventral view, specimen from Dizan, Iran.

Bonab (37°26'N, 45°57'E), 4.VI.1975. - 1 ♀ [7511], W of Miyaneh (37°29'N, 47°36'E), 7.VI.1975. - 2 ♀ [7598], NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975. - 1 ♀ [7307], Gilan, Hashtpar (37°50'N, 48°58'E), 29.VI.1973; 2 ♂, 1 ♀ (ZMMU) [7365], Rudbar (36°49'N, 49°25'E), 4.IX.1973. - 1 ♀ [7328], Tehran, Polur (35°51'N, 52°04'E), 2300 m a.s.l., meadow, 17.VII.1973. - 2 ♂*, 2 ♀ [7363], Aqa (36°19'N, 49°49'E), 2.IX.1973. - 1 ♂*, 4 ♀ [7455], same locality, 6.VII.1974. - 1 ♂* [7338], Avaj (35°38'N, 49°13'E), 27.VII.1973. - 1 ♂ [7485], Tarazan/Lowshan (36°28'N, 49°31'E), 8.VIII.1974. - 1 ♂, 3 ♀ [7364], Tarazan/Lowshan (36°28'N, 49°31'E), 3.IX.1973. - 4 ♀ [7536], Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. - 4 ♀ [7333], Mazandaran, Sari (36°34'N, 53°09'E), 22.VII.1973. - 1 ♀ [7372], near Tang-e-Ram (37°25'N, 55°45'E), 28.VII.1974. - 3 ♂ [7546], near Kiyasar (36°16'N, 53°25'E), 10.VII.1975. - 5 ♀ [7571], Khorasan, Bodjnour (37°29'N, 57°26'E), 20.VIII.1975. - 1 ♂, 2 ♀ [7557], E of Badranlu (37°31'N, 57°08'E), 18.VII.1975. - 1 ♂ [7582], Lorestan, Veseyan (33°29'N, 48°04'E), 8.IX.1975. - 2 ♂, 5 ♀ [7345], Ma'amulan (33°20'N, 47°54'E), 6.VIII.1973. - 1 ♂ [7346], Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. - 1 ♂, 3 ♀ [7439], Azna (33°28'N, 49°22'E), 23.VI.1974. - 2 ♂, 5 ♀ [7440], Hatemvand (33°28'N, 48°07'E), 23.VI.1974. - 3 ♂, 8 ♀ [7444], Dizgaran (33°43'N, 47°00'E), 25.VI.1974. - 2 ♂, 3 ♀ [7581], N of Pol-e-Dokhtar (33°12'N, 47°44'E), 7.IX.1975. - 2 ♂, 6 ♀ [7582], Veseyan (33°29'N, 48°04'E), 8.IX.1975. - 2 ♂, 3 ♀ [7341], Kermanshah, Sahneh (34°28'N, 47°36'E), 2.VIII.1973. - 1 ♂, 4 ♀ [7344], Garavand/Shahabad (33°55'N, 46°47'E), 5.VIII.1973. - 2 ♂, 4 ♀ [7348], Esfahan, Eskandari (32°50'N, 50°21'E), 8.VIII.1973. - 3 ♂, 15 ♀ [7353], Riz-e-Landjan

(32°24'N, 51°19'E), 1600 m a.s.l., rice fields, 11.VIII.1973. – 5 ♂, 19 ♀ [7358], W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 4 ♀ [7431], Bakhtiyari, E of Farsan (32°17'N, 50°38'E), 17.VI.1974. – 2 ♂, 2 ♀ [7432], road from Kuhrang (32°23'N, 50°18'E), 17.VI.1974. – 2 ♀ [7434], Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 13 ♀ [7352], Farsan (32°17'N, 50°31'E), 11.VIII.1973. – 1 ♀ [7451], Kermanshah, Kangavar (34°29'N, 47°55'E), 1.VII.1974. – 2 ♂, 4 ♀ [7525], Behistun (= Bisutum or Bisutun) (34°23'N, 47°26'E), 17.VI.1975. – 1 ♂, 4 ♀ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 1 ♂, 1 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 7 ♂, 18 ♀ [7448], Tchaharmelleh (33°57'N, 46°17'E), 28.VI.1974. – 5 ♂, 3 ♀ [7528], Kordestan, S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 1 ♂ [7593], E of Marivan (35°32'N, 46°20'E), 16.IX.1975. – 1 ♂ [7596], Hoseynabad (35°33'N, 47°08'E), 17.IX.1975. – 2 ♂, 16 ♀ [7354], Fars, Izadkhast (31°31'N, 52°09'E), 16.VIII.1973. – 1 ♂, 2 ♀ [7578], Bishapoor (29°47'N, 51°53'E), 3.IX.1975.

VARIABILITY: In some samples from different localities (marked with an asterisk in the Material section above), the shape of the male carapace, earlier believed to be uniform, shows a tendency towards the formation of a globular cephalic outgrowth carrying the posterior median eyes, thus making the carapace of *A. prospiciens* and *A. alticola* look similar (Fig. 14 cf. Fig. 15). This is a good example of Vavilov's law of homological series (Vavilov, 1922), postulating that closely related taxa are characterised by similar hereditary trends.

RECORDS FROM IRAN: Western Azarbayjan: Qarazia-ed-Din. – Eastern Azarbayjan: Sowfyan. – Esfahan: Nowghan, Falayarjan, Pol-e-Kaleh. – Lorestan: Dizgaran, Pol-e-Dokhtar. – Khuzestan: Shush. – Kohgiluyeh, Charam, Basht, Yasudj. – Fars: Bishapoor, Dasht-e-Arjan, Serizjan, Allabad, Izadkhast. – Mazandaran: Tang-e-Rah, Shahpasand, Valiabad. – Khorasan: Chaman Bid, Quchan, Emam Qoli, Amirabad, Shandiz Valley, Bojnurd (Tanasevitch, 2008).

RANGE: European-Ancient Mediterranean.

Bathyphantes gracilis (Blackwall, 1841)

MATERIAL: IRAN: 1 ♀ [7310], Gilan, Parehsar (37°37'N, 49°03'E), sifting debris from tree holes, 2.VII.1973. – 1 ♀ [7311], Galugah (37°31'N, 49°19'E), 4.VII.1973. – 1 ♂, 2 ♀ [7520], Galugah (37°31'N, 49°19'E), 12.VI.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Holarctic.

Bolyphantes elburzensis sp. n.

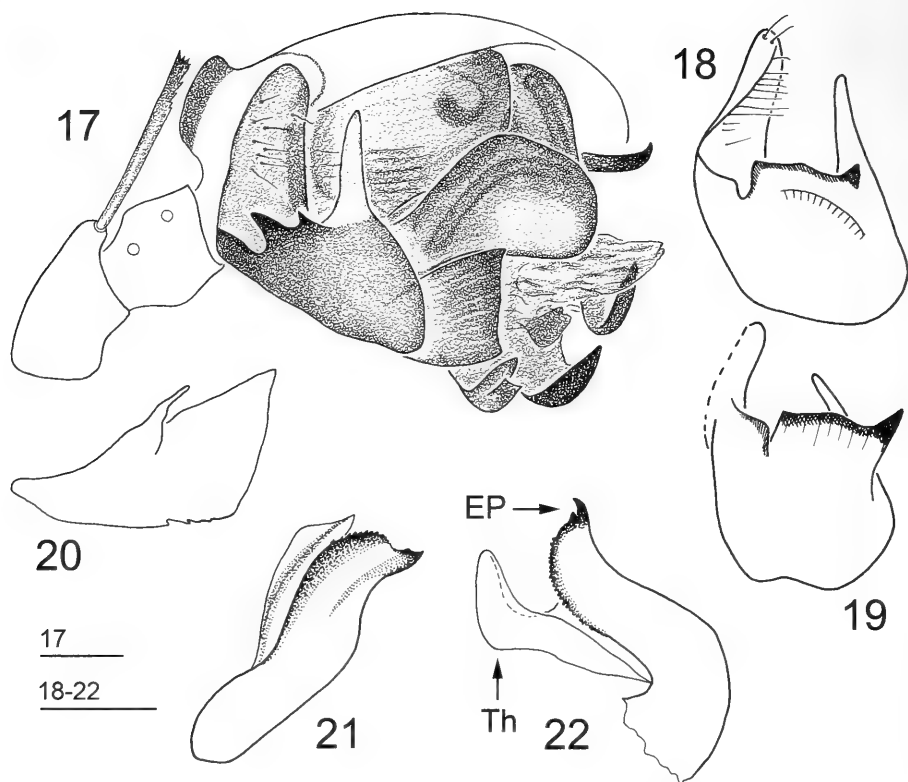
Figs 3, 17-26

MATERIAL: IRAN: ♂ holotype [7361], Tehran, Shemshak (36°01'N, 51°29'E), 2600 m a.s.l., 27.VIII.1973. – Paratypes: 2 ♂, 2 ♀ (ZMMU), 8 ♂, 11 ♀, from same locality, together with holotype. – 1 ♀ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♀ [7544], Mazandaran, W of Razan, (36°12'N, 52°08'E), 1500 m a.s.l., 8.VII.1975. – 4 ♂, 2 ♀ [7598], Eastern Azarbayjan, NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975.

ETYMOLOGY: The specific name, an adjective, refers to the Elburz Mts, the terra typica of the new species.

DIAGNOSIS: The species is characterised by the particular shape of the lamella characteristica in the male; a short, drop-shaped pseudoscape, as well as a totally reduced stretcher of the epigyne in the female.

DESCRIPTION: Male. Total length 3.00 (2.70-3.15). Carapace 1.25 long, 1.05 wide, yellow to pale brown, with a grey median stripe and a darker margin present in

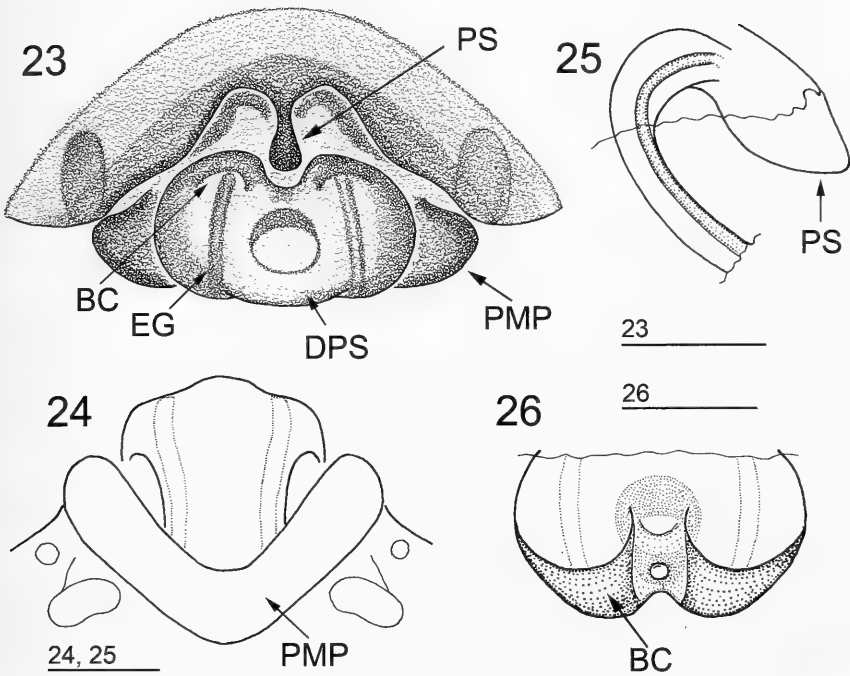


FIGS 17-22

Bolyphantes elburzensis sp. n., ♂ paratype from Shemshak, Iran. (17) Right palp, retrolateral view. (18, 19) Paracymbium, different aspects. (20) Lamella characteristic. (21, 22) Embolus, different aspects.

darker specimens; unmodified, only head part slightly protruded forward and carrying several short and curved spines. Chelicerae 0.55. long, stridulatory area well developed. Legs yellow to pale brown. Leg I 6.70 long (1.75+0.40+1.70+1.75+1.10), IV 5.80 long (1.60+0.35+1.45+1.50+0.90). Chaetotaxy. FeI: 0-1-0-0, II-IV: 0-0-0-0; TiI: 2-1-1-1; II: 2-0-1-1, III: 2-0(1)-0-1, IV: 2-1-1-1; MtI-IV: 1-0-0-0. TmI 0.25. Metatarsi IV without trichobothrium. Palp (Figs 17-22): Patella with a special seta typical of the genus. Cymbium with a keel-shaped posterodorsal outgrowth. Paracymbium with a wide ridge-like tooth in median part. Lamella characteristic short and wide, with a small branch on dorsal side. Embolus relatively large, slightly S-shaped, with a serrate surface near embolus proper. Abdomen 1.75 long, 1.00 wide, dorsally pale, sometimes white, with a grey median stripe flanked by paramedian spots connected to it with thin bands.

Female. Total length 3.35 (2.95-3.40). Carapace 1.25 long, 1.05 wide. Chelicerae 0.50 long. Leg I 6.30 long (1.65+0.45+1.60+1.60+1.00), IV 5.85 long (1.60+0.40+1.45+1.50+0.90). TmI 0.22. Abdomen 2.00 long, 0.65 wide. Epigyne (Figs



FIGS 23-26

Bolyphantes elburzensis sp. n., ♀ paratype from Shemshak, Iran. (23) Epigyne, ventral view. (24) same, dorsal view. (25) Pseudoscape (back wall of epigyne and distal part of scape removed, lateral view). (26) Distal part of scape, anterior view.

23-26): Pseudoscape small, drop-shaped. Distal part of scape well developed, globular, stretcher totally reduced. Posterior median plate large, V-shaped. Body and leg coloration, and chaetotaxy as in male.

VARIABILITY: A melanic female is present in the above material: its carapace is brown, the dark margin and median stripe are well-expressed, and the legs are with dark bands.

TAXONOMIC REMARKS: This new species is well distinguished from all congeners by the particular shape of the lamella characteristica in the male, by a short and narrow pseudoscape, as well as a totally reduced stretcher of the epigyne in the female.

DISTRIBUTION: Known from the Elburz Mts, Iran (see Fig. 3).

RANGE: Iranian.

Caviphantes dobrogicus (Dumitrescu & Miller, 1962)

Fig. 3

MATERIAL: IRAN: 1 ♂ [7503], Western Azarbayjan, N of Khoy (38°37'N, 45°02'E), 1.VI. 1975. - 1 ♀ [7556], Mazandaran, Garmab (37°43'N, 56°18'E), 18.VII.1975. - 1 ♂, 1 ♀ [7335], Tehran, Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. - 1 ♂ [7361], Shemshak (36°01'N, 51°29'E), 2600 m a.s.l., 27.VIII.1973, 1 ♂ [7536], Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. - 1 ♀ [7352], Bakhtiyari, Farsan (32°17'N, 50°31'E), 11.VIII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Eastern Ancient Mediterranean.

Centromerus sylvaticus (Blackwall, 1841)

MATERIAL: IRAN: 1 ♀ [7487], Gilan, road to Hero-Abad (37°38'N, 48°50'E), 1600 m a.s.l., forest, 10.VIII.1974.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Holarctic.

Ceratinella brevis (Wider, 1834)

MATERIAL: IRAN: 1 ♀ [7315], Gilan, Chaboksar (36°59'N, 50°34'E), 7.VII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Palaearctic.

Dactylopiastes digiticeps (Simon, 1881)

MATERIAL: IRAN: 4 ♀ [7512], Eastern Azarbayjan, E of Miyaneh (37°28'N, 47°52'E), swamps, rice fields, 8.VI.1975. – 1 ♂ [7598], NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975. 1 ♀ [7520], Gilan, Galugah (37°31'N, 49°19'E), 12.VI.1975. – 1 ♂ [7307], Hashtpar (37°50'N, 48°58'E), 29.VI.1973. – 2 ♀ [7333], Mazandaran, Sari (36°34'N, 53°09'E), 22.VII.1973. – 7 ♂, 8 ♀ [7536], Tehran, Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. – 2 ♀ [7358], Esfahan, W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 1 ♂ [7578], Fars, Bishapoor (29°47'N, 51°53'E), 3.IX.1975.

RECORDS FROM IRAN: Lorestan: Pol-e-Dokhtar. – Khuzestan: Shush. – Kohgiluyeh: Charam. – Fars: Bishapoor, Serizjan, Sivand. – Mazandaran: Mahmoodabad (Tanasevitch, 2008).

RANGE: Eastern Ancient Mediterranean.

Dicymbium nigrum (Blackwall, 1834)

MATERIAL: IRAN: 21 ♀ [7517], Gilan, near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 3 ♀ [7516], near Asalem (37°38'N, 48°48'E), 1800 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 1 ♀ [7478], Dalasm, near Dalasm (36°26'N, 51°32'E), 4.VIII.1974. – 1 ♀ (ZMMU) [7321], Tehran, N of Kendvan Canyon (36°10'N, 51°19'E), 2700 m a.s.l., 12.VII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: West Palaearctic.

Diplocephalus transcausicus Tanasevitch, 1990

Fig. 3

MATERIAL: IRAN: 1 ♂ [7333], Mazandaran, Sari (36°34'N, 53°09'E), 22.VII.1973. – 1 ♂, 1 ♀ [7334], Keyasar (36°22'N, 53°16'E), sifting in very dry forest, 22.VII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Caucasian-Iranian.

Diplostyla concolor (Wider, 1834)

MATERIAL: IRAN: 1 ♀ (ZMMU) [7503], Western Azarbayjan, N of Khoy (38°37'N, 45°02'E), 1.VI.1975. – 2 ♀ [7305], Gilan, Chelvand (38°19'N, 48°51'E), 27.VI.1973. – 1 ♀

[7517], near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 1 ♂ [7519], Asalem (37°45'N, 48°57'E), sifting debris from tree holes, 11.VI.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Holarctic.

***Entelecara erythropus* (Westring, 1851)**

Entelecara sp. - Tanasevitch, 2008: 477.

MATERIAL: IRAN: 3 ♀, 1 ♂ (ZMMU) [7352], Bakhtiyari, Farsan (32°17'N, 50°31'E), 11.VIII.1973.

REMARKS: This species was earlier determined to genus level only (Tanasevitch, 2008). A detailed study of the epigynes of several specimens shows that they belong to *E. erythropus*. This species is here reported for the first time for the Iranian fauna.

RECORDS FROM IRAN: Fars: Qader Abad (= Ghaderabad) (Tanasevitch, 2008, as *Entelecara* sp.).

RANGE: Palaearctic.

***Erigone atra* Blackwall, 1833**

MATERIAL: IRAN: 4 ♀ [7510], Eastern Azarbayjan, W of Bostanabad (37°55'N, 46°42'E), 1900 m a.s.l., 7.VI.1975.

RECORDS FROM IRAN: Mazandaran: Baladeh (Tanasevitch, 2008).

RANGE: Holarctic.

***Erigone dentipalpis* (Wider, 1834)**

MATERIAL: IRAN: 10 ♂, 6 ♀ [7503], Western Azarbayjan, N of Khoy (38°37'N, 45°02'E), 1.VI.1975. – 7 ♂, 7 ♀ [7533], Mahabad (36°47'N, 45°45'E), 24.VI.1975. – 3 ♂, 2 ♀ [7301], Maku (39°08'N, 44°30'), 23.VI.1973. – 2 ♂, 3 ♀ [7303], Bostanabad (37°48'N, 46°51'E), 25.VI.1973. – 1 ♂, 6 ♀ [7510], W of Bostanabad (37°55'N, 46°42'E), 1900 m a.s.l., 7.VI.1975. – 1 ♂, 2 ♀ [7512], E of Miyaneh (37°28'N, 47°52'E), swamps, rice fields, 8.VI.1975. – 3 ♂, 1 ♀ [7508], N of Bonab (37°26'N, 45°57'E), 4.VI.1975. – 1 ♂ [7305], Gilan, Chelvand (38°19'N, 48°51'E), 27.VI.1973. – 1 ♂ [7307], Hashtpar (37°50'N, 48°58'E), 29.VI.1973. – 1 ♂ [7483], near Kelatchay (37°01'N, 50°27'E), 6.VIII.1974. – 3 ♂, 1 ♀ [7517], near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 3 ♂, 1 ♀ [7520], Galugah (37°31'N, 49°19'E), 12.VI.1975; 1 ♀ [7367], Fowmen (37°12'N, 49°12'E), 7.IX.1973. – 1 ♂, 2 ♀ [7311], Galugah (37°31'N, 49°19'E), 4.VII.1973. – 1 ♂, 9 ♀ [7332] Mazandaran, Naharkoran/Gorgan (36°44'N, 54°29'E), sifting in forest, litter and moss, 20.VII.1973. – 1 ♀ [7543], E of Baladeh (36°12'N, 51°57'E), 2000 m a.s.l., 8.VII.1975. – 1 ♂, 1 ♀ [7547], Ivel (36°14'N, 53°37'E), 1500 m a.s.l., under stones, 11.VII.1975. – 1 ♀ [7555], near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975; 1 ♂ [7333], Sari (36°34'N, 53°09'E), 22.VII.1973. – 1 ♂, 2 ♀ [7316], Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 2 ♀ (ZMMU) [7321], Tehran, N of Kendvan Canyon (36°10'N, 51°19'E), 2700 m a.s.l., 12.VII.1973. – 2 ♂, 3 ♀ [7327], Rud-e-Hen (35°44'N, 51°55'E), 17.VIII.1973. – 4 ♀ [7328], Polur (35°51'N, 52°04'E), 2300 m a.s.l., meadow, 17.VII.1973. – 16 ♂, 6 ♀ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♂ [7336], near Firuz Kun (35°43'N, 52°40'E), 24.VII.1973. – 5 ♂, 3 ♀ [7338], Avaj (35°38'N, 49°13'E), 27.VII.1973. – 4 ♂, 2 ♀ [7361], Shemshak (36°01'N, 51°29'E), 2600 m a.s.l., 27.VIII.1973. 1 ♀ [7455], Aqa (36°19'N, 49°49'E), 6.VII.1974. – 2 ♀ [7362], Fasham (35°55'N, 51°32'E), 2000 m a.s.l., 27.VIII.1973. –

2 ♂, 2 ♀ [7363], Aqa (36°19'N, 49°49'E), 2.IX.1973. – 1 ♂, 2 ♀ [7536], Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. – 1 ♂ [7537], Mo'lem Kalayeh (36°26'N, 50°27'E), 3.VII.1975. – 6 ♂, 13 ♀ [7351], Bakhtiyari, Kuhrang (32°29'N, 50°04'E), 2700 m a.s.l., barrage, 9.VIII.1973. – 10 m, 9 ♀ [7431], E of Farsan (32°17'N, 50°38'E), 7.VI.1974. – 3 ♀ [7434], Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 1 ♂, 4 ♀ [7346], Lorestan, Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 2 ♂, 2 ♀ [7439], Azna (33°28'N, 49°22'E), 23.VI.1974. – 1 ♀ (ZMMU) [7440], Hatemvand (33°28'N, 48°07'E), 23.VI.1974. – 2 ♂ [7444], Lorestan, Dizgaran (33°43'N, 47°00'E), 25.VI.1974. – 6 ♀ [7348], Esfahan, Eskandari (32°50'N, 50°21'E), 8.VIII.1973. – 7 ♂, 12 ♀ [7358], W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 1 ♂, 2 ♀ [7353], Riz-e-Landjan (32°24'N, 51°19'E), 1600 m a.s.l., rice fields, 11.VIII.1973. – 2 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 1 ♀ [7447], Ilam (33°37'N, 46°23'E), sifting of litter, 27.VI.1974. – 5 ♂, 5 ♀ [7448], Tchaharmelleh (33°57'N, 46°17'E), 28.VI.1974. – 3 ♂, 3 ♀ [7344], Kermanshah, Garavand/Shahabad (33°55'N, 46°47'E), 5.VIII.1973. – 3 ♂, 5 ♀ [7451], Kangavar (34°29'N, 47°55'E), 1.VII.1974. – 5 ♂, 4 ♀ [7525], Kermanshah, Behistun (= Bisitum or Bisutun) (34°23'N, 47°26'E), 17.VI.1975. – 4 ♂, 2 ♀ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 3 ♂, 1 ♀ [7588], N of Kamyaran (34°48'N, 46°57'E), 13.IX.1975. – 1 ♂, 3 ♀ [7339], Hamadan, Hamadan (34°46'N, 48°27'E), 29.VII.1973. – 1 ♀ [7452], NE of Asadabad, (34°51'N, 48°12'E), 2.VII.1974. – 1 ♂ [7453b], Ganznameh/Hamadan (34°44'N, 48°30'E), 2250 m a.s.l., 4.VII.1974. – 6 ♂, 17 ♀ [7523], near Hamadan (34°44'N, 48°27'E), 2600 m a.s.l., 16.VI.1975. – 2 ♂, 1 ♀ [7586], near Hamadan (33°44'N, 48°27'E), 2600 m a.s.l., 11.IX.1975. – 2 ♀ [7558], Khorasan, S of Bodjnour (37°20'N, 57°20'E), 1700 m a.s.l., 19.VII.1975. – 9 ♂, 15 ♀ [7528], S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 1 ♀ (ZMMU) [7531], S of Divandarreh (35°45'N, 47°05'E), 23.VI.1975. – 1 ♂, 1 ♀ [7532], Santeh (36°11'N, 46°32'E), 23.VI.1975. – 3 ♂ [7595], road from Marivan (35°27'N, 46°38'E), 16.IX.1975. – 3 ♀ [7596], Hoseynabad (35°33'N, 47°08'E), 17.IX.1975. – 7 ♂, 8 ♀ [7597], N of Saqqez (36°23'N, 46°12'E), 8.IX.1975. – 1 ♂, 3 ♀ [7578], Fars, Bishapoor (29°47'N, 51°53'E), 3.IX.1975. – 1 ♂, 2 ♀ [7356], Persepolis (29°59'N, 52°54'E), 18.VIII.1973.

RECORDS FROM IRAN: Kerman or Gilan (Roewer, 1955). – Gilan: Galugah. – Mazandaran: Amol, Naharkoran/Gorgan, Baladeh, Keyasar. – Lorestan: Aligudarz. – Bakhtiyari: Kuhrang, Pol-e-Dokhtar. – Fars: Bishapoor, Dasht-e-Arjan and Izadkhash. – Esfahan: Falayarjan, Pol-e-Kaleh. – Khorasan: Emam Qoli, Zavi and Amirabad. – Tehran: Shahrak (Tanasevitch, 2008).

RANGE: Holarctic.

Erigonoplus ninae Tanasevitch & Fet, 1986

Fig. 4

MATERIAL: IRAN: 1 ♀ [7333], Mazandaran, Sari (36°34'N, 53°09'E), 22.VII.1973.

REMARKS: *E. ninae* was original described from Turkmenistan, SW Kopetdagh Mts, environs of Kara-Kala (Tanasevitch & Fet, 1986), i.e., in close proximity to the border of Golestan Province, Iran.

This species is here reported for the first time for the Iranian fauna.

RANGE: Turkmenian-Iranian.

Erigonoplus sengleti Tanasevitch, 2008

Fig. 3

RECORDS FROM IRAN: Kohgiluyeh: Charam (Tanasevitch, 2008).

DISTRIBUTION: Known from the type locality only.

RANGE: Iranian.

Erigonoplus zagros sp. n.

Figs 3, 28-37

E. nigrocaeruleus (Simon, 1881). - Tanasevitch, 2008: 478.

ETYMOLOGY: The specific name, an adjective, refers to the Zagros Mts, the terra typica of the new species.

DIAGNOSIS: The species is characterised by the conformation of the distal part of the embolic division.

MATERIAL: IRAN: holotype ♂ [7435], Bakhtiyari, NE of Zardeh-Kuh (32°23'N, 50°07'E), 2600-2800 m a.s.l., 20.VI.1974. - Paratypes: 2 ♂, 7 ♀ [7435], same locality together with holotype. - 1 ♂, 1 ♀ (ZMMU), 2 ♂, 2 ♀ [7433], Bakhtiyari, dam near Kuhrang (32°26'N, 50°06'E), 18.VI.1974. - 1 ♀ [7447], Ilam, near Ilam (33°37'N, 46°23'E), sifting of litter, 27.VI.1974. - 1 ♀ [7449], Kermanshah, Mahi Dasht (34°14'N, 46°42'E), 29.VI.1974.

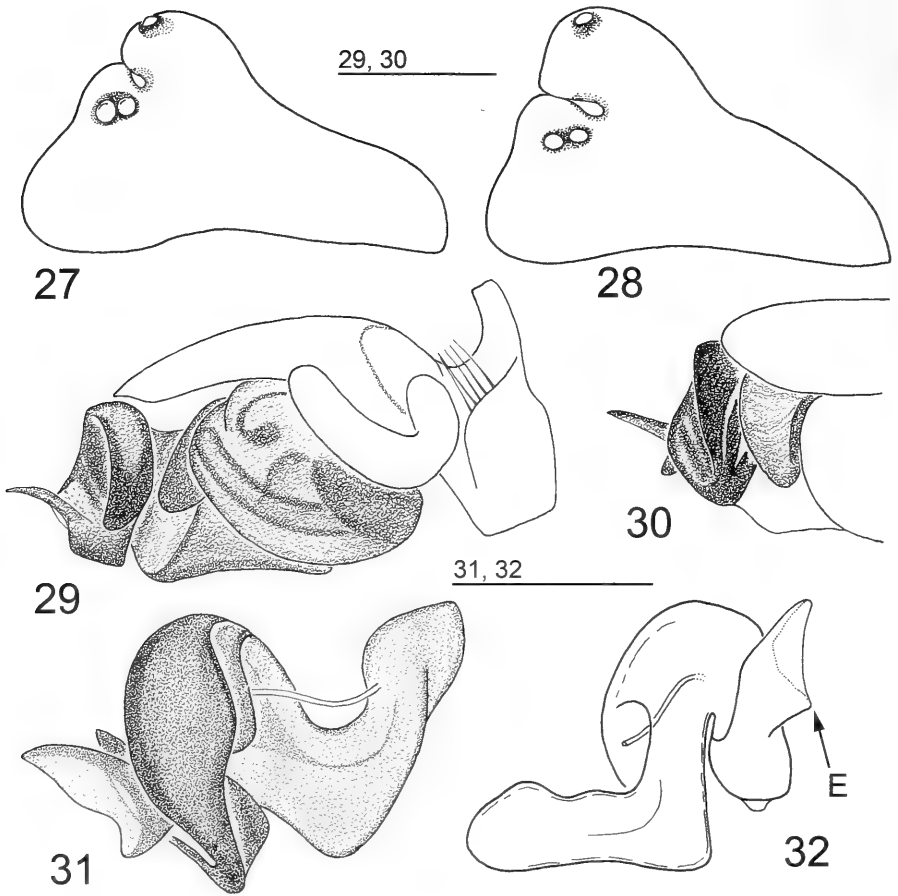
DESCRIPTION: Male. Total length 1.58. Carapace 0.73 long, 0.50 wide, pale brown to brown, modified as in Fig. 28. Chelicerae 0.25 long. Legs yellow to pale brown. Femora I with a ventral row of stout spines (Figs 33, 34). Leg I 1.84 long (0.53+0.15+0.43+0.40+0.33), IV 1.95 long (0.55+0.15+0.50+0.45+0.30). Chaetotaxy 1.1.1.1. TmI 0.43. Metatarsi IV without trichobothrium. Palp (Figs 29-32, 35): Cymbium without posterodorsal outgrowth. Tibia with two processes distally: one pointed, the other wider, obtuse, with a small tooth apically. Paracymbium U-shaped. Distal suprategular apophysis rather short, wide, tongue-shaped. Embolic division relatively large, distal part wide, divided into two branches, these connected by a semi-transparent membrane. Abdomen 0.88 long, 0.63 wide, pale grey to almost black, with sparse and long hairs.

Female. Total length 1.65. Carapace 0.68 long, 0.50 wide, unmodified. Chelicerae 0.23 long. Leg I 1.89 long (0.55+0.18+0.43+0.40+0.33), IV 2.06 long (0.60+0.20+0.48+0.45+0.33). TmI 0.40. Abdomen 1.13 long, 0.75 wide, with rare long hairs. Epigyne as in Figs 36, 37. Body and leg coloration, and chaetotaxy as in male.

VARIABILITY: The shape of the carapace is uniform, but the arrangement of ventral stout spines on femora I is slightly different in different specimens.

TAXONOMIC REMARKS: Unfortunately the type of *E. nigrocaeruleus*, demanded on loan from the MNHNP, could not be received in time for the completion of my previous contribution (Tanasevitch, 2008). Therefore the *Erigonoplus* specimens from Zardeh-Kuh were wrongly determined as *E. nigrocaeruleus*. Now that this type has been examined, the material from Zardeh-Kuh can be attributed to a new species. The new species is most similar to *E. nigrocaeruleus*, but differs by the shape of the male carapace (Fig. 28 cf. Fig. 27) and in the structure of the distal part of the embolic division.

In the shape of the male carapace and genitalic conformation, *E. zagros* sp. n. is also similar to *E. spinifemoralis* Dimitrov, 2003, known from SE Bulgaria. Two *Erigonoplus* species, described just after *E. spinifemoralis*, i.e., *E. ayyildizi* Tanasevitch, Topçu & Demir, 2005 syn. n. from Turkey and *E. galophilus* Gnelitsa, 2007 syn. n. from the Crimea, are actually junior synonyms of *E. spinifemoralis*. This decision is based on a careful study of the descriptions of these nominal species, both provided with nice illustrations, as well as a thorough examination of additional material, including the types: 3 ♂, 1 ♀ (holotype and paratypes in NUAM), TURKEY,

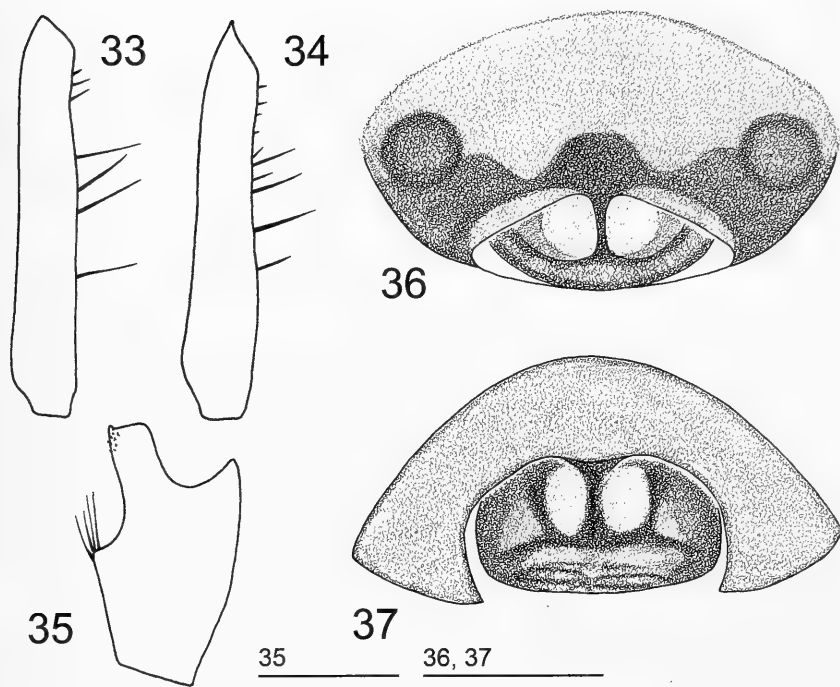


FIGS 27-32

Erigonoplus nigrocaeruleus (Simon, 1881), ♂ holotype from Corsica (MNHN) (27), and *E. zagros* sp. n., ♂ paratype from Zardeh-Kuh, Iran (28-32). (27, 28) ♂ carapace, lateral view. (29, 30) Left palp, different aspects. (31, 32) Embolic division, different aspects.

Antalya Province, Fener District. – 1 ♂ (A. Pomarev, personal collection), RUSSIA, Rostov Area, Remontnenskiy District, near Podgornoye. The type of *E. galophilus* has not been studied by me, but its illustrations are so clear and highly detailed (Gnelitsa, 2007) that there are no doubts whatever about its conspecificity with *E. spinifemoralis*. It is noteworthy, however, that the ventral spination of the male femora I in *Erigonoplus* species is not uniform and can vary even between the left and right femur of a single specimen; slight differences in the details of palpal structure, which can be traced in the illustrations of *E. spinifemoralis*, *E. ayyildizi* and *E. galophilus*, are mainly a result of different orientation.

COMPARATIVE MATERIAL EXAMINED: Holotype ♂, AR12683(4344), deposited in MNHN.



FIGS 33-37

Erigonopus zagros sp. n., ♂ and ♀ paratypes from Zardeh-Kuh, Iran. (33, 34) Varieties of ♂ femur spination. (35) Left palpal tibia, dorsal view. (36, 37) Epigyne, ventral and posteroventral view, respectively.

DISTRIBUTION: Known from the Zagros Mts, Iran (see Fig. 3).

RANGE: Iranian.

***Frontinellina frutetorum* (C.L. Koch, 1834)**

MATERIAL: IRAN: 1 ♂ [7332], Mazandaran, Naharkoran/Gorgan (36°44'N, 54°29'E), sifting in forest, moss, 20.VII.1973. – 1 ♀ [7540], Valiabad (36°16'N, 51°16'E), 1900 m a.s.l., 5.VII.1975. – 2 ♂, 1 ♀ [7546], near Kiyasar (36°16'N, 53°25'E), 10.VII.1975. – 3 ♂, 6 ♀ [7555], near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975. – 2 ♀ [7333], Sari (36°34'N, 53°09'E), 22.VII.1973. – 1 ♂ [7334], Keyasar (36°22'N, 53°16'E), sifting in very dry forest, 22.VII.1973. – 1 ♀ [7366], Gilan, Shahr-Bijar (37°00'N, 49°36'E), sifting debris from tree holes, 6.IX.1973. – 1 ♀ [7484], road from Djavaherdeh (36°55'N, 50°33'E), 1100-1300 m a.s.l., 7.VIII.1974. – 1 ♀ [7570], Khorasan, E of Shirvan (37°27'N, 57°43'E), 19.VIII.1975. – 1 ♀ [7448], Ilam, Tchaharmelleh (33°57'N, 46°17'E), 28.VI.1974.

RECORDS FROM IRAN: Tehran (Goodarzi, 1994). – Gilan: Roodbar. – Golestan: Nodijeh, Raamian. – Zanjan: Mamalah, Soomeahbar, Hendezamin, Vaneser, Tarom (Ghavami et al., 2004). – Golestan, Mazandaran (Ghavami, 2006). – Golestan: Gonbad, Nodijeh, Tooskaostan. – Gilan (Ghavami, 2006). – Khorasan: Bojnurd, Ramiyan, Allabad, Now Shahr (Tanasevitch, 2008).

RANGE: West Palaearctic.

Gnathonarium dentatum (Wider, 1834)

MATERIAL: IRAN: 2 ♂, 5 ♀ [7302], Eastern Azerbaijan, Khoy (38°41'N, 45°08'E), 24.VI.1973. – 1 ♂, 1 ♀ [7514], Kivi Pain (37°41'N, 48°21'E), 9.VI.1975. – 3 ♂, 8 ♀ [7488], N of Hero-Abad (37°42'N, 48°29'E), 10.VIII.1974. – 5 ♂, 5 ♀ [7510], W of Bostanabad (37°55'N, 46°42'E), 1900 m a.s.l., 7.VI.1975. – 2 ♂, 3 ♀ [7512], E of Miyaneh (37°28'N, 47°52'E), swamps, rice fields, 8.VI.1975. – ca 60 ♂ & ♀ [7305], Gilan, Chelvand (38°19'N, 48°51'E), 27.VI.1973. – ca 50 ♂ & ♀ [7307], Hashpar (37°50'N, 48°58'E), 29.VI.1973. – 2 ♂, 2 ♀ (ZMMU) [7310], Parehsar (37°37'N, 49°03'E), sifting debris from tree holes, 2.VII.1973. – 3 ♂, 6 ♀ (ZMMU) [7311], Galugh (37°31'N, 49°19'E), 4.VII.1973. – 1 ♂, 1 ♀ [7312], Lahijan (37°11'N, 49°54'E), 5.VII.1973. – 24 ♂, 46 ♀ [7483], near Kelatchay (37°01'N, 50°27'E), 6.VIII.1974. – 6 ♂, 3 ♀ [7367], Fowmen (37°12'N, 49°12'E), 7.IX.1973. – 19 ♂, 21 ♀ [7519], Asalem (37°45'N, 48°57'E), sifting debris from tree holes, 11.VI.1975. – 17 ♂, 14 ♀ [7520], Galugh (37°31'N, 49°19'E), 12.VI.1975. – 70 ♂ & ♀ [7315], Chaboksar, (36°59'N, 50°34'E), 7.VII.1973. – 7 ♂, 6 ♀ [7316], Mazandaran, Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 1 ♂ [7329a], near Amol (36°18'N, 52°21'E), meadow, 18.VII.1973. – ca 60 ♂ & ♀ [7330], Hamzeh Kala (36°30'N, 52°31'E), sifting litter, 19.VII.1973. – 1 ♂, 4 ♀ [7332], Naharkoran/Gorgan (36°44'N, 54°29'E), sifting in forest, moss, 20.VII.1973. – 4 ♂, 4 ♀ [7540], Valiabad (36°16'N, 51°16'E), 1900 m a.s.l., 5.VII.1975. – ca 30 ♂ & ♀ [7545], Farahabad (36°49'N, 53°12'E), 9.VII.1975. – 5 ♂, 10 ♀ [7547], Ivel (36°14'N, 53°37'E), 1500 m a.s.l., under stones, 11.VII.1975. – 1 ♀ [7551], 'Arab (37°40'N, 55°47'E), 15.VII.1975. – 2 ♂, 4 ♀ [7333], Sari (36°34'N, 53°09'E), 22.VII.1973. – 2 ♂, 5 ♀ [7582], Lorestan, Veseyan (33°29'N, 48°04'E), 8.IX.1975. – 4 ♀ (ZMMU) [7321], Tehran, N of Kendvan Canyon (36°10'N, 51°19'E), 2700 m a.s.l., 12.VII.1973. – 5 ♂, 5 ♀ [7324], Gajereh (36°05'N, 51°22'E), 2500 m a.s.l., 13.VII.1973. – ca 60 ♂ & ♀ [7361], Shemshak (36°01'N, 51°29'E), 2600 m a.s.l., 27.VIII.1973. – 5 ♀ [7362], Fasham (35°55'N, 51°32'E), 2000 m a.s.l., 27.VIII.1973. – 3 ♂ [7364], Tarazan/Lowshan (36°28'N, 49°31'E), 3.IX.1973. – 1 ♂, 4 ♀ [7328], Polur (35°51'N, 52°04'E), 2300 m a.s.l., meadow, 17.VII.1973. – 35 ♂ & ♀ [7336], near Firuz Kun (35°43'N, 52°40'E), 24.VII.1973. – 9 ♂, 38 ♀ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – ca 60 ♂ & ♀ [7454], Ab Garm (35°41'N, 49°13'E), 5.VII.1974. – ca 100 ♂ & ♀ [7485], Tarazan/Lowshan (36°28'N, 49°31'E), 8.VIII.1974. – 1 ♀ [7537], Mo'lem Kalayeh (36°26'N, 50°27'E), 3.VII.1975. – 1 ♂ [7539], Asara (36°02'N, 51°14'E), 1900 m a.s.l., 4.VII.1975. – ca 100 ♂ & ♀ [7536], Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. – 1 ♂ (ZMMU) [7531], Kordestan, S of Divandarreh (35°45'N, 47°05'E), 23.VI.1975. – 2 ♂, 6 ♀ [7596], Hoseynabad (35°33'N, 47°08'E), 17.IX.1975. – 3 ♂, 5 ♀ [7528], S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 2 ♂, 8 ♀ (ZMMU) [7529], N of Sanandaj (35°28'N, 47°01'E), 22.VI.1975. – 5 ♂ [7530], S of Hoseynabad (35°33'N, 47°08'E), 21.VI.1975. – 5 ♀ [7352], Bakhtiyari, Farsan (32°17'N, 50°31'E), 11.VIII.1973. – 1 ♀ [7431], E of Farsan (32°17'N, 50°38'E), 17.VI.1974. – 5 ♀ [7348], Esfahan, Eskandari (32°50'N, 50°21'E), 8.VIII.1973. – 6 ♂, 12 ♀ [7358], W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 5 ♂, 2 ♀ [7438], Nowghan (33°11'N, 50°04'E), 22.VI.1974. – 15 ♂, 38 ♀ [7453b], Hamadan, Ganznameh/Hamadan (34°44'N, 48°30'E), 2250 m a.s.l., 4.VII.1974. – 4 ♂, 6 ♀ [7523], near Hamadan (34°44'N, 48°27'E), 2600 m a.s.l., 16.VI.1975. – 7 ♂, 12 ♀ [7586], same, 2600 m a.s.l., 11.IX.1975. – 2 ♂, 3 ♀ [7571], Khorasan, Bodjnour (37°29'N, 57°26'E), 20.VIII.1975. – 20 ♂ & ♀ [7357], Fars, Sivand, NE of Sivand (30°07'N, 52°58'E), 22.VIII.1973. – 6 ♀ [7578], Bishapoor (29°47'N, 51°53'E), 3.IX.1975.

RECORDS FROM IRAN: Kerman or Gilan (Roewer, 1955). – Mazandaran: Nashtarud. Now Shahr. – Khuzestan: Shush. – Kohgiluyeh: Charam. – Fars: Bishapoor, Firuzabad, Serizjan, Allabad, Sivand, Qader Abad (= Ghaderabad). – Esfahan: Falayarjan, Pol-e-Kaleh, Baladeh. – Khorasan: Emam Qoli, Kapkan, Bojnurd. – Tehran: Asara, Mahmoudabad (Tanasevitch, 2008).

RANGE: Palaearctic.

***Gongyliellum murcidum* Simon, 1884**

MATERIAL: IRAN: 1 ♂, 1 ♀ [7598], Eastern Azarbayjan, NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975. – 3 ♀ [7517], Gilan, near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 2 ♀ [7518], near Asalem (37°42'N, 48°53'E), 450 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 1 ♂ [7519], Asalem (37°45'N, 48°57'E), sifting debris from tree holes, 11.VI.1975. – 1 ♂ [7520], Galugah (37°31'N, 49°19'E), 12.VI.1975. – 1 ♂, 1 ♀ [7520], Gilan, Galugah (37°31'N, 49°19'E), 12.VI.1975. – 1 ♂ [7334], Mazandaran, Keyasar (36°22'N, 53°16'E), sifting in very dry forest, 22.VII.1973. – 3 ♀ [7555], near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: West Palaearctic.

***Halorates inerrans* (O. P.-Cambridge, 1885)**

MATERIAL: IRAN: 1 ♀ [7324], Tehran, Gajereh (36°05'N, 51°22'E), 2500 m a.s.l., 13.VII.1973.

TAXONOMIC REMARKS: Despite the detailed explanation of Buckle *et al.* (2001) concerning the synonymy of *Collinsia* O.P.-Cambridge, 1913 and *Halorates* Hull, 1911, most authors still use the name *Collinsia*, following Platnick (2009) who cited *Halorates* species under *Collinsia*. After having compared the genitalic conformation of the type species of these genera, I can confirm that they are congeneric. Therefore *Collinsia* must be treated as a junior subjective synonym of *Halorates*. I am not quite sure if all species currently in *Halorates* are congeneric with *Halorates reprobus* (O.P.-Cambridge, 1879), but, pending a thorough revision of all relevant species from this group, all *Collinsia* species must be listed under *Halorates*.

RECORDS FROM IRAN: Mazandaran: Baladeh (Tanasevitch, 2008).

RANGE: Palaearctic.

***Lepthyphantes iranicus* Saaristo & Tanasevitch, 1996**

RECORDS FROM IRAN: Mazandaran: Now Shahr (spelled Novshar in Saaristo & Tanasevitch, 1996b).

REMARKS: This species is absent from the material examined.

RANGE: Iranian.

***Leptorhoptrum robustum* (Westring, 1851)**

RECORDS FROM IRAN: Gilan. – Zanjan: Zanjan. – Eastern Azarbayjan: Tarom (Ghavami *et al.*, 2004).

REMARKS: This species is absent from the material examined.

RANGE: Palaearctic.

***Linyphia hortensis* (Sundevall, 1830)**

MATERIAL: IRAN: 1 ♂, 4 ♀ [7516], Gilan, near Asalem (37°38'N, 48°48'E), 1800 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 3 ♀ [7517], near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Palearctic.

Linyphia triangularis (Clerck, 1757)

RECORDS FROM IRAN: Kerman or Gilan (Roewer, 1955).

REMARKS: This species is absent from the material examined.

RANGE: Palearctic.

Maso sundevalli (Westring, 1851)

MATERIAL: IRAN: 4 ♀ [7516], Gilan, near Asalem (37°38'N, 48°48'E), 1800 m a.s.l., sifting debris from tree holes, 10.VI.1975.

RECORDS FROM IRAN: Tehran: Pol-e-Zanguleh (Tanasevitch, 2008).

RANGE: Holarctic.

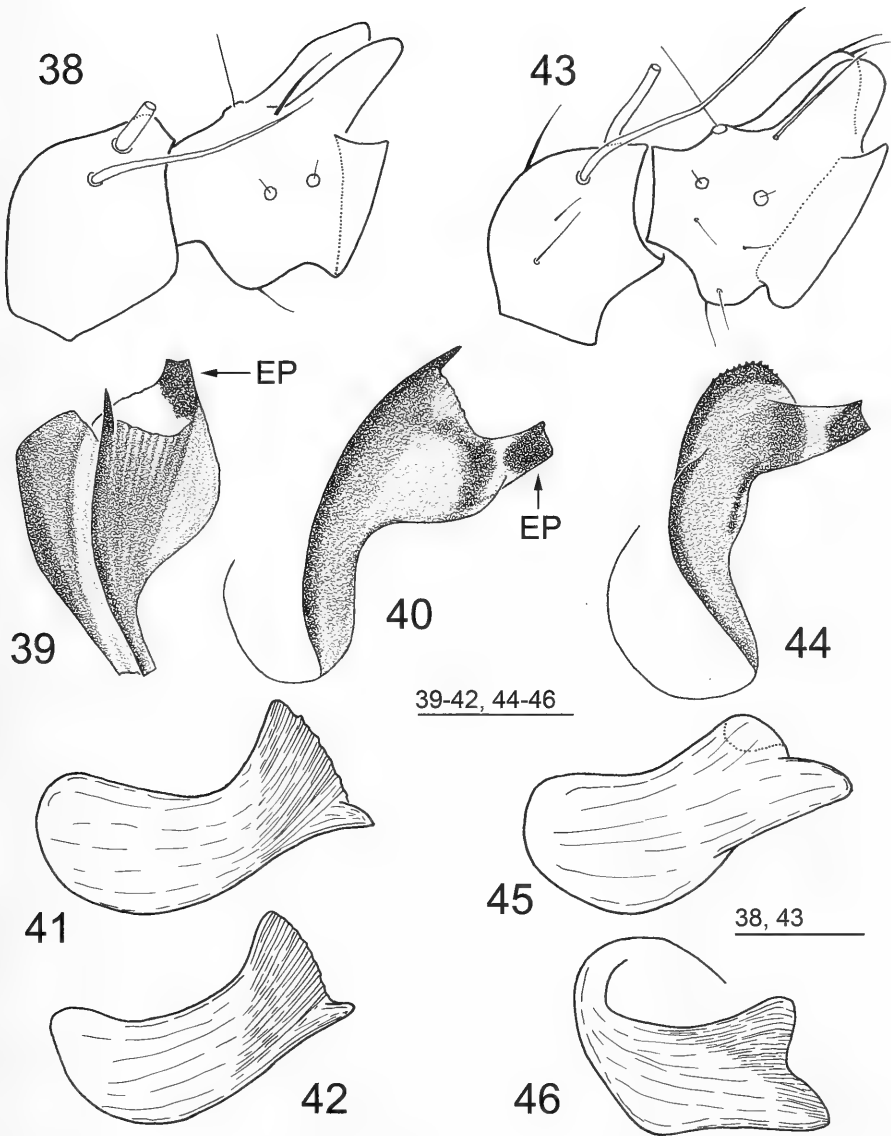
Megalephyphantes camelus (Tanasevitch, 1990)

Figs 4, 38-42, 47-49

MATERIAL: IRAN: 1 ♂ [7309], Eastern Azarbayjan, Hero-Abad (37°38'N, 48°33'E), 1900-2200 m a.s.l., 1.VII.1973. – 16 ♂, 12 ♀ (ZMMU) [7489], near Miyaneh (37°21'N, 47°49'E), 11.VIII.1974. – 1 ♀ [7372], Mazandaran, near Tang-e-Ram (37°25'N, 55°45'E), 28.VII.1974. – 1 ♀ [7454], Tehran, Ab Garm (35°41'N, 49°13'E), 5.VII.1974. – 1 ♀ [7537], Mo'lem Kalayeh (36°26'N, 50°27'E), 3.VII.1975. – 2 ♂, 4 ♀ [7439], Lorestan, Azna (33°28'N, 49°22'E), 23.VI.1974. – 1 ♂ [7440], Hatemvand (33°28'N, 48°07'E), 23.VI.1974. – 1 ♂, 4 ♀ [7443], Malavi-Shihabad (33°35'N, 47°14'E), 25.VI.1974. – 1 ♂, 4 ♀ [7444], Dizgaran (33°43'N, 47°00'E), 25.VI.1974. – 1 ♂ [7343], Kermanshah, Mahi Dasht (34°14'N, 46°42'E), 4.VIII.1973. – 2 ♀ [7527], NE of Kunduleh (34°44'N, 47°17'E), 20.VI.1975. – 10 ♂, 14 ♀ [7449], Mahi Dasht (34°14'N, 46°42'E), 29.VI.1974. – 1 ♀ [7588], N of Kamyaran (34°48'N, 46°57'E), 13.IX.1975. – 7 ♀ [7452], Hamadan, NE of Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 2 ♂, 6 ♀ [7453b], Ganznameh/Hamadan (34°44'N, 48°30'E), 2250 m a.s.l., 4.VII.1974. – 1 ♂, 2 ♀ [7528], Kordestan, S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 1 ♀ [7530], S of Hoseynabad (35°33'N, 47°08'E), 21.VI.1975. – 1 ♀ (ZMMU) [7531], S of Divandarreh (35°45'N, 47°05'E), 23.VI.1975. – 2 ♀ [7434], Bakhtiyari, Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 1 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 1 ♂ (ZMMU) [7355], Fars, Ghader-Abad (30°21'N, 53°19'E), 17.VIII.1973. – 1 ♂ (ZMMU), Barm-e-peere-Ghaibi, 29.V.2000, leg. Y. Marusik & E. Elmi. – 1 ♀ (ZMMU), 40 km NE of Shiraz, Band-e-Amir (29°52'N 52°47'E), 25.V.2000, leg. Y. Marusik. – 2 ♂ (ZMMU), Tehran, ca 3 km NNW of Tehran (35°36'N, 51°18'E), 22.VI.2000, leg. Y. Marusik. – 1 ♂, 2 ♀ (ZMMU), Fars, 25 km NE of Shiraz, Zargan (29°47'N 52°44'E), Aradegan Park, 25.V.2000, leg. Y. Marusik.

TAXONOMIC REMARKS: The female of *M. camelus*, a species known from both sexes (see Tanasevitch, 2008), is very similar to that of *M. kuhitangensis* (Tanasevitch, 1989), the latter species was originally described from females from Central Asia: Turkmenistan and Uzbekistan (Tanasevitch, 1989). The females of both these species are distinguished by the shape of the notch on the posterior median plate (Figs 47-49 cf. Figs 50-52).

Senglet's material from Afghanistan, kept at MHNG, contains females and the still unknown male of *M. kuhitangensis*. As a result, males of *M. kuhitangensis* and *M. camelus* also appear to be very similar to each other, but can be clearly separated by the absence of a spear-shaped outgrowth on the embolus (Fig. 44 cf. Figs 39, 40),



FIGS 38-46

Megalephyphantes camelus (Tanasevitch, 1990), ♂ holotype from Caucasus (ZMMU) (38-41), specimen from Miyaneh, Iran (42), and *M. kuhitangensis* (Tanasevitch, 1989), ♂ from Kandahar, Afghanistan (43-46). (38, 43) Right patella and palpal tibia, retrolateral view. (39, 40, 44) Embolus, different aspects. (41, 42, 45, 46) Lamella characteristica, different aspects.

in the shape of the apex of the lamella characteristica (Figs 45, 46 cf. Figs 41, 42), and by a wider retrolateral outgrowth on the palpal tibia in *M. kuhitangensis* (Fig. 43 cf. Fig. 38).

RECORDS FROM IRAN: Lorestan: Pol-e-Dokhtar. – Khuzestan: Andimeshk. – Kohgiluyeh: Yasudj. – Fars: Dasht-e-Arjan, Kavar, Izadkhast. – Mazandaran: Dasht (Tanasevitch, 2008).

RANGE: Caucasian-Iranian.

Megalephyphantes kuhitangensis (Tanasevitch, 1989)

Figs 43-46, 50-52

MATERIAL: TURKMENISTAN: ♀ holotype (ZMMU), 1 ♀ paratype (CAT), Pamir-Alai Mts, Kuhitang-Tau Mt. Ridge, near Khodjapil-Ata (ca 37°43'N, 66°21'E), 1200-1400 m a.s.l., leg. A. Tanasevitch. AFGHANISTAN: 1 ♂, 2 ♀ [7560], Kandahar, E of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet.

COMPARATIVE MATERIAL EXAMINED: *M. camelus*: 1 ♂ holotype (ZMMU), AZERBAIDJAN, East Caucasus, Agdash Distr., Turianchayskiy Nature Reserve, 300 m a.s.l., sparse *Juniperus* & *Pistacia* forest, 13.V.1986, leg. P. Dunin; numerous specimens from Iran (see Tanasevitch, 2008 and current paper).

REMARKS: This species has been described from females. A description of the male is given below for the first time.

DESCRIPTION OF MALE: Total length 3.10. Carapace 1.25 long, 1.00 wide, pale brown. Chelicerae 0.45 long. Legs pale brown, without median bands. Length of leg I segments: Fe 2.35, Pt 0.40, Ti 2.30, Mt 2.00, Ta - ? Chaetotaxy. TiI: 2-1-1-0, II, III: 2-0-1-0, IV - ?; Mt I-IV: 1-0-0-0. TmI - ? Palp (Figs 43-46): Patella with two curved special spines. Cymbium with a small posterodorsal outgrowth. Paracymbium with a dentiform extension in posterior part. Lamella characteristic short and wide, bifid apically. Embolus seahorse-like, with a serrate surface above embolus proper. Abdomen 1.60 long, 1.10 wide, dorsally pale, with a wide grey median stripe in anterior part and several transverse grey stripes posteriorly.

REMARKS: *M. kuhitangensis* is not a species known from Iran, but it is presented for a comparison with the very similar *M. camelus*.

RANGE: Central Asian.

Megalephyphantes kronebergi (Tanasevitch, 1989)

Fig. 4

MATERIAL: IRAN: 1 ♂ (ZMMU), Khorasan, VI.1997, leg. Rahnana.

RECORDS FROM IRAN: Khorasan: Mashhad (Tanasevitch, 2008).

RANGE: Central Asian.

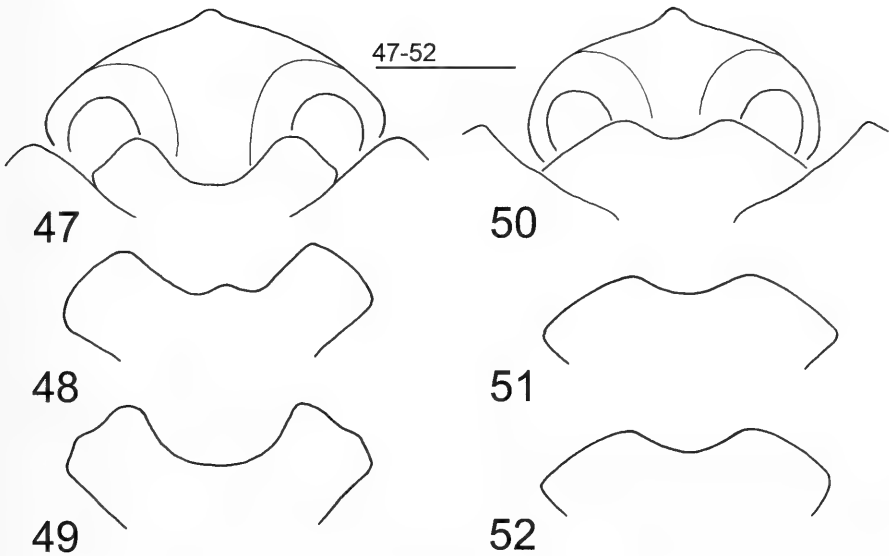
Megalephyphantes nebulosoides (Wunderlich, 1977)

Fig. 4

MATERIAL: IRAN: 2 ♂ (subad.), 2 ♀ [7555], Mazandaran, near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975. – 3 ♂, 5 ♀ (ZMMU), 8 ♂, 39 ♀ [7555], near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975. – 1 ♀ [7558], Khorasan, S of Bodjnour (37°20'N, 57°20'E), 1700 m a.s.l., 19.VII.1975.

RECORDS FROM IRAN: Kerman (Roewer, 1955, as *L. nebulosus*). – Fars: Bishapoor. – Khorasan: Chaman Bid, Quchan, Emam Qoli, Kapkan, Amirabad, Shandiz Valley and Bojnurd. – Mazandaran: Dasht (Tanasevitch, 2008).

RANGE: Central Asian.



FIGS 47-52

Megalephyphantes camelus (Tanasevitch, 1990), ♀ specimens from Miyaneh, Iran (47-49), and *M. kuhitangensis* (Tanasevitch, 1989), ♀ specimens from Kandahar, Afghanistan (50-52). (47, 50) Epigyne, dorsal view. (48, 49, 51, 52) Posterior median plate of epigyne, dorsal view.

***Megalephyphantes nebulosus* (Sundevall, 1939)**

Fig. 4

MATERIAL: IRAN: 2 ♂ [7598], Eastern Azarbayjan, NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975.

REMARKS: It is quite possible that this locality is one of the easternmost in the *M. nebulosus* distribution; further to the east, this species is substituted by its vicariant, *M. nebulosoides*.

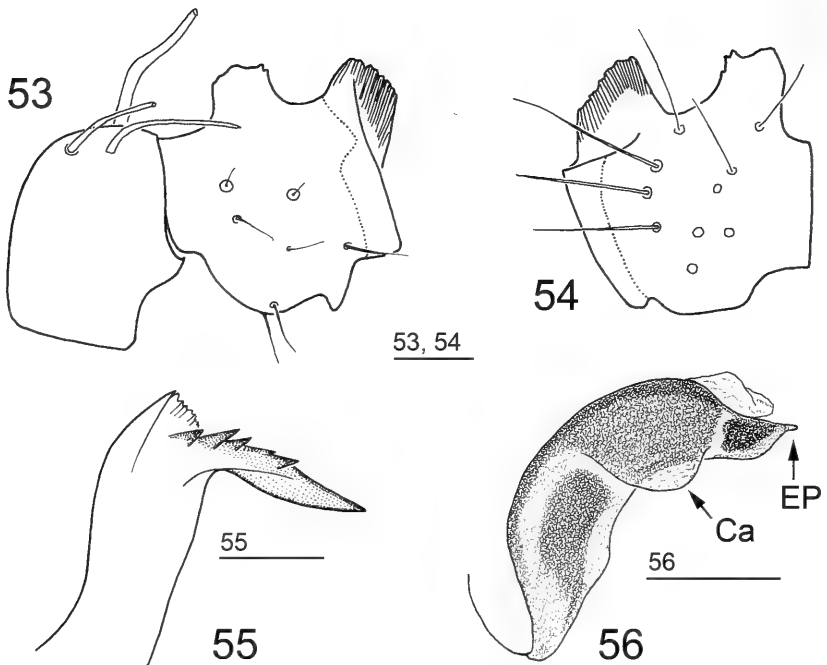
RANGE: Holarctic.

***Megalephyphantes pseudocollinus* Saaristo, 1997**

Figs 4, 53-56

MATERIAL: IRAN: 2 ♀, 1 juv. [7489], Eastern Azarbayjan, near Miyaneh (37°21'N, 47°49'E), 11.VIII.1974. – 1 ♂, 2 ♀, 4 juv. [7544], Mazandaran, W of Razan (36°12'N, 52°08'E), 1500 m a.s.l., 8.VII.1975. – 1 ♀ [7478], Dalasm, near Dalasm (36°26'N, 51°32'E), 4.VIII.1974. – 1 ♀ [7442], Lorestan, Tang-e-Malavi (33°15'N, 47°48'E), 24.VI.1974.

TAXONOMIC REMARKS: In the original description Saaristo (1997: 257) noted that "It has now become evident that both *M. collinus* and the new species *M. pseudocollinus* described here have a presumably polymorphic form with a drastically truncated tibial apophysis". The single male from Mazandaran shows yet a different, third kind of tibial apophysis (Figs 53, 54), deviating from both depicted by Saaristo (1997: Figs 1, 2). All other details of palp and epigyne structure in the specimens examined correspond to those provided in the original description of *M. pseudocollinus* (Figs 55, 56).



Figs 53-56

Megalephyphantes pseudocollinus Saaristo, 1997, ♂ from Razan, Iran. (53) Right patella and palpal tibia, retrolateral view. (54) Right palpal tibia, prolateral view. (55) Lamella characteristic. (56) Embolus.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: European-Ancient Mediterranean.

Mesasisgone mira Tanasevitch, 1989

MATERIAL: IRAN: 1 ♀ [7301], Western Azarbayjan, Maku (39°08'N, 44°30'), 23.VI.1973. – 2 ♀ [7503], N of Khoy (38°37'N, 45°02'E), 1.VI.1975. – 1 ♂ [7599], Qaraziad-Din (38°56'N, 45°03'E), 1.IX.1975. – 1 ♀ [7533], Mahabad (36°47'N, 45°45'E), 24.VI.1975. – 1 ♀ [7508], Eastern Azarbayjan, N of Bonab (37°26'N, 45°57'E), 4.VI.1975. – 1 ♂, 5 ♀ [7512], E of Miyaneh (37°28'N, 47°52'E), swamps, rice fields, 8.VI.1975. – 1 ♀ [7302], Khoy (38°41'N, 45°08'E), 24.VI.1973. – 2 ♂ [7335], Tehran, Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♂, 1 ♀ [7363], Aqa (36°19'N, 49°49'E), 2.IX.1973. – 1 ♀ [7536], Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. – 1 ♂, 1 ♀ [7346], Lorestan, Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 5 ♀ [7348], Esfahan, Eskandari (32°50'N, 50°21'E), 8.VIII.1973. – 2 ♂, 1 ♀ [7353], Riz-e-Landjan (32°24'N, 51°19'E), 1600 m a.s.l., rice fields, 11.VIII.1973. – 7 ♂, 7 ♀ [7358], W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 1 ♂ [7452], Hamadan, NE of Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 1 ♀ [7558], Khorasan, S of Bodjnour (37°20'N, 57°20'E), 1700 m a.s.l., 19.VII.1975.

RECORDS FROM IRAN: Lorestan: Aligudarz. – Esfahan: Pol-e-Kaleh. – western part of Azarbayjan: Saqqez (Tanasevitch, 2008).

RANGE: Eastern Palearctic.

Microlinyphia pusilla (Sundevall, 1830)

MATERIAL: IRAN: 1 ♀ [7301], Western Azarbayjan, Maku (39°08'N, 44°30'), 23.VI.1973. – 4 ♂, 3 ♀ [7302], Eastern Azerbaijan, Khoy (38°41'N, 45°08'E), 24.VI.1973. – 1 ♀ [7555], Mazandaran, near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975. – 1 ♀ [7556], Garmab (37°43'N, 56°18'E), 18.VII.1975. – 1 ♂, 1 ♀ [7335], Tehran, Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 2 ♀ [7336], near Firuz Kun (35°43'N, 52°40'E), 24.VII.1973. – 1 ♀ [7363], Aqa (36°19'N, 49°49'E), 2.IX.1973. – 1 ♀ [7346], Lorestan, Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 1 ♀ [7528], Kordestan, S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 1 ♂ [7557], Khorasan, E of Badranlu (37°31'N, 57°08'E), 18.VII.1975. – 1 ♀ [7358], Esfahan, W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973.

RECORDS FROM IRAN: Fars: Sivand. – Khorasan: Quchan, Emam Qoli, Kapkan, Amirabad and Bojnurd (Tanasevitch, 2008).

RANGE: Holarctic.

Neriene clathrata (Sundevall, 1830)

MATERIAL: IRAN: 1 ♂ [7307], Gilan, Hashtpar (37°50'N, 48°58'E), 29.VI.1973. – 1 ♂, 5 ♀ [7310], Parehsar (37°37'N, 49°03'E), sifting debris from tree holes, 2.VII.1973. – 1 ♂, 1 ♀ [7311], Galugah (37°31'N, 49°19'E), 4.VII.1973. – 6 ♀ [7312], Lahijan (37°11'N, 49°54'E), 5.VII.1973. – 2 ♀ [7315], Chaboksar (36°59'N, 50°34'E), 7.VII.1973. – 1 ♂, 5 ♀ [7330], Mazandaran, Hamzeh Kala (36°30'N, 52°31'E), sifting litter, 19.VII.1973. – 3 ♀ [7549], Kiyasar (36°15'N, 53°29'E), 1100 m a.s.l., 12.VII.1975. – 1 ♂ [7367], Fowmen (37°12'N, 49°12'E), 7.IX.1973. – 1 ♂ [7519], Asalem (37°45'N, 48°57'E), sifting debris from tree holes, 11.VI.1975. – 3 ♂, 2 ♀ [7545], Mazandaran, Farahabad (36°49'N, 53°12'E), 9.VII.1975.

RECORDS FROM IRAN: Khorasan: Zavi. – Mazandaran: Now Shahr (Tanasevitch, 2008).

RANGE: Holarctic.

Neriene emphana (Walckenaer, 1841)

MATERIAL: IRAN: 1 ♂, 8 ♀ [7484], Gilan, road from Djavaherdeh (36°55'N, 50°33'E), 1100-1300 m a.s.l., 7.VIII.1974. – 2 ♀ [7316], Mazandaran, Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 2 ♂ [7317], road from Chorteh (36°49'N, 50°38'E), 1000-1300 m a.s.l., sifting oak litter, 8.VII.1973. – 15 ♀ [7548], E of Keyasar (36°14'N, 53°33'E), 1500 m a.s.l., big oak trees, 11.VII.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Palaearctic.

Neriene radiata (Walckenaer, 1842)

MATERIAL: IRAN: 1 ♂, 6 ♀ [7368], Gilan, Masuleh (37°09'N, 48°59'E), 2000 m a.s.l., sifting in very dry forest, 9.IX.1973. – 4 ♂, 10 ♀ [7317], Mazandaran, road from Chorteh (36°49'N, 50°38'E), 1000-1300 m a.s.l., sifting oak litter, 8.VII.1973. – 1 ♂ [7334], Keyasar (36°22'N, 53°16'E), sifting in very dry forest, 22.VII.1973. – 1 ♀ [7540], Valiabad (36°16'N, 51°16'E), 1900 m a.s.l., 5.VII.1975. – 2 ♀ [7547], Ivel (36°14'N, 53°37'E), 1500 m a.s.l., under stones, 11.VII.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Holarctic.

Oedothis apicatus (Blackwall, 1850)

MATERIAL: IRAN: 2 ♂, 1 ♀ [7302], Eastern Azerbaijan, Khoy (38°41'N, 45°08'E), 24.VI.1973. – 8 ♀ [7506], near Mahabad (36°50'N, 45°47'E), 3.VI.1975. – 2 ♂, 7 ♀ [7512], E

of Miyaneh (37°28'N, 47°52'E), swamps, rice fields, 8.VI.1975. – 1 ♂ [7507], Maragheh (37°24'N, 46°16'E), 4.VI.1975. – 2 ♂, 4 ♀ [7503], Western Azarbaijan, N of Khoi (38°37'N, 45°02'E), 1.VI.1975. – 5 ♂, 5 ♀ [7533], Mahabad (36°47'N, 45°45'E), 24.VI.1975. – ca 50 ♂ & ♀ (ZMMU) [7534], Gilan, SE of Nikpey (36°47'N, 48°14'E), 30.VI.1975. – 6 ♀ [7520], Galugah (37°31'N, 49°19'E), 12.VI.1975. – 7 ♀ [7307], Hashtpar (37°50'N, 48°58'E), 29.VI.1973. – 2 ♂, 5 ♀ [7311 ZNNU], Galugah (37°31'N, 49°19'E), 4.VII.1973. – 3 ♂ [7372], Mazandaran, near Tang-e-Ram (37°25'N, 55°45'E), 28.VII.1974. – ca 30 ♂ & ♀ [7543], E of Baladeh (36°12'N, 51°57'E), 2000 m a.s.l., 8.VII.1975. – ca 30 ♂ & ♀ [7545], Farahabad (36°49'N, 53°12'E), 9.VII.1975. – 1 ♂ [7362], Tehran, Fasham (35°55'N, 51°32'E), 2000 m a.s.l., 27.VIII.1973. – 1 ♀ [7536], Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. – 11 ♂, 23 ♀ [7582], Lorestan, Veseyan (33°29'N, 48°04'E), 8.IX.1975. – 1 ♂, 4 ♀ [7583], Hatemvand (33°28'N, 48°07'E), 9.IX.1975. – ca 100 ♂ & ♀ [7584], E of Khorramabad (33°29'N, 48°28'E), 10.IX.1975. – 2 ♂, 6 ♀ [7345], Ma'amulan (33°20'N, 47°54'E), 6.VIII.1973. – 7 ♀ [7346], Lorestan, Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 10 ♂, 5 ♀ [7439], Azna (33°28'N, 49°22'E), 23.VI.1974. – 3 ♂, 4 ♀ [7440], Hatemvand (33°28'N, 48°07'E), 23.VI.1974. – 5 ♂, 6 ♀ [7443], Malavi-Shihabad (33°35'N, 47°14'E), 25.VI.1974. – 5 ♂, 1 ♀ [7444], Dizgaran (33°43'N, 47°00'E), 25.VI.1974. – ca 50 ♂ & ♀ [7340], Kermanshah, Kangavar (34°29'N, 47°55'E), 1.VIII.1973. – ca 50 ♂ & ♀ [7341], Sahneh (34°28'N, 47°36'E), 2.VIII.1973. – ca 60 ♂ & ♀ [7342a], Near Kenesht /Kermanshah (34°29'N, 47°09'E), 3.VIII.1973. – 1 ♂, 1 ♀ [7343], Mahi Dasht (34°14'N, 46°42'E), 4.VIII.1973. – 22 ♀ [7344], Garavand/Shahabad (33°55'N, 46°47'E), 5.VIII.1973. – 1 ♂, 1 ♀ [7449], Mahi Dasht (34°14'N, 46°42'E), 29.VI.1974. – 3 ♂, 5 ♀ [7451], Kangavar (34°29'N, 47°55'E), 1.VII.1974. – ca 60 ♂ & ♀ [7525], Behistun (= Bisitum or Bisutun) (34°23'N, 47°26'E), 17.VI.1975. – ca 40 ♂ & ♀ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 2 ♂, 4 ♀ [7527], NE of Kunduleh (34°44'N, 47°17'E), 20.VI.1975. – 9 ♂, 13 ♀ [7588], N of Kamyaran (34°48'N, 46°57'E), 13.IX.1975. – 4 ♂, 3 ♀ [7339], Hamadan, Hamadan (34°46'N, 48°27'E), 29.VII.1973. – 5 ♂, 9 ♀ [7452], NE Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 2 ♂, 4 ♀ [7524], NNW of Serkan (34°42'N, 48°23'E), 2200 m a.s.l., 16.VI.1975. – 1 ♂, 4 ♀ [7438], Esfahan, Nowghan (33°11'N, 50°04'E), 22.VI.1974. – 3 ♂, 11 ♀ (ZMMU) [7529], Kordestan, N of Sanandaj (35°28'N, 47°01'E), 22.VI.1975. – 5 ♂, 4 ♀ [7532], Santej (36°11'N, 46°32'E), 23.VI.1975. – ca 30 ♂ & ♀ [7589], E of Nyabad (road Sanandaj - Marivan) (35°20'N, 46°39'E), 14.IX.1975. – 7 ♂, 15 ♀ [7528], S of Sanandaj (35°13'N, 47°00'E), 21.VI.1975. – 14 ♂, 16 ♀ [7590], SE of Kal'eh Dja (road Sanandaj - Marivan) (35°19'N, 46°20'E), 14.IX.1975. – 10 ♂, 7 ♀ [7592], Marivan (35°32'N, 46°09'E), 15.IX.1975. – ca 100 ♂ & ♀ [7593], E of Marivan (35°32'N, 46°20'E), 16.IX.1975. – ca 40 ♂ & ♀ [7595], road from Marivan (35°27'N, 46°38'E), 16.IX.1975. – ca 100 ♂ & ♀ [7597], N of Saqqez (36°23'N, 46°12'E), 18.IX.1975. – ca 40 ♂ & ♀ [7594], Sheykh Attar (35°30'N, 46°28'E), 16.IX.1975. – 3 ♂, 5 ♀ (ZMMU) [7596], Hoseynabad (35°33'N, 47°08'E), 17.IX.1975. – ca 100 ♂ & ♀ [7559], Khorasan, NW of Estarayan (37°12'N, 57°27'E), 1200 m a.s.l., 20.VII.1975. – 1 ♂, 7 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 5 ♂, 42 ♀ [7447], Ilam (33°37'N, 46°23'E), sifting litter, 27.VI.1974.

RECORDS FROM IRAN: Khorasan (Mozaffarian *et al.*, 2004). – Tehran: Delichal. – Kermanshah. Garavand/Shahabad. – Mazandaran: Baladeh, Mahmoudabad. – Khorasan: Emam Qoli, Kapkan, Mashhad, Amirabad, Shandiz Valley and Bojnurd (Tanasevitch, 2008).

RANGE: European-Ancient Mediterranean.

Oedothorax meridionalis Tanasevitch, 1987

Fig. 5

MATERIAL: IRAN: 1 ♀ [7335], Tehran, Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♀ [7438], Esfahan, Nowghan (33°11'N, 50°04'E), 22.VI.1974. – 1 ♀ [7431], Bakhtiyari, E of Farsan (32°17'N, 50°38'E), 17.VI.1974. – 1 ♂, 1 ♀ [7576], Fars, Dasht-e-Arjan (29°40'N, 51°59'E), 2.IX.1975.

RECORDS FROM IRAN: Fars: Dasht-e-Arjan, Serizjan, Sivand (Tanasevitch, 2008).
RANGE: Eastern Ancient Mediterranean.

Palliduphantes sbordonii (Brignoli, 1970) comb. n.

TAXONOMIC REMARKS: This very small micronetine (1.2-1.5 mm) was originally described as a *Lepthyphantes* Menge, 1866 from females from the Elburz Mts, Demavand Volcano, 1200 m.a.s.l. (Brignoli, 1970). Later, Thaler (1986) described a male from 4200 m.a.s.l. on the same mountain and provided a description accompanied by very good illustrations of both sexes. Based on the basic conformation of the palp and epigyne, this species belongs to *Palliduphantes* Saaristo & Tanasevitch, 2001, and is well distinguished from other congeners by the short embolus carrying numerous long dagger-shaped processes.

RECORDS FROM IRAN: Mazandaran: Demavand Volcano (Brignoli, 1970; Thaler, 1986; both as *Lepthyphantes*).

REMARKS: This species is absent from the material examined.

RANGE: Iranian.

Palliduphantes sp.

MATERIAL: IRAN: 1 ♀ [7507], Eastern Azarbayjan, Maragheh (37°24'N, 46°16'E), 4.VI.1975. – 1 ♀ [7508], Eastern Azarbayjan, N of Bonab (37°26'N, 45°57'E), 4.VI.1975.

RECORDS FROM IRAN: Fars: Aliabad (Tanasevitch, 2008).

REMARKS: In the absence of conspecific male material, these females cannot be identified to species.

Pelecopsis laptevi Tanasevitch & Fet, 1986

Fig. 5

RECORDS FROM IRAN: Khorasan: Emam Qoli (Tanasevitch, 2008).

RANGE: Eastern Ancient Mediterranean.

Piniphantes pinicola (Simon, 1884)

Fig. 5

MATERIAL: IRAN: 1 ♀ [7509], Eastern Azarbayjan, NW of Sowfyan (38°21'N, 45°50'E), 5.VI.1975. – 1 ♀ [7435], Bakhtiyari, NE of Zardeh-Kuh (32°23'N, 50°07'E), 2600-2800 m a.s.l., 20.VI.1974. – 2 ♀ [7527], Kermanshah, NE of Kunduleh (34°44'N, 47°17'E), 20.VI.1975. – Tehran, E of Tehran, Ab-Ali (35°46'N 51°57'E), leg. Y. Marusik. – 1 ♀ (ZMMU) Mazandaran, Javaher deh (36.867°N 50.467°E), 9.VI.2000, leg. Y. Marusik.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: European-Ancient Mediterranean.

Pocadicnemis pumila (Blackwall, 1841)

MATERIAL: IRAN: 1 ♀ [7336], Tehran, near Firuz Kun (35°43'N, 52°40'E), 24.VII.1973. – 1 ♀ [7453b], Hamadan, Ganznameh/Hamadan (34°44'N, 48°30'E), 2250 m a.s.l., 4.VII.1974.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Holarctic.

***Poecilometes variegata* (Blackwall, 1841)**

MATERIAL: IRAN: 1 ♀ [7339], Hamadan, Hamadan (34°46'N, 48°27'E), 29.VII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Palaearctic-West Nearctic.

***Porrhomma microphthalmum* (O.P.-Cambridge, 1871)**

MATERIAL: IRAN: 1 ♀ [7452], Hamadan, NE of Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 2 ♂ (ZMMU), 10 ♂, 6 ♀ [7526], Kermanshah, N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975.

REMARKS: The genitalia of *P. microphthalmum* are very similar to those *P. lativelum* Tretzel, 1956, but *P. microphthalmum* can be distinguished by a smaller body, as well as the size of certain genitalic structures (for details, see Helsdingen, 1986). This species is here reported for the first time for the Iranian fauna.

RANGE: European-Ancient Mediterranean.

***Porrhomma pallidum* Jackson, 1913**

MATERIAL: IRAN: 1 ♂ [7590], Kordestan, SE of Kal'eh Dja (road Sanandaj - Marivan) (35°19'N, 46°20'E), 14.IX.1975.

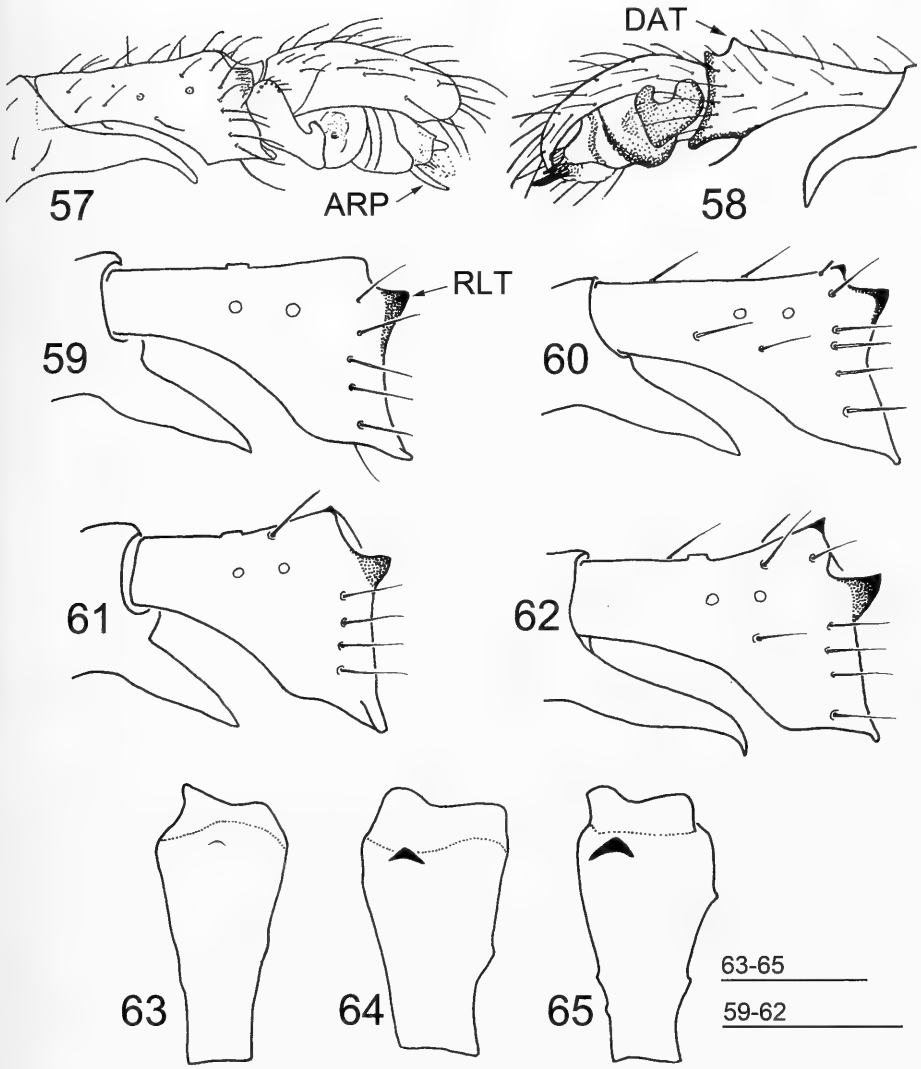
REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: Palaearctic.

***Prinerigone vagans* (Audouin, 1826)**

Figs 57-70

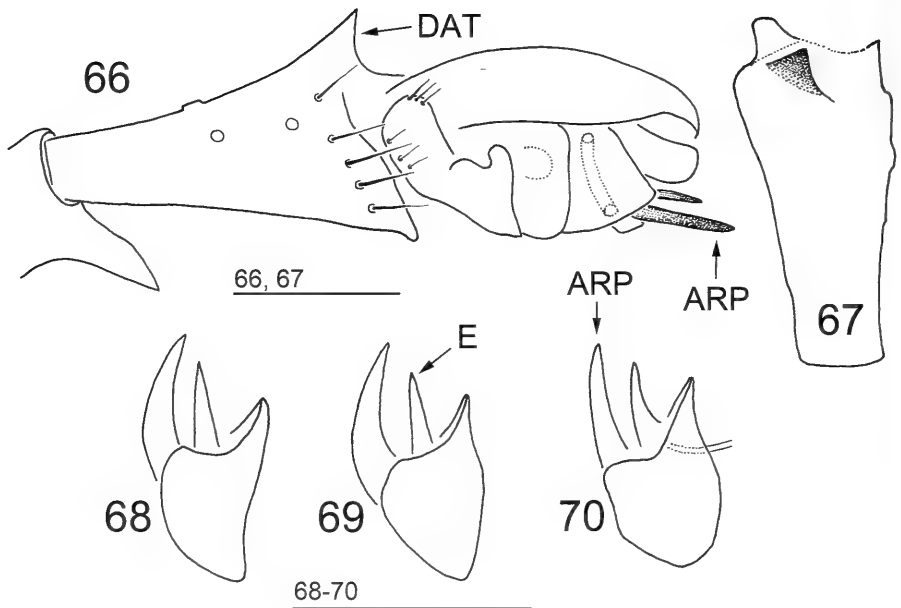
MATERIAL: IRAN: 1 ♂, 5 ♀ [7512], Eastern Azarbayjan, E of Miyaneh (37°28'N, 47°52'E), swamps, rice fields, 8.VI.1975. – 1 ♂ [7301], Western Azarbayjan, Maku (39°08'N, 44°30'), 23.VI.1973. – 1 ♂ [7517], Gilan, near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 1 ♂ [7519], Asalem (37°45'N, 48°57'E), sifting debris from tree holes, 11.VI.1975. – 1 ♂, 1 ♀ [7520], Galugah (37°31'N, 49°19'E), 12.VI.1975. – 1 ♂ [7367], Fowmen (37°12'N, 49°12'E), 7.IX.1973. – 1 ♀ [7316], Mazandaran, Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 1 ♂ [7332], Naharkoran/Gorgan (36°44'N, 54°29'E), sifting in forest, moss, 20.VII.1973. – 1 ♂, 2 ♀ [7550], near Kalaleh (37°19'N, 55°33'E), 14.VII.1975. – 3 ♂, 6 ♀ [7551], 'Arab (37°40'N, 55°47'E), 15.VII.1975. – 5 ♂, 4 ♀ [7556], Garmab (37°43'N, 56°18'E), 18.VII.1975. – 2 ♂ [7439], Lorestan, Azna (33°28'N, 49°22'E), 23.VI.1974. – 1 ♂ [7443], Malavi-Shihabad (33°35'N, 47°14'E), 25.VI.1974. – 3 ♂, 5 ♀ [7441], Ma'amulan (33°20'N, 47°54'E), 24.VI.1974. – 5 ♂ [7345], Ma'amulan (33°20'N, 47°54'E), 6.VIII.1973. – 1 ♂ [7346], Aligudarz (33°21'N, 49°48'E), 7.VIII.1973. – 1 ♂, 1 ♀ [7536], Tehran, Shahrak (36°25'N, 50°30'E), 1500 m a.s.l., 2.VII.1975. – 1 ♂ [7593], Kordestan, E of Marivan (35°32'N, 46°20'E), 16.IX.1975. – 2 ♂ [7595], Kordestan, road from Marivan (35°27'N, 46°38'E), 16.IX.1975. – 1 ♂, 1 ♀ [7344], Kermanshah, Garavand/Shahabad (33°55'N, 46°47'E), 5.VIII.1973. – 2 ♂ [7525], Behistun (= Bisutum or Bisutun) (34°23'N, 47°26'E), 17.VI.1975. – 1 ♂ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 3 ♂, 8 ♀ [7351], Bakhtiyari, Kuhrang (32°29'N, 50°04'E), 2700 m a.s.l., barrage, 9.VIII.1973. – 1 ♂ [7434], Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 1 ♀ [7438], Esfahan, Nowghan (33°11'N, 50°04'E), 22.VI.1974. – 3 ♂, 4 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 1 ♂, 2 ♀ [7447], Ilam (33°37'N, 46°23'E), sifting debris & humus, 27.VI.1974. – 3 ♂, 4 ♀ [7448], Tchaharmelleh (33°57'N, 46°17'E), 28.VI.1974. – 1 ♂ [7354], Fars, Izadkhash (31°31'N, 52°09'E), 16.VIII.1973. – 9 ♂, 1 ♀ [7333], Mazandaran, Sari (36°34'N, 53°09'E), 22.VII.1973.



FIGS 57-65

Varieties of ♂ palp of *Prinerigone vagans* (Audouin, 1826). (57) After Wiehle (1960), (58) after Locket & Millidge (1951), (59, 60, 63) specimens from Aligudarz, Iran (609 and 63 same specimen), (61, 64) specimen from Ilam, Iran, (62, 65) deviating specimen from Izadkhash, Iran. (57, 58) Retrolateral view of right and left palp, respectively. (59-62) Right palpal tibia, retrolateral view. (63-65) Palpal tibia, dorsal view.

TAXONOMIC REMARKS: Males of *Prinerigone vagans* show a high degree of variability (see also Denis, 1948). This concerns not only body size, the size and arrangement of teeth on the chelicerae and carapace, but also the shape of the male palpal tibia. Usually, in ordinary forms the dorso-apical tooth on the palpal tibia (DAT in Fig. 58) is either poorly expressed (Figs 58, 60, 61, 64) or absent (Figs 57, 59, 63).



FIGS 66-70

Males of *Prinerigone vagans* (Audouin, 1826) var. *monodentata*, from Farsan, Iran (66-68), and of *P. vagans* from Ilam, Iran (69) and from Izadkhast, Iran (70). (66) Right palp, retrolateral view. (67) Palpal tibia, dorsal view. (68-70) Embolic division.

In rare cases, it is strongly developed and sclerotized (Figs 62, 65). A retrolateral tooth (RLT in Fig. 59) is always present, but varies in size and shape, whereas the embolic division is always identical.

P. vagans arabica (Jocqué, 1981) has been described from a single male from Saudi Arabia, distinguished in possessing a very large dorso-apical and retrolateral tooth (Jocqué, 1981). A relatively large (yet a little smaller than in *P. v. arabica*) dorso-apical tooth is present in *P. pigra* (Blackwall, 1862), known from Madeira (Wunderlich, 1995). In the material from Iran, a form, which is here informally named *P. vagans* var. *monodentata* (Figs 66-70), has a dorso-apical tooth on the palpal tibia equal in size to that of *P. vagans arabica*, but the retrolateral tooth on the palpal tibia is totally reduced. The shape of the palpal tibia in *P. vagans* var. *monodentata* is uniform, with only weak differences in length. Such males occur separately and together with the ordinary form. I refrain from describing this form as a distinct species because the structure of the embolic division in *P. vagans* var. *monodentata* is identical to that in *P. vagans vagans*. The available material of possible females of *P. vagans* var. *monodentata* is too scanty and they are difficult to recognize among the females of the ordinary form. It cannot be excluded that *P. vagans* var. *monodentata* is a separate species, but it seems more probable that *P. vagans* var. *monodentata*, as well as *P. vagans arabica* and even *P. pigra* belong to a single polymorphic species, *P. vagans*. This question invites further research.

The following material from Iran belongs to *P. vagans* var. *monodentata*: 1 ♂, 1 ♀ [7442], Lorestan, Tang-e-Malavi (33°15'N, 47°48'E), 24.VI.1974. – 4 ♂ [7431], Bakhtiyari, E of Farsan (32°17'N, 50°38'E), 17.VI.1974. From material published in Tanasevitch (2008): 7 ♂ [7402], Lorestan: Pol-e-Dokhtar (together with 6 ♂ and 12 ♀ of the ordinary form). – 1 ♂ [7406], Khuzestan: Ahvaz (together with 5 ♂ and 5 ♀ of the ordinary form).

RECORDS FROM IRAN: Gilan and Mazandaran (Mozaffarian *et al.*, 1998). – Lorestan: Pol-e-Dokhtar. – Khuzestan: Andimeshk, Shush, Masjed Soleyman, Ahvaz, Kohgiluyeh: Dow Gonbadan, Charam, Basht. – Fars: Bishapoor, Dasht-e-Arjan, Kavar, Firuzabad, Serizjan, Allabad, Izadkhast. – Mazandaran: Baladeh, Shahpasand, Ramiyan, Mahmoudabad. – Khorasan: Chaman Bid, Quchan, Amirabad, Shandiz Valley (Tanasevitch, 2008).

RANGE: Southern Palaearctic, Afrotropical, Oriental, Pacific.

Sengletus latus sp. n.

Figs 6, 71-75

MATERIAL: IRAN: ♀ holotype [7490], Western Azarbayjan, Qareh Zia-ed-Din (38°52'N, 45°12'E), 13.VIII.1974.

ETYMOLOGY: The specific name is a Latin adjective meaning “wide”, referring to the shape of the epigyne.

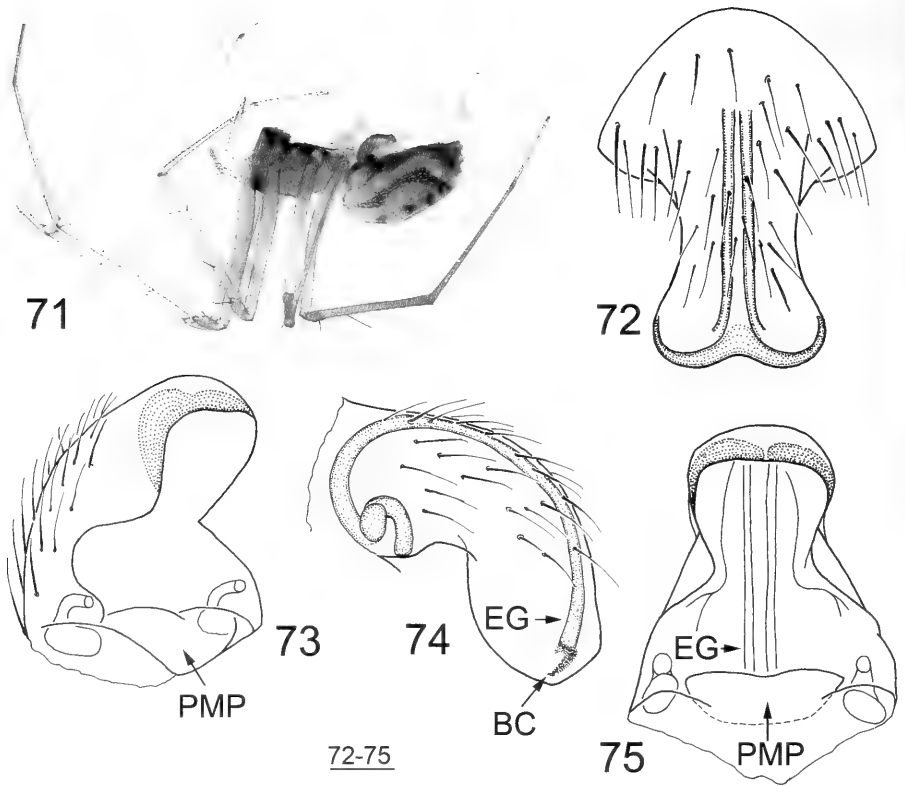
DIAGNOSIS: The species is characterised by the very large, thin-walled, scoop-shaped epigyne. The proscape, the middle part of the scape, the lateral lobes and the stretcher are totally reduced.

DESCRIPTION: Female (male unknown). Habitus, see Fig. 71. Total length: 2.75. Carapace: 1.01 long, 0.90 wide, sandy-pale, unmodified. Chelicerae: 0.5 long. Legs pale yellow. Leg I 7.70 long (2.00+0.45+2.15+1.85+1.25), IV 6.75 long (1.90+0.35+1.70+1.80+1.00). Chaetotaxy. FeI: 0-1-0-0, II-IV: 0-0-0-0; TiI: 2-1-1-0, II: 2-0-1-0, III-IV: 2-?(0)-?(0)-0; MtI: 1-0-0-0, II-IV: ? Metatarsi I-III each with a trichobothrium. TmI 0.16. Abdomen: 1.60 long, 1.05 wide, dorsally pale with two longitudinal rows of grey spots. Epigyne very large, thin-walled and scoop-shaped (Figs 72-75). Proscapae, middle part of scape, lateral lobes and stretcher totally reduced. Distal part of scape (in this case defined as the apical spineless part of the epigyne ending with a bursa copulatrix) thin and wide, well-sclerotized, equal in colour with integument, carrying spines. Entrance grooves running not into lateral wall, but into back wall.

TAXONOMIC REMARKS: In the absence of male material it is very difficult to unambiguously place this species into any genus. It most probably belongs to *Sengletus* Tanasevitch, 2008. In principle the epigynal conformation of *S. latus* sp. n. can easily be derived from the epigyne of the type species, *S. longiscapus* Tanasevitch, 2008, where the distal part of the scape, the lateral lobes and the stretcher are very poorly developed. The chaetotaxy in both species is slightly different: *S. longiscapus* has neither lateral spines on the tibiae nor spines on the metatarsi. Yet this does not prevent me from assigning both species to the same genus.

DISTRIBUTION: Known from the type locality only.

RANGE: Iranian.



Figs 71-75

Sengletus latus sp. n., ♀ holotype. (71) Habitus. (72-75) Epigyne, different aspects.

***Sengletus longiscapus* Tanasevitch, 2008**

Fig. 6

MATERIAL: IRAN: 1 ♀ [7431], Bakhtiyari, E of Farsan (32°17'N, 50°38'E), 17.VI.1974. – 1 ♀ [7439], Lorestan, Azna (33°28'N, 49°22'E), 23.VI.1974. – 4 ♀ [7441], Ma'amulan (33°20'N, 47°54'E), 24.VI.1974. – 2 ♀ [7443], Malavi-Shihabad (33°35'N, 47°14'E), 25.VI.1974. – 1 ♂ [7444], Dizgaran (33°43'N, 47°00'E), 25.VI.1974. – 1 ♂, 7 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 1 ♂, 4 ♀ [7448], Tchaharmelleh (33°57'N, 46°17'E), 28.VI.1974. – 1 ♂, 1 ♀ [7449], Kermanshah, Mahi Dasht (34°14'N, 46°42'E), 29.VI.1974. – 2 ♂, 1 ♀ [7452], Hamadan, NE of Asadabad (34°51'N, 48°12'E), 2.VII.1974. – 1 ♀ [7592], Kordestan, Marivan (35°32'N, 46°09'E), 15.IX.1975.

RECORDS FROM IRAN: Lorestan: Pol-e-Dokhtar. – Khuzestan: Shush (Suze) and Ahvaz (Tanasevitch, 2008).

RANGE: Iranian.

***Silometopus reussi* (Thorell, 1871)**

Silometopus cf. *reussi* (Thorell, 1871). – Tanasevitch, 2008: 485.

MATERIAL: IRAN: 1 ♀ [7301], Western Azarbayjan, Maku (39°08'N, 44°30'), 23.VI.1973. – 1 ♀ [7512], Eastern Azarbayjan, E of Miyaneh (37°28'N, 47°52'E), swamps, rice

fields, 8.VI.1975. – 2 ♀ [7507], Maragheh (37°24'N, 46°16'E), 4.VI.1975. – 3 ♂, 3 ♀ (ZMMU), 18 ♂, 46 ♀ [7335], Tehran, Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♀ [7363], Aqa (36°19'N, 49°49'E), 2.IX.1973. – 1 ♀ [7455], Aqa (36°19'N, 49°49'E), 6.VII.1974. – 3 ♀ [7352], Bakhtiyari, Farsan (32°17'N, 50°31'E), 11.VIII.1973. – 3 ♀ [7431], E of Farsan (32°17'N, 50°38'E), 17.VI.1974. – 7 ♀ [7434], Kuhrang (32°28'N, 50°08'E), 19.VI.1974. – 2 ♀ [7358], Esfahan, W of Esfahan (32°34'N, 51°31'E), 23.VIII.1973. – 3 ♂, 5 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 1 ♀ [7451], Kermanshah, Kangavar (34°29'N, 47°55'E), 1.VII.1974. – 1 ♀ [7527], NE of Kunduleh (34°44'N, 47°17'E), 20.VI.1975. – 3 ♀ [7524], Hamadan, NNW of Serkan (34°42'N, 48°23'E), 2200 m a.s.l., 16.VI.1975. – 1 ♂ [7558], Khorasan, S of Bodjnour (37°20'N, 57°20'E), 1700 m a.s.l., 19.VII.1975. – 1 ♀ [7594], Kordestan, Sheykh Attar (35°30'N, 46°28'E), 16.IX.1975.

REMARKS: Both males referred to as “*S. cf. reussi*” in Tanasevitch (2008) have the palpal conformation identical to that in samples from the other parts of the distribution area of this species, but they lack a tooth near the base of a whip-shaped outgrowth on the palpal tibia. In the above mentioned material, there are numerous males which show variability in the shape of the palpal tibia: the tooth at the base of the outgrowth can vary in size or be completely absent. A male without such tooth is in my personal collection: 1 ♂ (CAT), UKRAINE, Kherson Area, Golaya Pristan' District, Rybal'chye Village (46°28'N 32°23'E), sandy steppe, 5.VII.1987, leg. L. Zelinskaya.

RECORDS FROM IRAN: Esfahan: Esfahan. – Mazandaran: Baladeh (Tanasevitch, 2008).

RANGE: Palaearctic.

Styloctetor romanus (O. P.-Cambridge, 1872)

RECORDS FROM IRAN: Khuzestan: Shush and Ahvaz (Tanasevitch, 2008).

RANGE: Palaearctic.

Tenuiphantes perseus (Helsdingen, 1977)

Figs 6, 76-79, 83-85, 90-94

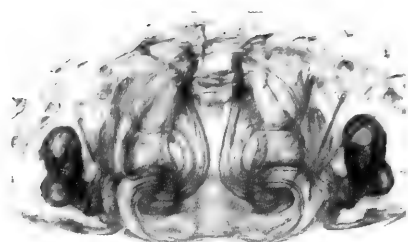
Lepthyphantes perseus Helsdingen, 1977 in Helsdingen, Thaler & Deltshv, 1977: 11, figs 6-8, 69.

T. mengei. - Saaristo & Tanasevitch, 1996a: 181, fig. 14: C, misidentification, specimens examined.

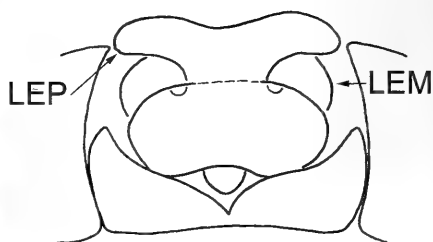
T. mengei. - Tanasevitch, 2008: 486, misidentification, specimens examined.

REMARKS: *T. perseus* was described from males from Gilan: Asalem (Helsdingen, 1977). Unfortunately the Iranian material treated previously (see Tanasevitch, 2008) contained only females of *T. perseus* which were misidentified as *T. mengei* (Kulczy ski, 1887). Since the new material comprises both sexes, this mistake can now be corrected.

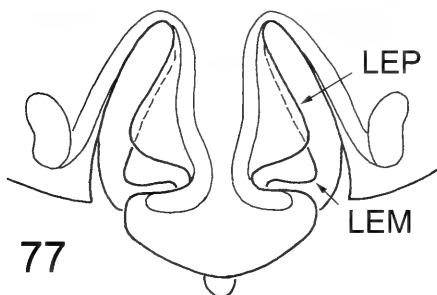
MATERIAL: IRAN: 1 ♂, 2 ♀ [7312], Gilan, Lahijan (37°11'N, 49°54'E), 5.VII.1973. – 1 ♀ [7484], road from Djavaherdeh (36°55'N, 50°33'E), 1100-1300 m a.s.l., 7.VIII.1974. – ca 50 ♂ & ♀ [7517], near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 3 ♂, 3 ♀ [7368], Masuleh (37°09'N, 48°59'E), 2000 m a.s.l., sifting in very dry forest, 9.IX.1973. – 1 ♀ [7369], road to Masuleh (37°11'N, 49°07'E), 1000 m a.s.l., 10.IX.1973. – 2 ♂, 7 ♀ (ZMMU) [7516], near Asalem (37°38'N, 48°48'E), 1800 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 1 ♂, 2 ♀ [7316], Mazandaran, Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 2 ♀ (ZMMU) [7332], Naharkoran/Gorgan (36°44'N, 54°29'E), sifting in forest, moss, 20.VII.1973. – 3 ♂, 7 ♀ (ZMMU), N of Javaher deh (36.872°N, 50.467°E), 9.VI.2000, leg. Y. Marusik. – 6 ♂, 1 ♀ [7440], Lorestan, Hatemvand (33°28'N, 48°07'E), 23.VI.1974. – 2 ♂ [7535], Tehran, pass above Ghazvin (36°23'N, 50°12'E), 2200-2300 m a.s.l., 1.VII.1975.



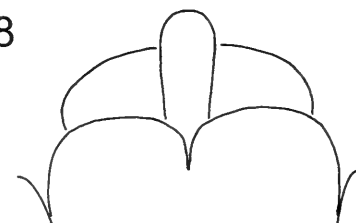
76



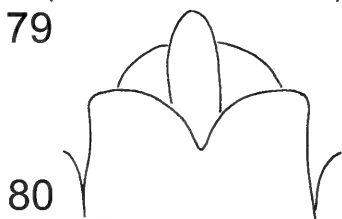
78



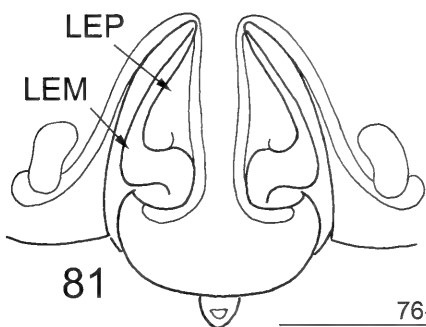
77



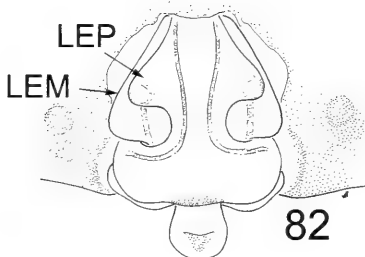
79



80



81



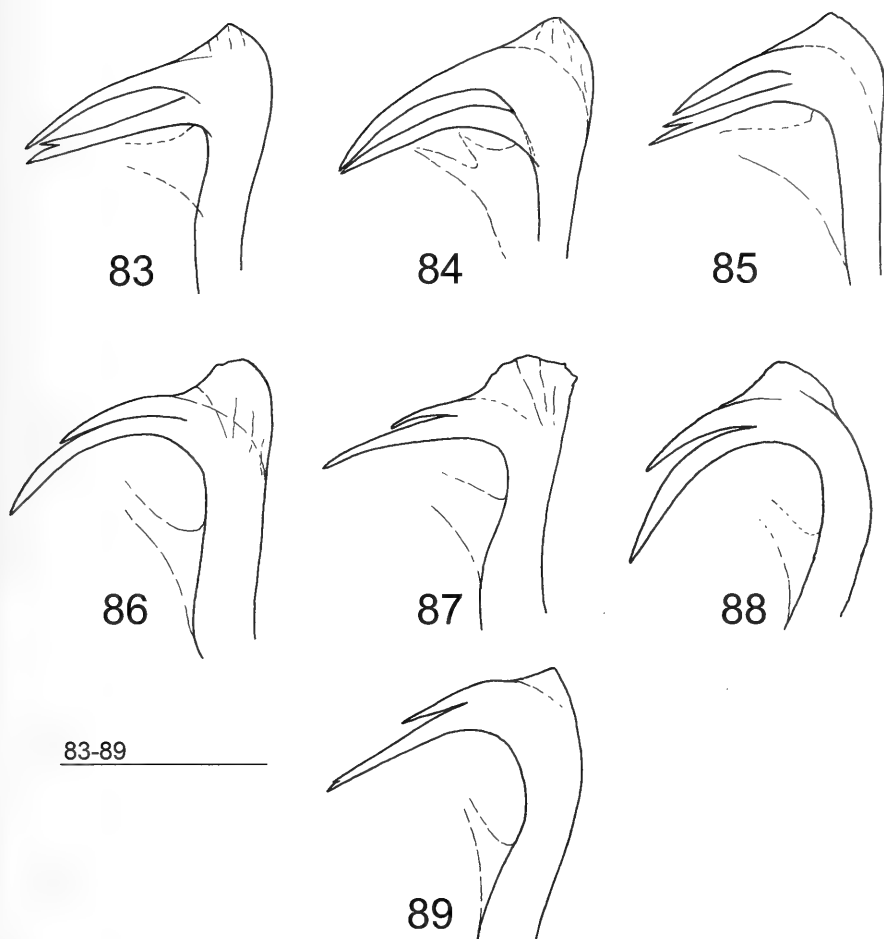
82

76-81

Figs 76-82

Tenuiphantes perseus (Helsdingen, 1977), specimens from Asalem (76-79), and *T. mengei* (Kulczy ski, 1887) (80-82), specimen from Paratunka, Kamchatka, Russia (80, 81), after Helsdingen (1977) (82). (76, 77, 81, 82) Epigyne, ventral view. (78) Same, posteroventral view. (79, 80) Same, dorsal view.

ADDITIONAL MATERIAL STUDIED: In the mid-1990's most of the Caucasian material I determined as *T. mengei* was moved to the Zoological Museum of the Turku University, Finland for a more detailed study, but unfortunately it has since vanished. So no old material from the Caucasus can be checked. *T. mengei*: 1 ♂, 1 ♀ (ZMMU), RUSSIA, Arkhangelsk Area, near Nizhnyaya Pesha (66°45'N, 47°46'E), summer 1983, leg. A. Tanasevitch. - 3 ♂ (ZMMU), Kostroma Area, Manturovo Distr., near Ugory, 28.VIII.1983, leg. E. Veselova. - 5 ♂, 5 ♀ (ZMMU), Republic of Mari El, near Yoshkar-Ola (56°34'N, 47°49'E), spruce forest, in grass, sweeping, May 2006, leg. I. Kamayev. - 8 ♂, 21 ♀, Krasnoyarskiy Area, middle flow of Yenisei River, Mirnoye, upland meadow, 18.VIII.1979, leg. K. Eskov. - 1 ♀ (ZMMU), Republic of



FIGS 83-89

Varieties of lamella characteristic of *Tenuiphantes perseus* (Helsdingen, 1977) (83-85) and *T. mengei* (Kulczyński, 1887) (86-89). (83-85) Specimens from Asalem, Iran. (86) Specimen from Kostroma, Russia. (87, 88) Specimens from Paratunka, Kamchatka, Russia. (89) Specimen from N. Pesha, Arkhangelsk Area, Russia.

Altay, Altay Mts, near Gorno-Altaysk, in garden, 17.VII.2001, leg. N. Levina. – 1 ♀ (CAT), Amur Area, Selezdzhinskiy District, Norskiy Nature Reserve, Nora River basin near Maltsevskiy cordon, E side of Maltsevskoye Lake, 210 m a.s.l., 1.X.2008, leg. E. Veselova & A. Ryvkin (new locality). – 5 ♂, 7 ♀ (CAT), Kamchatka, environs of Petropavlovsk-Kamchatskiy, near Paratunka (52°57'N, 158°15'E), 12.VIII.1987, A. Tanasevitch. – 2 ♀ (ZMMU), Republic of Buryatiya, Lake Baikal, near Selenginsk, in grass, 25.VIII.1983, leg. S. Danilov. – 2 ♂, 2 ♀ (ZMMU), eastern part of KAZAKHSTAN, Dzhungarskiy Alatau Mt. Ridge, near Lepsinsk, flood-plain of Lepsa River (45°32'N, 80°25'E), 750 m a.s.l., 19.VII.1984, leg. C. Tarabaev, S. Deryugin (new locality). – 2 ♀ (CAT), Dzhungarskiy Alatau Mt. Ridge, near Lepsinsk, Chernaya River Canyon (45°31'N, 80°43'E), 1200-1400 m. a.s.l., 13.-15.VI.2001, leg. S. Golovatch (new locality). – 1 ♀ (CAT), Tarbagatay Mts, Urdzhar Distr., 4 km N of Alexeevka,

Urdzhar River Valley, (47°17'N, 81°34'E), 1000 m a.s.l., *Populus, Malus, Salix* forest, 24., 25.VI.2001, leg. S. Golovatch (new locality). – UKRAINE, Crimea: 1 ♂, 6 ♀ (CAT), environs of Sokolinoye, glade in deciduous forest, in grass, 19.-23.V.1989, leg. A. Tanasevitch (new locality). – 1 ♂, 3 ♀ (CAT), same date and locality, deciduous forest, litter, leg. A. Tanasevitch. – 12 ♂, 18 ♀ (CAT), environs of Bakhchisarai, deciduous forest, litter, 18.V.1989, leg. A. Tanasevitch (new locality).

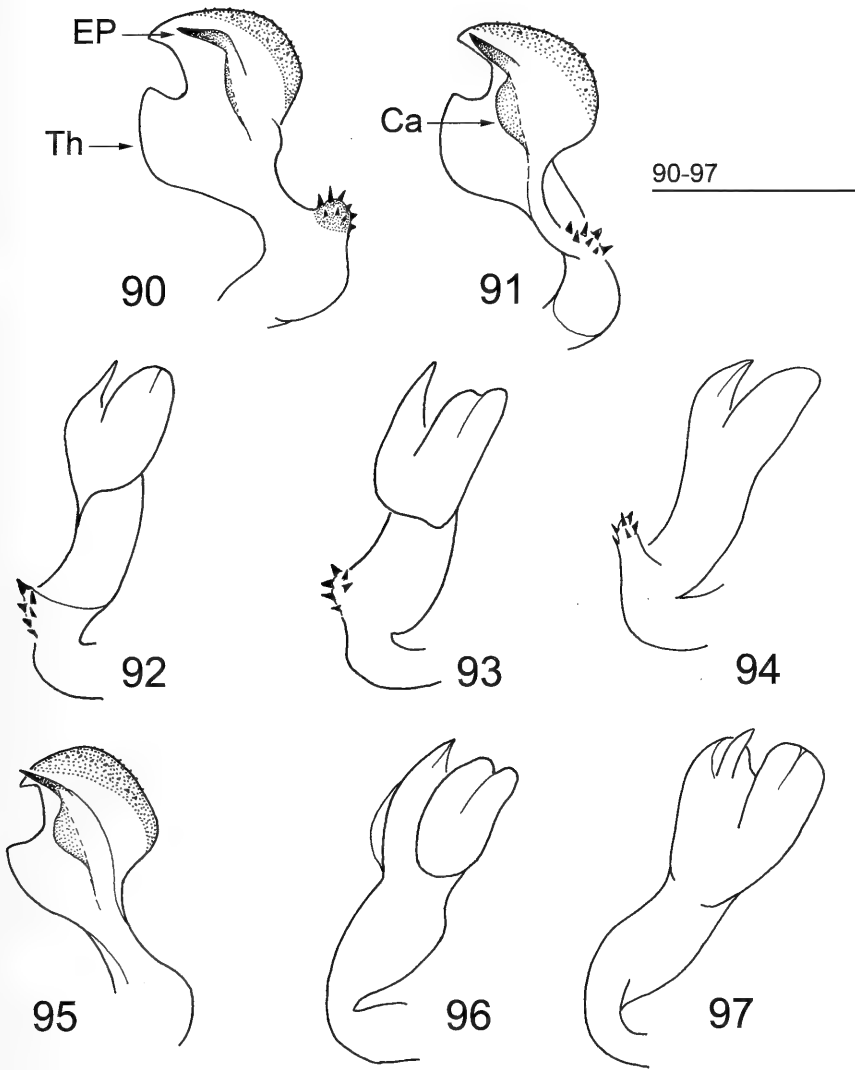
T. perseus: 21 ♂, 32 ♀ (CAT), RUSSIA, North Caucasus, Republic of North Osetiya, Tsey Mt. Ridge, near Tsey, 2000 m a.s.l., *Pinus* forest, 24.X.1985, leg. S. Alekseev. – 1 ♀ (ZMMU), ABKHAZIA, West Caucasus, Sukhum, botanical garden, litter and tree shaking, 9.XII.2003, leg. Y. Marusik & G. Antipova. – 2 ♂, 4 ♀ (ZMMU), Sukhum, University Campus, litter, *Eucalyptus*, tree shaking, 7.XII.2003, leg. Y. Marusik & G. Antipova. – 1 ♀ (ZMMU), environs of Pitsunda, Ldzaa Vil. (43°10'N 40°21'E), Myusser highland, *Pinus pityusa* litter on steep slope, 15.X.2004, leg. Y. Marusik. – 3 ♀ (ZMMU), road to Ritsa Lake (43°28'N 40°30'E), shaking moss epiphytes and in moss, 14.X.2004, leg. Y. Marusik. – 1 ♂, 1 ♀ (ZMMU), AZERBAIDJAN (territory of the former USSR Republic), East Caucasus, near Chilegir (41°32'N, 48°46'E), 700 m a.s.l., 25.VII.1983, leg. P. Dunin. – 4 ♀ (CAT), Yardymly, near Avash, 1200 m a.s.l., 12.VII.1985, leg. P. Dunin. – 1 ♂, 3 ♀ (CAT), Zakataly Nature Reserve, 2100 m a.s.l., 15.VIII.1989, leg. Dashdamirov.

DESCRIPTION OF FEMALE (here given for the first time): Total length: 2.25 (from 1.75 to 2.50). Carapace: 0.95 long, 0.70 wide, pale brown to brown. Chelicerae: 0.50 long. Legs pale brown. Leg I 4.50 long (1.15+0.30+1.20+1.15+0.70), IV 4.25 long (1.10+0.30+1.05+1.15+0.65). Chaetotaxy. FeI: 0-1-0-0, II-IV: 0-0-0-0; TiI: 2-1-1-0, II: 2-0-1-0, III-IV: 2-0-0-0; MtI-III: 1-0-0-0, IV: 0-0-0-0. Metatarsi I-III each with a trichobothrium. TmI 0.21-0.23. Abdomen: 1.45 long, 0.85 wide, dorsally grey, with a pale fir-tree-shaped pattern and an irregular arrangement of white spots, ventrally grey. Epigyne (Figs 76-79): middle part of scape and proscape (= distal part of scape, see Saaristo & Tanasevitch, 1996a) each with a lateral extension. Lateral extension of proscape covering upper part of lateral extension of middle part of scape. Posterior median plate well-developed, medially with a notch.

TAXONOMIC REMARKS: *T. perseus* is very similar to *T. mengei*, but can be distinguished by the dentition of the embolus, the shape of the lamella characteristica, as well as the structure of the scape. The embolus in *T. perseus* has a group of small teeth (Figs 90-94) which is totally absent in *T. mengei* (Figs 95-97); two branches of the lamella characteristica in *T. perseus* are almost of the same length (Figs 83-85), whereas in *T. mengei* the upper branch is about half the length of the lower one (Figs 86-89). The lateral extension of the middle part of the scape in *T. mengei* is wider than that of the proscape and it is visible from the sides (Figs 81, 82). In *T. perseus* the lateral extension of the middle part of the scape is narrowed than that of the proscape, so only its distal part is visible (Figs 76-78).

VARIABILITY: The group of denticles on the embolus of *T. perseus* is variable in number and arrangement (Figs 90-94). The lateral extension of the middle part of the scape in *T. perseus* is rarely almost equal in width to the that of the proscape, but it is never as much extended as in *T. mengei*.

NOTE: Unfortunately not all is so simple. During checking the comparative material from ZMMU, a very strange *Tenuiphantes* sp. from the West Caucasus has been found. That species has an epigyne like in *T. perseus*, but a male palp like in *T. mengei* (see Figs 98-104). This fact demands further study and re-evaluation: there can



FIGS 90-97

Varieties of embolus of *Tenuiphantes perseus* (Heldsingen, 1977) (90-94) and *T. mengei* (Kulczy ski, 1887) (95-97). (90-94) Specimens from Asalem, Iran. (95, 96) Specimen from Kostroma, Russia. (97) Specimen from N. Pesha, Arkhangelsk Area, Russia.

be a separate species with such unique characters, or there is a hybrid population which formed in a zone of contact between two (sub)species. The following material of this form was examined: numerous ♂ and ♀ (ZMMU), RUSSIA, West Caucasus, Republic of Karachaevo-Cherkessiya, environs of Teberda, different biotopes and collectors, 1982, 2008.

REMARKS: It is difficult to say where exactly the border between the *T. perseus* and *T. mengei* distribution areas lies. Most probably *T. perseus* occurs in the eastern part of the Caucasus, Transcaucasia and in Iran; the West Caucasus is occupied by *T. mengei* and *Tenuiphantes* sp. The neighbouring territories of the Caucasus, (i.e. Ciscaucasia and Crimea) house *T. mengei*.

RECORDS FROM IRAN: Gilan: Asalem (= Assalem) (Helsdingen et al., 1977). – Mazandaran: Tang-e-Rah & Allabad. – Gilan: Jirandeh. – Eastern Azarbaijan: Hero-Abad (Tanasevitch, 2008, as *T. mengei*).

RANGE: Caucasian-Iranian.

Tenuiphantes tenuis (Blackwall, 1852)

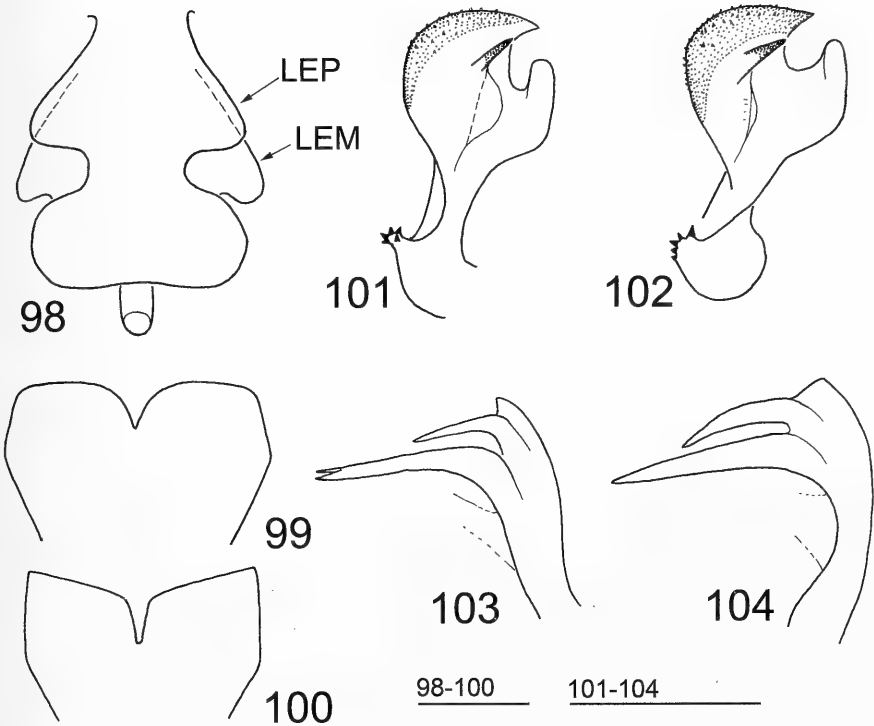
MATERIAL: IRAN: 1 ♂, 8 ♀ [7509], Eastern Azarbaijan, NW of Sowfyan (38°21'N, 45°50'E), 5.VI.1975. – 4 ♀ [7599], Qarazia-ed-Din (38°56'N, 45°03'E), 1.IX.1975. – 2 ♂, 1 ♀ [7598], NW of Sowfyan (38°21'N, 45°51'E), 21.IX.1975. – 2 ♂, 3 ♀ [7511], W of Miyaneh (37°29'N, 47°36'E), 7.VI.1975. – 1 ♀ [7503], N of Khoy (38°37'N, 45°02'E), 1.VI. 1975. – 1 ♀ [7484], Gilan, road from Djavaherdeh (36°55'N, 50°33'E), 1100-1300 m a.s.l., 7.VIII.1974. – 1 ♀ [7517], near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975. – 1 ♂ [7316], Mazandaran, Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 2 ♂, 3 ♀ [7331], Galugah (36°42'N, 53°38'E), 19.VII.1973. – 1 ♂, 1 ♀ [7329a], near Amol (36°18'N, 52°21'E), meadow, 18.VII.1973. – 1 ♀ [7333], Sari (36°34'N, 53°09'E), 22.VII.1973. – 8 ♂, 10 ♀ [7540], Valiabad (36°16'N, 51°16'E), 1900 m a.s.l., 5.VII.1975. – 2 ♀ [7543], E of Baladeh (36°12'N, 51°57'E), 2000 m a.s.l., 8.VII.1975. – 1 ♀ [7544], W of Razan (36°12'N, 52°08'E), 1500 m a.s.l., 8.VII.1975. – 2 ♀ [7545], Farahabad (36°49'N, 53°12'E), 9.VII.1975. – 3 ♂, 11 ♀ [7547], Ivel (36°14'N, 53°37'E), 1500 m a.s.l., under stones, 11.VII.1975. – 3 ♂, 7 ♀ [7555], near Dasht (37°23'N, 56°13'E), 1600 m a.s.l., 17.VII.1975. – 1 ♂ [7364], Tehran, Tarazan/Lowshan (36°28'N, 49°31'E), 3.IX.1973. – 3 ♂, 7 ♀ [7335], Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. – 1 ♂ [7336], near Firuz Kun (35°43'N, 52°40'E), 24.VII.1973. – 3 ♀ [7454], Ab Garm (35°41'N, 49°13'E), 5.VII.1974. – 1 ♂, 1 ♀ (ZMMU), NW of Tehran, 10 km N of Karaj (35°50'N 51°05'E), 13.VI.2000, leg. Y. Marusik. – 1 ♂, 1 ♀ [7485], Tarazan/Lowshan (36°28'N, 49°31'E), 8.VIII.1974. – 7 ♀ [7341], Kermanshah, Sahneh (34°28'N, 47°36'E), 2.VIII.1973. – 2 ♂, 2 ♀ [7449], Mahi Dasht (34°14'N, 46°42'E), 29.VI.1974. – 2 ♂, 1 ♀ [7525], Behistun (= Bisitum or Bisutun) (34°23'N, 47°26'E), 17.VI.1975. – 1 ♂ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 4 ♀ [7527], NE of Kunduleh (34°44'N, 47°17'E), 20.VI. 1975. – 1 ♂, 1 ♀ [7588], N of Kamyaran (34°48'N, 46°57'E), 13.IX.1975. – 3 ♂, 3 ♀ [7557], Khorasan, E of Badranlu (37°31'N, 57°08'E), 18.VII.1975. – 1 ♂, 3 ♀ [7582], Lorestan, Veseyan (33°29'N, 48°04'E), 8.IX.1975. – 5 ♂, 13 ♀ [7583], Hatemvand (33°28'N, 48°07'E), 9.IX.1975. – [7339], Hamadan, Hamadan (34°46'N, 48°27'E), 29.VII.1973. – 1 ♂, 1 ♀ [7586], near Hamadan (33°44'N, 48°27'E), 2600 m a.s.l., 11.IX.1975. – 1 ♀ [7445], Ilam, Sarab Eyvan (33°45'N, 46°22'E), 26.VI.1974. – 1 ♀ [7589], Kordestan, E of Nyabad (road Sanandaj - Marivan) (35°20'N, 46°39'E), 14.IX.1975. – 4 ♀ [7529], N of Sanandaj (35°28'N, 47°01'E), 22.VI.1975. – 1 ♂ [7592], Marivan (35°32'N, 46°09'E), 15.IX.1975. – 1 ♂, 1 ♀ (ZMMU) [7355], Fars, Ghader-Abad (30°21'N, 53°19'E), 17.VIII.1973. – 1 ♀ (ZMMU), 25 km NE of Shiraz, Zargan (29°47'N 52°44'E), Aradegan Park, 25.V.2000, leg. Y. Marusik. – 1 ♀ [7357], Sivand, NE of Sivand (30°07'N, 52°58'E), 22.VIII.1973.

RANGE: European-Ancient Mediterranean.

Tenuiphantes zimmermanni (Bertkau, 1890)

RECORDS FROM IRAN: Tehran: Varamin, Goltapeh (Ghavami et al., 2005)

REMARKS: The record of this West European species in Iran appears highly doubtful. The authors could have misidentified *T. zimmermanni* with *T. tenuis* or *T. perseus*. This species is absent from the material examined.



FIGS 98-104

Tenuiphantes sp., specimens from Teberda, West Caucasus, Russia. (98) Scape, ventral view. (99, 100) Varieties of posterior median plate. (101, 102) Varieties of embolus. (103, 104) Varieties of lamella characteristica.

***Trematocephalus cristatus* (Wider, 1834)**

MATERIAL: IRAN: 1 ♂ [7534], Mazandaran, Keyasar (36°22'N, 53°16'E), sifting in very dry forest, 22.VII.1973.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: West Palaearctic.

***Trichoncoides piscator* (Simon, 1884)**

Fig. 6

MATERIAL: IRAN: 2 ♂ [7503], Western Azarbayjan, N of Khoy (38°37'N, 45°02'E), 1.VI.1975. - 1 ♀ [7504A], Eastern Azarbayjan, S of Khoy (38°28'N, 44°56'E), swamp, under stones and trunks, 1.VI.1975. - 1 ♂, 1 ♀ [7331], Mazandaran, Galugah (36°42'N, 53°38'E), 19.VII.1973. - 1 ♀ [7332], Naharkoran/Gorgan (36°44'N, 54°29'E), sifting in forest, moss, 20.VII.1973. - 3 ♂, 3 ♀ (ZMMU), 1 ♂, 7 ♀ [7335], Tehran, Firuz Kun (35°45'N, 52°46'E), 23.VII.1973. - 1 ♀ [7344], Kermanshah, Garavand/Shahabad (33°55'N, 46°47'E), 5.VIII.1973. - 1 ♀ [7432], Bakhtiyari, road from Kuhrang (32°23'N, 50°18'E), 17.VI.1974. - 1 ♀ [7434], Kuhrang (32°28'N, 50°08'E), 19.VI.1974. - 1 ♂ [7439], Lorestan, Azna (33°28'N, 49°22'E), 23.VI.1974. - 1 ♀ [7443], Malavi-Shihabad (33°35'N, 47°14'E), 25.VI.1974. - 1 ♀ (ZMMU) [7531], Kordestan, S of Divandarreh (35°45'N, 47°05'E), 23.VI.1975.

RECORDS FROM IRAN: Khorasan: Zavi (Tanasevitch, 2008).

RANGE: European-Ancient Mediterranean.

Troglohyphantes paulusi Thaler, 2002

RECORDS FROM IRAN: Gilan: Asalem (= Assalem) (Thaler, 2002).

REMARKS: This species is absent from the material examined.

RANGE: Iranian.

Walckenaeria acuminata Blackwall, 1833

MATERIAL: IRAN: 1 ♀ [7517], Gilan, near Asalem (37°40'N, 48°52'E), 1200 m a.s.l., sifting debris from tree holes, 10.VI.1975.

REMARKS: This species is here reported for the first time for the Iranian fauna.

RANGE: European-Ancient Mediterranean.

Walckenaeria alticeps (Denis, 1952)

Fig. 5

MATERIAL: IRAN: 2 ♀ [7303], Eastern Azarbaijan, Bostanabad (37°48'N, 46°51'E), 25.VI.1973. – 1 ♀ [7316], Mazandaran, Chorteh (36°46'N, 50°35'E), 1600 m a.s.l., 8.VII.1973. – 3 ♂, 1 ♀ [7372], near Tang-e-Ram (37°25'N, 55°45'E), 28.VII.1974. – 2 ♀ [7343], Kermanshah, Mahi Dasht (34°14'N, 46°42'E), 4.VIII.1973. – 2 ♂, 3 ♀ [7588], N of Kamyaran (34°48'N, 46°57'E), 13.IX.1975. – 1 ♀ [7526], N of Kermanshah (34°28'N, 47°00'E), 18.VI.1975. – 1 ♀ [7527], NE of Kunduleh (34°44'N, 47°17'E), 20.VI.1975. – 1 ♂, 1 ♀ [7585], Lorestan, NW of Borudjerd (33°57'N, 48°41'E), 10.IX.1975. – 1 ♂, 1 ♀ [7597], Kordestan, N of Saqqez (36°23'N, 46°12'E), 18.IX.1975. – 2 ♀ (dried up) [7347], Esfahan, Nowghan (33°14'N, 49°59'E), 7.VIII.1973. – 2 ♀ [7437], Daran (32°58'N, 50°24'E), 22.VI.1974. – 1 ♀ (ZMMU) [7355], Fars, Ghader-Abad (30°21'N, 53°19'E), 17.VIII.1973.

RECORDS FROM IRAN: Tehran: Pol-e-Djadjirad. – Fars: Qader Abad (= Ghaderabad). – Bakhtiyari: Qafarokh (Tanasevitch, 2008).

RANGE: West Palaearctic.

CONCLUSION

Currently the Iranian fauna is known to contain 66 linyphiid species. Since the previous paper on Iran (Tanasevitch, 2008), the number of known species increased at the expense of widespread elements (17 species), European-Ancient Mediterranean elements (6 species), and potential endemics (3 species). In general, the Iranian fauna is characterised by a high percentage of widespread species (50%), a small percentage of European-Ancient Mediterranean (14%) and Eastern Ancient Mediterranean elements (7%). The portion of potential Iranian endemics is 15%. These are: *Araeoncus mitriformis*, *Archaraeoncus alticola*, *Bolyphantes elburzensis* sp. n., *Erigonoplus sengleti*, *E. zagros* sp. n., *Lepthyphantes iranicus*, *Palliduphantes sbordonii*, *Sengletus latus* sp. n., *S. longiscapus* and *Troglohyphantes paulusi*. The Caucasian-Iranian relations are very weak and supported by five species: *Agyneta mesasiatica*, *A. mitriformis*, *Diplocephalus transcaucasicus*, *Megalepthyphantes camelus* and *Tenuiphantes perseus*. The Central Asian-Iranian relations are demonstrated by *M. kronebergi*, *M. kuhitangensis*, and *M. nebulosoides* only. It is very strange that the relations between the Iranian and Anatolian (Turkey) fauna are based on widespread species only.

ACKNOWLEDGEMENTS

I am most grateful to Antoine Senglet (Vich, Switzerland), upon whose material the present study is based, to Yuri Marusik (Magadan, Russia) for specimens from Iran, to Kirill Mikhailov (Moscow, Russia) for comparative material from ZMMU, and to Christine Rollard (Paris, France) for types from the MNHNP. Special thanks to Peter J. Schwendinger (MHNG) for checking the manuscript and for the opportunity to work on the spider collections of the Muséum d'histoire naturelle, Geneva, as well as to Peter van Helsdingen (Leiden, Netherlands) for helpful comments. This study was supported in part by the Russian Foundation for Basic Research, Projects # 09-04-01365-a, and # 08-04-92230-a.

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Notes on linyphiid spiders from Afghanistan (Araneae, Linyphiidae)

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Notes on linyphiid spiders from Afghanistan (Araneae, Linyphiidae). -

A small collection of linyphiid spiders from Afghanistan contains eleven species, ten of which are new to the Afghan fauna, and one species, i.e. *Megalephyphantes kandahar* sp. n., is new to science. A new combination is established: *Lepthyphantes afghanus* Denis, 1958 = *Mughiphantes afghanus* (Denis, 1958) comb. n. All records of *Arachosinella strepens* Denis, 1958 from Kirghizia, Kazakhstan and Mongolia actually refer to *A. oeroe-gensis* Wunderlich, 1995. The distribution of *A. strepens* is restricted to Afghanistan.

Keywords: Taxonomy - new species - new combination - new records.

INTRODUCTION

Only six linyphiid species have hitherto been known from Afghanistan, i.e. *Arachosinella strepens* Denis, 1958, *Erigone atra* Blackwall, 1833, *Lepthyphantes afghanus* Denis, 1958, *Tenuiphantes tenuis* (Blackwall, 1852) (Denis, 1958), *Mughiphantes hindukuschensis* (Miller & Buchar, 1972) (Miller & Buchar, 1972) and *Megalephyphantes kuhitangensis* (Tanasevitch, 1989) (for the latter species see Tanasevitch, 2009). A small collection of spiders from Afghanistan, stored in the Muséum d'histoire naturelle, Geneva, allowed to replenish the list of Afghan linyphiids with 10 species, one of which is new to science.

MATERIAL AND METHODS

This paper is based on collections of A. Senglet and J. Klapperich from Afghanistan, stored in the Muséum d'histoire naturelle, Geneva, and on available records in the literature. Spider material in the Zoological Museum of the Moscow State University, Moscow was used for comparison.

The terminology of genitalic structures in *Megalephyphantes* Wunderlich, 1994 follows that of Saaristo & Tanasevitch (1996). In the description, chaetotaxy is given in the following formula: TiI: 2-1-1-0, which means that tibia I has two dorsal spines, one pro-, one retrolateral spine, and no ventral spine (the apical spines are disregarded). The sequence of leg segment measurements is as follows: femur + patella + tibia + metatarsus + tarsus. All measurements are given in mm. Scale lines in the figures are 0.1 mm.

Abbreviation used in the text and figures: DPS - distal part of scape, EP - embolus proper, Fe - femur, Mt - metatarsus, PMP - posterior median plate, P - proscape, Ti - tibia, TmI - position of the tri-cho-bothrium on tibia I, ZMMU - Zoological Museum of the Moscow State University. Senglet's collection numbers are given in square brackets. Unless otherwise stated, all specimens are deposited in the Muséum d'histoire naturelle, Geneva.

RESULTS

Arachosinella strepens Denis, 1958

RECORDS FROM AFGHANISTAN: Bamian: Puistagoli, Koh-i-Baba Mt. Ridge (Hindukush Mts system) (Denis, 1958).

REMARKS: This species is absent from the material examined. A study of the material kept at ZMMU (see below) showed that all records of *A. strepens* from Kirghizia (Tanasevitch, 1989), Eastern Kazakhstan (Eskov & Marusik, 1995) and Mongolia (Marusik *et al.*, 2000) actually refer to *A. oerogensis* Wunderlich, 1995, originally described from Mongolia (Wunderlich, 1995). The known distribution of *A. strepens* seems to be restricted to Afghanistan.

COMPARATIVE MATERIAL EXAMINED: 4 ♂, 3 ♀ (ZMMU), Eastern KAZAKHSTAN, Zaysan District, Saur Mt. Ridge, Karaungur River Valley (Kenderlyk River basin), *Populus* forest, 18-22.VI.1990, leg. K. Eskov. - 1 ♂ (ZMMU), RUSSIA, Tuva Republic, near Ersin, flood-plain of Tes-Khem River, 1000 m a.s.l., 14.VIII.1989, leg. D. Logunov. - 1 ♂ (ZMMU), MONGOLIA, Suhbaatar Aimak, Tumentsogt Somon, leg. V. Ovtsharenko, 10.VIII.1985. - 3 ♂, 3 ♀ (ZMMU), near Shamor, bank of dead channel of Orkhon River, 17.VII.1990, leg. E. Veselova.

Agyreta fuscipalpa (C.L. Koch, 1836)

MATERIAL: AFGHANISTAN: 2 ♂, 1 ♀ [7568], Vardak, NNE of Ghazni (33°45'N, 68°34'E), 12.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Araeoncus caucasicus Tanasevitch, 1987

MATERIAL: AFGHANISTAN: 2 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Dactylopiastes digiticeps (Simon, 1881)

MATERIAL: AFGHANISTAN: 1 ♂, 3 ♀, Kandahar, 950 m. a.s.l., 12.I.1953, leg. J. Klapperich. - 1 ♀. Kandahar-Kuna, 950 m. a.s.l., 17.II.1953, leg. J. Klapperich. - 2 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. - 1 ♀ [7561], Kandahar, E of Kandahar (31°37'N, 65°53'E), 1.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Erigone atra Blackwall, 1833

RECORDS FROM AFGHANISTAN: Bamian: Panjab, Koh-i-Baba Mt. Ridge (Hindukush Mts system) (Denis, 1958).

REMARKS: This species is absent from the material examined.

Erigone dentipalpis (Wider, 1834)

MATERIAL: AFGHANISTAN: 1 ♂, Kandahar-Kuna, 950 m. a.s.l., 17.II.1953, leg. J. Klapperich. – 1 ♂, 4 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. – 1 ♀ [7568], Vardak, NNE of Ghazni (33°45'N, 68°34'E), 12.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Frontinellina frutetorum (C.L. Koch, 1834)

MATERIAL: AFGHANISTAN: 1 ♀ [7563], Kabul, E of Kabul (34°34'N, 69°29'E), 4.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Megalephyphantes kandahar sp. n.

Figs 1-6

MATERIAL: AFGHANISTAN: ♂ holotype, Kandahar, E of Kandahar [7561] (31°37'N, 65°53'E), 1.VIII.1975, leg. A. Senglet. – Paratypes: 1 ♂, 2 ♀, same locality, together with holotype.

ETYMOLOGY: The specific name, a noun, refers to the Kandahar Province of Afghanistan, the terra typica of the new species.

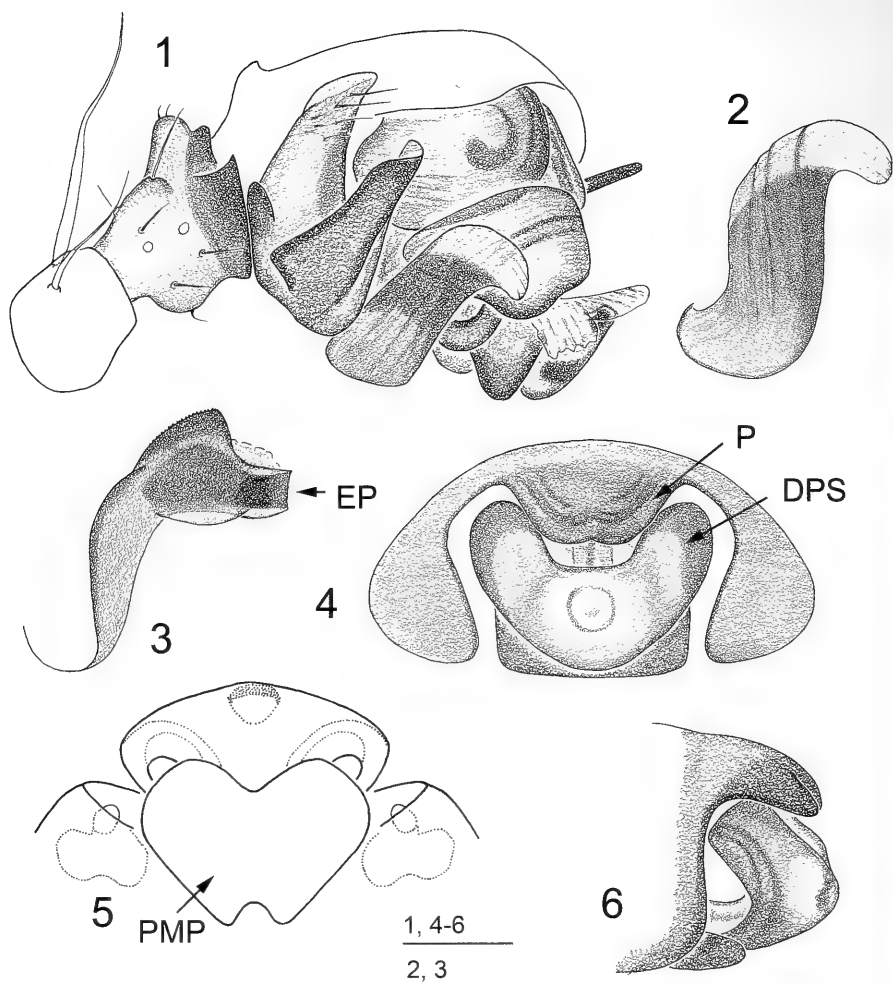
DIAGNOSIS: The species is characterised by the shape of the palpal tibia and the lamella characteristica in males, and by the shape of the posterior median plate in females.

DESCRIPTION: Male. Total length 3.05. Carapace 1.25 long, 0.90 wide, pale brown, almost yellow, unmodified. Chelicerae 0.50 long, stridulatory area distinct. Legs pale yellow, tibia with a grey median band, distal part of segments darkened. Leg I 8.40 long (2.20+0.30+2.30+2.20+1.40), IV 7.30 long (2.00+0.25+1.80+2.10+1.15). Chaetotaxy. FeI: 0-1-0-0, II-IV: 0-0-0-0; TiI: 2-1-1-0, II: 2-0-1-0, III-IV: 2-1-0-0; MtI-IV: 1-0-0-0. TmI 0.13. Metatarsi IV without trichobothrium. Palp (Figs 1-3): Patella with two special setae. Tibia with a rounded dorsal process. Cymbium with a small posterodorsal outgrowth. Paracymbium highly sclerotized, with a tooth in proximal part. Lamella characteristica S-shaped, well-sclerotized in middle part, almost transparent distally. Embolus seahorse-like, with a serrate surface above embolus proper. Abdomen 2.00 long, 1.30 wide, dorsally pale, sometimes white, with a pale grey median stripe flanked by paramedian spots connected to it with thin bands.

Female. Total length 3.00. Carapace 1.05 long, 0.80 wide. Chelicerae 0.55 long. Leg I 7.15 long (2.00+0.35+2.10+1.65+1.05), Fe IV 1.70 long. FeI: 0-1-0-0, II-IV: 0-0-0-0; TiI: 2-1-1-0, II-IV: 2-0-1-0; MtI-IV: 1-0-0-0. TmI 0.12. Abdomen 2.00 long, 1.20 wide. Epigyne (Figs 4-6): Proscape short and strongly sclerotized, distal part wide, V-shaped. Stretcher totally reduced. Posterior median plate darkened, with a hollow anteriorly and posteriorly.

VARIABILITY: The posterior median plates of both females are identical in shape.

TAXONOMIC REMARKS: The new species is very similar to *M. kuhitangensis* (Tanasevitch, 1989), but distinguishable by the presence of only one dorsal outgrowth on the male palpal tibia (two in *M. kuhitangensis*), by the rounded apex of the lamella



FIGS 1-6

Megalephyphantes kandahar sp. n., ♂ & ♀ paratypes. (1) Right palp, retrolateral view. (2) Lamella characteristica. (3) Embolus. (4-6) Epigyne, ventral, dorsal and lateral view, respectively.

characteristica (bifid in *M. kuhitangensis*), as well as by the shape of the posterior median plate.

DISTRIBUTION: The species is known from the type locality only.

***Megalephyphantes kuhitangensis* (Tanasevitch, 1989)**

REMARKS: This species was described from females collected in Turkmenistan (Tanasevitch, 1989). The male sex has just been described from Kandahar, Afghanistan (Tanasevitch, 2009).

RECORDS FROM AFGHANISTAN: Kandahar: Kandahar (Tanasevitch, 2009).

Megalephyphantes turkestanicus (Tanasevitch, 1989)

MATERIAL: AFGHANISTAN: 6 ♂, 8 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. – 1 ♀ [7567], E of Kandahar (31°37'N, 65°53'E), 1.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Mesasigone mira Tanasevitch, 1989

MATERIAL: AFGHANISTAN: 3 ♂, 5 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. – 2 ♂, 5 ♀ [7561], E of Kandahar (31°37'N, 65°53'E), 1.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Microlinyphia pusilla (Sundevall, 1830)

MATERIAL: AFGHANISTAN: 1 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. – 1 ♀ [7561], Kandahar, E of Kandahar (31°37'N, 65°53'E), 1.VIII.1975, leg. A. Senglet. – 1 ♀ [7568], Vardak, NNE of Ghazni (33°45'N, 68°34'E), 12.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Mughiphantes afghanus (Denis, 1958) comb. n.

RECORDS FROM AFGHANISTAN: Herat: Zarmast, 2500 m a.s.l. (Denis, 1958).

REMARKS: This species is absent from the material examined. Based on the original description and figure, *Lepthyphantes afghanus* clearly belongs to the genus *Mughiphantes* Saaristo & Tanasevitch, 1999.

Mughiphantes hindukuschensis (Miller & Buchar, 1972)

RECORDS FROM AFGHANISTAN: Hindukush, Tiritsch-Taal, 4100 m a.s.l. (Miller & Buchar, 1972).

REMARKS: This species is absent from the material examined.

Prinerigone vagans (Audouin, 1826)

MATERIAL: AFGHANISTAN: 2 ♂, 4 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. – 1 ♂, 1 ♀ [7561], E of Kandahar (31°37'N, 65°53'E), 1.VIII.1975, leg. A. Senglet.

REMARKS: This species is here reported for the first time for the Afghan fauna.

Tenuiphantes tenuis (Blackwall, 1852)

MATERIAL: AFGHANISTAN: 1 ♂, 2 ♀ [7560], Kandahar, W of Kandahar (31°37'N, 65°36'E), 31.VII.1975, leg. A. Senglet. – 1 ♀ [7567], Kabul, Golbagh (34°26'N, 69°07'E), 11.VIII.1975, leg. A. Senglet.

RECORDS FROM AFGHANISTAN: Laghman (given as Paghman in Denis, 1958).

ACKNOWLEDGEMENTS

I am most grateful to Antoine Senglet (Vich, Switzerland) and the late J. Klapperich (Bonn, Germany) on whose material the present study is based, as well as to Kirill Mikhailov (Moscow, Russia) for comparative material from the ZMMU. Special thanks to Peter J. Schwendinger (Geneva, Switzerland) for checking the manuscript and for the opportunity to work on the spider collections of the Muséum d'histoire naturelle, Geneva, as well as to Christo Deltchev (Sofia, Bulgaria) for helpful comments. This study was supported in part by the Russian Foundation for Basic Research, Projects # 09-04-01365-a and # 08-04-92230-a.

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Nouvelles données sur la distribution géographique en Suisse du Mulot alpestre (*Apodemus alpicola* Heinrich, 1952)

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New data on the occurrence of the Alpine mouse (*Apodemus alpicola* Heinrich, 1952) in Switzerland. - To better understand the distribution of the recently discovered Alpine mouse in the Swiss Alps, we revised 4144 specimens of *Apodemus* spp. housed in the collections of the Natural History Museum of Geneva. Because the morphological distinction of *A. alpicola* from the other two widespread species (*A. sylvaticus* and *A. flavicollis*) is difficult, we first evaluated the validity of a simple ratio of two linear measurements (length of diastem over condylobasal length, expressed in percent) on a subset of 150 reference specimens (50 of each species) previously identified by molecular characters or by a more complex discriminant function (Reutter *et al.*, 2002). This simple ratio was always smaller than 31% in both *A. sylvaticus* and *A. flavicollis*, and larger in all measured *A. alpicola*. The diagnostic absence of a small lateral tubercle on the second upper molar was also highly correlated with values larger than 31% in this ratio, further validating this simple way of identifying skulls of Alpine mice. Using this method, we subsequently identified 143 *A. alpicola* from 28 locations in the Swiss Alps. Most of them were sampled in the oriental stronghold of Alpine mice (province of Graubünden), but some specimens were also sampled to the west, in the provinces of Ticino, Valais, Vaud and Bern. The precise western limits of the Alpine mouse and its ecological relationships with other, more widespread species needs to be further studied.

Keywords: Morphological discrimination - identification - Rodentia - molars - Alps - distribution

INTRODUCTION

Décrit des Alpes bavaroises par Heinrich (1952) comme une sous-espèce du Mulot à collier (*Apodemus flavicollis*), le Mulot alpestre (*A. alpicola*) a été depuis élevé au rang d'espèce sur la base de critères morphologiques (Storch & Lütt, 1989), statut désormais confirmé par des études biochimiques (Vogel *et al.*, 1991; Reutter *et al.*, 2001) et moléculaires (Reutter *et al.*, 2002). A ce jour, l'espèce apparaît comme strictement endémique à l'arc alpin, sa présence n'ayant été signalée que dans les Alpes autrichiennes, suisses et italiennes, ainsi qu'au sud de l'Allemagne (Bavière) et dans deux localités des Alpes françaises. En outre, contrairement au Mulot sylvestre (*A. sylvaticus*) dont la distribution altitudinale s'étend de l'étage collinéen à l'étage subalpin, le Mulot alpestre n'a été trouvé jusqu'à aujourd'hui qu'entre les étages montagnard et alpin, où il peut atteindre, comme dans la région du Grand Paradiso (Italie), l'altitude de 2423 m (Debernardi *et al.*, 2003). Sa propension à coloniser davantage les milieux

d'altitude que le Mulot sylvestre et le Mulot à collier serait due au fait qu'il présente un métabolisme de base sensiblement plus faible que ces deux autres espèces (Aeschmann *et al.*, 1998).

En 1995, lors de la publication de l'ouvrage sur les «Mammifères de la Suisse», le Mulot alpestre n'avait pu être décelé en Suisse que dans dix localités, la plupart situées en Engadine (Vogel, 1995). Depuis, sa présence a encore été confirmée dans quelques autres régions, notamment au col du Grand Saint-Bernard (Valais), dans la région du Sanetsch (Valais) et dans l'Oberland bernois (Reutter, 2002; Reutter *et al.*, 2005). Néanmoins, malgré ces nouvelles données, la répartition en Suisse du Mulot alpestre demeure encore très lacunaire, particulièrement dans le Valais et le Tessin.

Aussi, fort de ce constat et dans le dessein de contribuer à une meilleure connaissance de la distribution géographique et altitudinale du Mulot alpestre en Suisse, il a été décidé d'entreprendre un examen complet des 4144 spécimens du genre *Apodemus* présents dans les collections du Muséum d'histoire naturelle de la Ville de Genève (MHNG) et collectés sur près de 180 ans. Sur la base d'un diagnostic morphologique simplifié du crâne, cet examen a également servi à la révision de certaines identifications anciennes, quelquefois erronées, et de déterminer du matériel introduit sous «*Apodemus sp.*».

MATÉRIEL ET MÉTHODE

Bien qu'il se spécifie clairement des autres espèces du genre *Apodemus* par des caractères biochimiques et génétiques, le Mulot alpestre demeure une espèce très difficile à identifier sur la base de caractères morphologiques externes. En effet, avec le Mulot à collier, le Mulot sylvestre et d'autres espèces du sous-genre *Sylvaemus* distribuées en dehors des frontières suisses, il constitue un complexe d'espèces cryptiques, dont certaines peuvent vivre en sympatrie, voire dans certaines situations en syntopie (Storch & Lütt, 1989). D'une taille proche de celle du Mulot sylvestre, les éléments morphométriques qui pourraient l'en distinguer ne peuvent être mis en évidence que statistiquement et essentiellement à partir de sujets parfaitement conservés. Sa queue est particulièrement longue et dépasse généralement la tête et le corps d'environ 115%, avec des extrêmes de 108 à 130%, voire 140% selon Vogel (1995). Les adultes pèsent ordinairement entre 25 et 35 g et la patte postérieure est nettement plus grande que celle du Mulot sylvestre, mais de grandeur sensiblement identique à celle du Mulot à collier, soit environ 24 à 26 mm. En outre, les adultes comme les subadultes possèdent tous une ornementation pectorale sous la forme d'une tache beige (parfois en forme de cravatte) s'étendant souvent, à l'instar de bon nombre de Mulots à collier, sur les côtés du cou (Heinrich, 1951). En revanche, aucun spécimen examiné dans les collections du Muséum n'a montré une absence totale d'ornementation, comme c'est parfois le cas chez *A. sylvaticus* selon Vogel (1995). Aussi, devant la difficulté d'appliquer ces différents critères d'identification de la morphologie externe et à défaut de pouvoir entreprendre des analyses génétiques, seule l'application d'une méthode utilisant des mesures morphométriques crâniennes permet à ce jour la séparation des trois espèces de mulots rencontrées en Suisse. Parmi ces méthodes, celle utilisant deux fonctions discriminantes prenant en compte six mesures crâniennes offre ainsi la possibilité d'obtenir une séparation satisfaisante des trois

espèces, à l'exclusion des juvéniles, avec un taux de réussite de 97,2% (Reutter *et al.*, 1999). Néanmoins, aussi intéressante soit-elle, cette méthode s'avère difficile à mettre en œuvre dans le cadre d'une importante collection muséale, ceci en raison d'un trop grand nombre de crânes partiellement endommagés ne permettant pas d'effectuer la totalité des mesures, sinon de manière imprécise. Par ailleurs, un autre problème pouvant être rencontré dans l'application de cette méthode multivariée réside dans la difficulté de déterminer de manière constante et précise les points de mesure de certaines variables discriminantes, notamment la longueur de la boîte crânienne (Hkl – length of the braincase). Ce sont les raisons pour lesquelles il a semblé plus judicieux dans ce cas de figure de n'utiliser qu'une seule discriminante basée sur la valeur relative du diastème (DIA) par rapport à la longueur condylobasale (LCB), valeur sensiblement plus grande chez *A. alpicola* que chez *A. sylvaticus* et *A. flavicollis*, comme le montre les mesures craniométriques de différents auteurs (Reinwaldt, 1955; Storch & Lütt, 1989; Spitzenberger & Englisch, 1996). Il est cependant important de souligner ici que cette discrimination simplifiée ne permet que l'identification d'*A. alpicola* et en aucun cas celle des deux autres espèces.

Afin de calculer chez les crânes des trois mulots la valeur relative du diastème (DIA/LCB) et dans l'espoir d'utiliser cette seule analyse craniométrique pour différencier de manière satisfaisante le Mulot alpestre de ses deux sosies, 50 crânes de référence de chaque espèce ont été mesurés à l'aide d'un pied à coulisse permettant d'obtenir des mesures d'une exactitude proche du dixième de millimètre. La mesure du diastème a été prise depuis la base de la première molaire (M^1) jusqu'à la base interne de l'incisive, tandis que la mesure de la longueur condylobasale a été prise depuis le bord d'un des condyles occipitaux jusqu'au bord le plus antérieur de l'incisive située dans son axe (Fig. 1A). Afin de diminuer tout risque d'erreur, toutes les mesures ont été répétées au minimum à trois reprises.

En ce qui concerne les 50 crânes de Mulot alpestre de référence, un choix a été fait sur des spécimens en provenance Département d'Ecologie et d'Evolution de l'Université de Lausanne (anciennement nommé IZEA) et du Muséum d'histoire naturelle de la Ville de Genève (MHNG). Ce choix s'est uniquement porté sur des spécimens identifiés biochimiquement ou l'aide de la méthode appliquée par Reutter *et al.* (1999). En revanche, pour ce qui est des crânes des deux autres espèces, seule une partie d'entre eux provenait de spécimens identifiés par l'une ou l'autre de ces méthodes, le reste ayant été identifié par le cumul de critères de morphologiques, crâniens, géographiques et altitudinaux, ces deux derniers critères permettant en principe d'exclure *A. alpicola* de certaines zones géographiques (cf. introduction). Par ailleurs, conjointement aux mesures effectuées sur ces crânes de référence, un examen de la deuxième molaire supérieure (M^2) a été pratiqué afin de définir l'importance du neuvième tubercule (T9) qui s'avère peu développé ou absent chez *A. alpicola* (Spitzenberger, 2001), à l'exception de certains individus du Val d'Aoste et du Valais chez lesquels il s'avère non seulement présent, mais parfois plus grand que chez *A. flavicollis* (Vogel *et al.*, 1991; Fig. 1A et 1C). Néanmoins, aussi utile qu'il puisse se révéler dans certains cas, notamment en ce qui concerne les crânes présentant une M^2 sans neuvième tubercule (*A. alpicola* typique), cet examen peut s'avérer totalement vain sur des sujets adultes présentant une forte usure des dents jugales. Enfin, notons

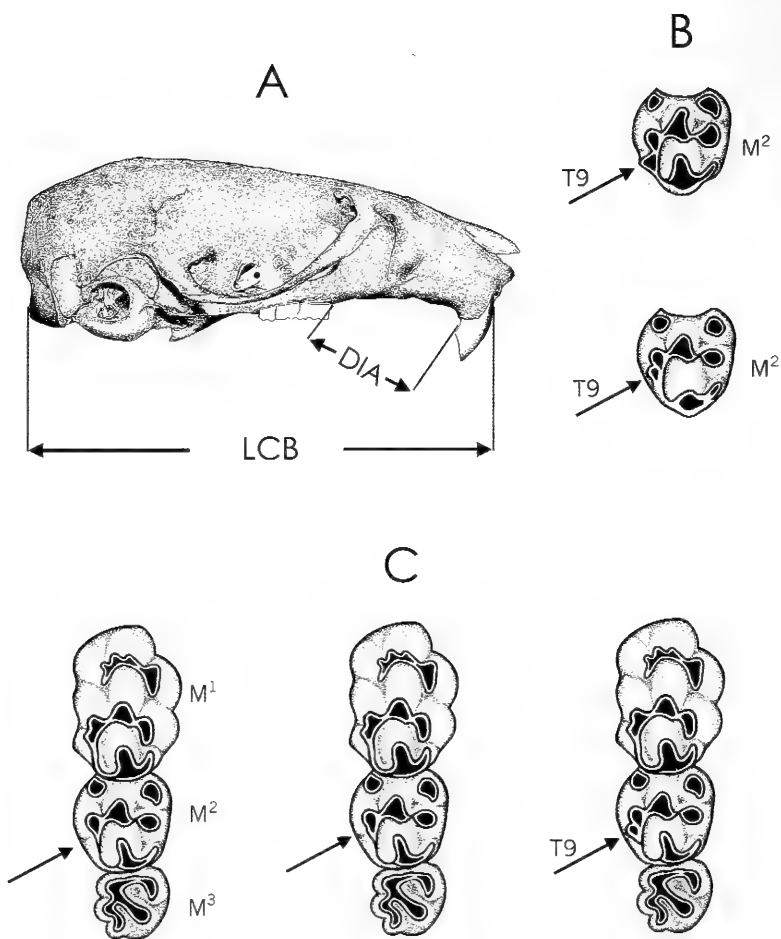


FIG. 1

(A) Crâne d'*Apodemus flavicollis* vu de profil avec indication de la mesure du diastème (DIA) et de la longueur condylobasale (LCB) effectuée depuis le bord du condyle occipital jusqu'au bord antérieur de l'incisive. (B) Patterns de la M² généralement rencontrés chez *A. sylvaticus* (haut) et *A. flavicollis*. (C) Dents jugales supérieures droites (M¹, M² et M³) chez *A. alpicola* montrant les principales variations du neuvième tubercule (T9) de la M² qui est souvent absent chez cette espèce.

que les crânes sélectionnés appartenaient aussi bien à des individus adultes que subadultes, ceci afin de savoir si le rapport DIA/LCB demeurerait relativement constant selon l'âge.

RÉSULTATS et DISCUSSION

SPÉCIMENS DE RÉFÉRENCE

Les crânes des 50 Mulots alpestres de référence examinés présentent tous un rapport DIA/LCB supérieur à 31%, voire, pour la plupart, supérieur à 31,5%, alors que

ceux des deux autres espèces affichent des valeurs inférieures à 31% (Fig. 2). Chez les crânes d'*A. alpicola*, la moyenne DIA/LCB est de 32,6%, avec des extrêmes de 31,3 et 34,6%. Quant aux crânes des deux autres espèces, la moyenne est de 29,5% chez ceux d'*A. flavicollis*, avec des extrêmes de 26,2 et 30,8%, et de 29,2% chez ceux d'*A. sylvaticus*, avec des extrêmes de 27,26 et 30,8%. Ces résultats montrent ainsi que des valeurs supérieures à 31% permettent d'identifier sans ambiguïté des crânes de Mulot alpestre sans avoir recours à des méthodes plus complexes. En outre, cette méthode simple s'avère également applicable à des crânes d'individus subadultes présentant une longueur condylobasale comprise entre 22,8 mm, pour le plus petit crâne mesuré, et 23,5 mm. En revanche, cette méthode ne permet pas de séparer les deux autres espèces en raison du recouvrement important des rapports DIA/LCB (Fig.2). Pour y parvenir, mais ce n'était pas le but principal, il est donc nécessaire d'entreprendre des examens morphométriques complémentaires ou d'utiliser des méthodes génétiques (p. ex. Reutter *et al.*, 2002).

En ce qui concerne l'absence du neuvième tubercule (T9) de la deuxième molaire supérieure (M²) chez *A. alpicola*, il a été constaté que ce critère d'identification était très variable et que partiellement discriminant chez les sujets en provenance de Suisse. Par conséquent, il ne peut renforcer une identification par mesures crâniennes que lorsqu'il est totalement absent, comme c'est en principe le cas chez les sujets en provenance d'Autriche. En Suisse, sur les 24 crânes d'*A. alpicola* de référence examinés en provenance des Grisons, seuls 11 présentaient une M² sans tubercule, tandis que 10 montraient un tubercule plus ou moins important et 3 une M² complètement usée ne permettant aucune appréciation. En revanche, aucun tubercule nettement développé n'a été constaté sur la M² des 7 crânes de référence en provenance du canton de Berne. Aussi, l'examen d'un plus grand nombre d'individus de différentes localités s'avérerait nécessaire pour connaître l'importance de la variabilité du T9 chez *A. alpicola* en Suisse.

SPÉCIMENS NOUVEAUX

L'examen du rapport DIA/LCB a permis d'identifier 143 Mulots alpestres supplémentaires issus des collections historiques du MHNG et jusqu'ici inscrits sous *A. flavicollis*, *A. sylvaticus* ou *A. sp.* Par ailleurs, 38 spécimens ne pouvant être clairement identifiés par cette méthode ont été consignés sous «*A. cf. alpicola*». Dans la plupart des cas, il s'agissait de très jeunes individus accompagnant un lot d'adultes identifiés comme *A. alpicola* ou de spécimens dont le crâne trop endommagé ne permettait pas d'effectuer de mesures précises. Tous ces crânes de Mulot alpestre nouvellement identifiés ont présenté un rapport DIA/LCB supérieur à 31%, à l'exception de deux crânes de très jeunes spécimens des Grisons (LCB: 21.77 et 22.9 mm) montrant des valeurs de 31% et 30,8%, soit proches des valeurs supérieures obtenues avec des crânes d'*A. sylvaticus* et *A. flavicollis* (Fig. 2). Ces spécimens douteux ont tout de même été consignés sous *A. alpicola* en raison d'une absence totale de neuvième tubercule à leur deuxième molaire supérieure.

Avec l'identification de ces 143 nouveaux Mulots alpestres, les collections du Muséum d'histoire naturelle de Genève possèdent à ce jour 170 spécimens de cette espèce ainsi que 38 spécimens dont l'identification certaine n'a pu être établie pour les

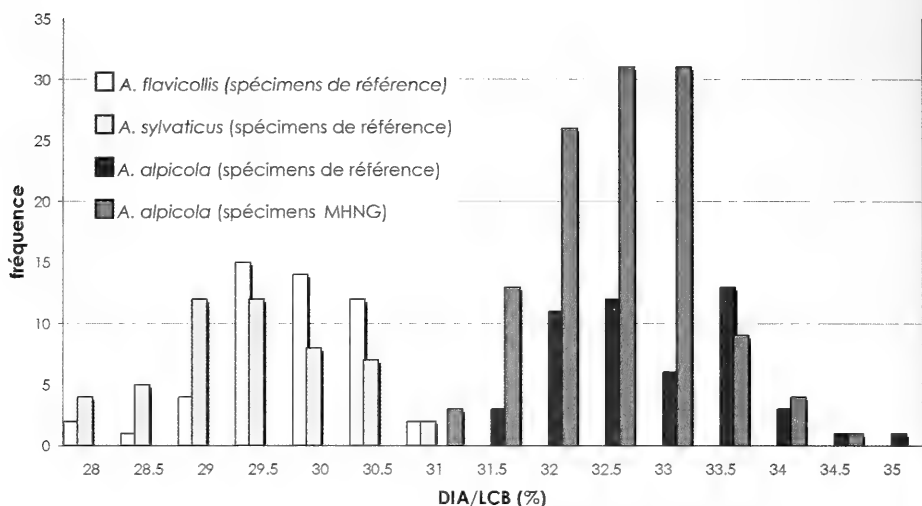


FIG. 2

Rapport de la longueur du diastème (DIA) sur la longueur condylobasale (LCB) de 150 crânes de référence d'*Apodemus* de 3 espèces et des 143 crânes d'*A. alpicola* nouvellement identifiés dans les collections du Muséum d'histoire naturelle de Genève (MHNG). Les crânes des 100 individus de référence d'*A. sylvaticus* et *A. flavicollis* présentent tous un rapport DIA/LCB inférieur à 31%, tandis que tous les crânes d'*A. alpicola* (spécimens de référence et spécimens nouvellement identifiés) affichent des valeurs plus élevées, la plupart supérieures à 31,5%, à l'exception de 3 crânes présentant des valeurs de 30,8 ou de 30,9 %.

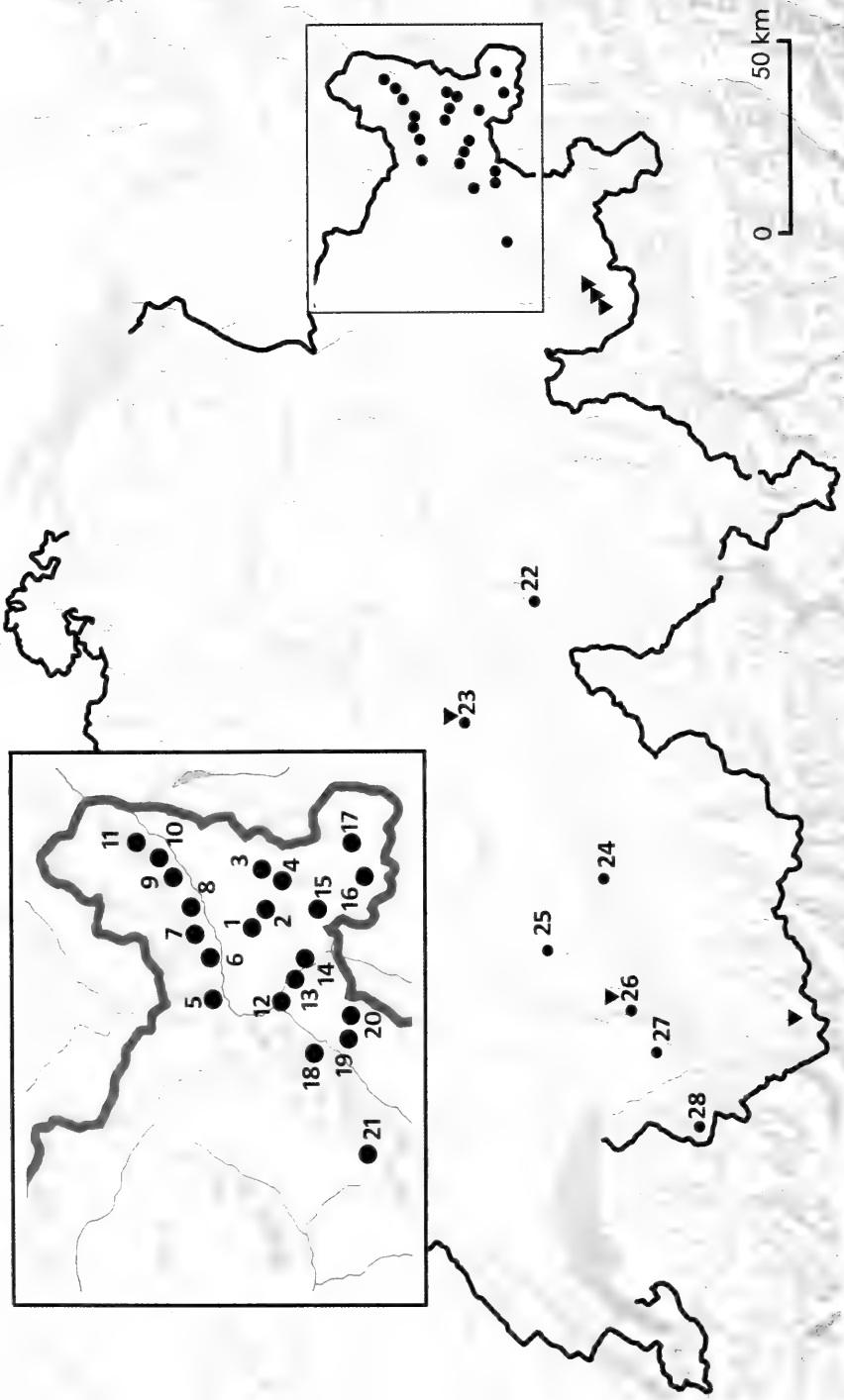
raisons évoquées plus haut. Parmi les Mulots alpestres formellement identifiés, 153 proviennent de 21 localités différentes des Grisons et 17 de 7 localités situées dans les cantons de Berne, Vaud, du Valais et du Tessin. (Tab. 1; Fig. 3). Hormis l'intérêt lié à la découverte de nouvelles localités pour cette espèce, l'examen complet des collections du Muséum a mis en évidence l'intérêt historique de celles-ci, notamment avec la découverte d'un spécimen collecté dans la région de Meiringen (Berne) par Victor Fatio (Tab. 1), en 1861, à une époque où ce naturaliste ne reconnaissait l'existence que d'une seule espèce en Suisse (Fatio, 1869).

Concernant les données altitudinales, il est possible de rejoindre les conclusions de Reutter *et al.* (2003) et ainsi affirmer qu'en Suisse le Mulot alpestre s'avère, comme dans le reste de son aire de distribution géographique, une espèce limitée aux étages montagnard, subalpin et alpin inférieur, avec une altitude maximum d'au moins 2200 m en ce qui concerne deux spécimens en provenance du Val S-Charl (Grisons). Par ailleurs, il est également possible de confirmer que le Mulot alpestre et le Mulot sylvestre peuvent vivre en sympatrie. En effet, sur les 28 localités notées avec une présence d'*A. alpicola*, 12 accueillent également la présence d'*A. sylvaticus*. En revanche, aucun Mulot à collier en provenance des Grisons n'a été trouvé parmi les 258 *Apodemus* collectés dans ce canton. Toutefois, considérant que cet échantillonnage historique n'est guère exhaustif en matière altitudinale, il n'est pas possible de déterminer si cette espèce est réellement rare dans les zones les plus basses de cette partie des Alpes où l'essentiel des spécimens collectés provient du Parc national et des

TABLE 1. Liste des localités dans lesquelles ont été identifiés des spécimens d'*Apodemus alpicola* conservés au Muséum d'histoire naturelle de Genève. Les numéros de station (gauche) correspondent à ceux géoréférencés à la figure 3.

Localité	Altitude	Date de récolte	Legs	Nombre
1 Grisons, Val Plavna	≥ 1803 m	1947	E. Dottrens	2
2 Grisons, Val Minger	≥ 1700 m	1935	P. Revilliod	2
3 Grisons, Alp Sesvena	≥ 2098 m	1934	P. Revilliod & J. G. Baer	2
4 Grisons, Val S-Charl, God Tamangur	≥ 2200 m	1934	P. Revilliod & J. G. Baer	2
4 Grisons, Val S-Charl, Alp Plazer	≥ 2091 m	1934	P. Revilliod & J. G. Baer	1
4 Grisons, S-Char	≥ 1810 m	1934	P. Revilliod & J. G. Baer	3
5 Grisons, Guarda	1400 m	1947; 1972	E. Dottrens; A. Meylan	5
6 Grisons, Ardez	1280 m	1972	A. Meylan	2
7 Grisons, Ftan	1230 m	1972	A. Meylan	3
8 Grisons, Tarasp	1210 m; 1390 m	1971; 1972	A. Meylan	2
9 Grisons, Sent	1770 m; 1880 m	1971; 1972	A. Meylan	2
10 Grisons, Ramosch	≥ 1100 m	1971; 1972	A. Meylan	19
10 Grisons, Ramosch, Chavradüra	≥ 1800 m	1971	A. Meylan	8
10 Grisons, Ramosch, Seraplana	≥ 1161 m	1971; 1972	A. Meylan	18
10 Grisons, Ramosch, Pra Dadora	≥ 1259 m	1971	A. Meylan	3
10 Grisons, Ramosch, Resgia & Clisot	≥ 1100 m	1971 - 1973	A. Meylan	34
11 Grisons, Tschlin	≥ 1060 m	1971; 1972	A. Meylan	6
12 Grisons, Zernez	≥ 1450 m	1963	G. Zenlenka	1
12 Grisons, Zernez, Crastascha Suot	≥ 1450 m	1972	A. Meylan	3
12 Grisons, Zernez, Val Gondas	≥ 1600 m	1972	A. Meylan	3
13 Grisons, Val dal Spöl (Parc national)	≥ 1700 m	1948	E. Dottrens	1
14 Grisons, Il Fuorn (Parc national)	≥ 1794 m	1943	P. Revilliod	2
15 Grisons, Val Tavriti	≥ 2121 m	1934	P. Revilliod & J. G. Baer	3
16 Grisons, Val Mora	≥ 2031 m	1934; 1938	P. Revilliod & J. G. Baer	8
17 Grisons, Val Müstair	≥ 1345 m	1946	P. Revilliod, E. Dottrens & J. G. Baer	3
18 Grisons, Brail, Pra Grond	1668 m	1971	A. Meylan	1
19 Grisons, Val Trupchun (Parc National)	≥ 1945 m	1933	P. Revilliod & J. G. Baer	10
20 Grisons, Val Münschaus	2040 m	1933	P. Revilliod & J. G. Baer	1
21 Grisons, La Punt-Chaumues	≥ 1680 m	1960	A. Meylan	3
22 Tessin, Airolo	≥ 1100 m	1970	A. Meylan	1
23 Berne, Méringen	≥ 600 m	1861	V. Fatio	1
24 Valais, Loeche-les-Bains	≥ 1350 m	1948	P. Hamard	3
25 Berne, Zweisimmen	≥ 940 m	1975	G. Mayor	2
25 Berne, Zweisimmen, St. Stephan	≥ 995 m	1977	G. Châtelin	1
26 Valais, Conthey, Derborence	≥ 1600 m	1979	A. Meylan	1
27 Vaud, Les Plans-sur-Bex	≥ 1080 m	1975	J.-D. Graf	1
28 Valais, Champéry, Col de Bretolet	≥ 1900 m	1960 - 1968	A. Meylan; J. P. Ribant	7

Total: 170



régions voisines, soit à des altitudes généralement supérieures à 1200 m. Enfin, soulignons que ces nouvelles données ne permettent pas encore d'affiner la distribution du Mulot alpestre dans les Alpes valaisannes, de même que dans les Alpes tessinoises où l'espèce n'a été trouvée qu'à Airolo (Tab. 1; Fig. 3). Aussi, afin de savoir si l'espèce est réellement moins répandue dans ces régions des Alpes, des recherches ciblées y devraient être entreprises, soit par des campagnes de capture, soit par des recherches complémentaires dans les différentes collections muséales de Suisse en utilisant la méthode simplifiée proposée ici.

REMERCIEMENTS

Pour ses encouragements, son aide ponctuelle et ses remarques avisées, mes remerciements s'adressent à M. Ruedi (Genève); ils s'adressent également à P. Vogel (Lausanne) qui m'a mis à disposition la collection IZEA et fait part de ses précieux commentaires relatifs au Mulot alpestre. Ma reconnaissance va aussi à B. Pavillard pour son assistance technique dans les collections de cet institut et à Brigitte Reutter (Berne) qui m'a aimablement fourni des compléments d'information relatifs au matériel examiné dans le cadre de sa thèse.

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FIG. 3. Localisation géographique des spécimens d'*Apodemus alpicola* présents dans les collections du Muséum d'histoire naturelle de Genève (ronds noirs) ou issus de la littérature (Vogel, Maddalena & Mabille, 1991; Reutter *et al.*, 2002; triangles noirs). Les numéros se réfèrent aux localités citées dans le tableau 1.

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***Magapia*, nom. nov., replacing *Laingia* Bouillon, 1978, and
Magapiidae, nom. nov., replacing Laingiidae Bouillon, 1978
[Cnidaria, Hydrozoa]**

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***Magapia*, nom. nov., replacing *Laingia* Bouillon, 1978, and Magapiidae,
nom. nov., replacing Laingiidae Bouillon, 1978 [Cnidaria, Hydrozoa].** –

The genus name *Laingia* Bouillon 1978 is an invalid junior homonym of *Laingia* Theobald, 1922 (Insecta). *Magapia*, nom. nov., is proposed as a new replacement name for *Laingia* Bouillon, 1978b, and the invalid family-group name Laingiidae Bouillon, 1978b based on it is replaced by Magapiidae, nom. nov.

Keywords: Hydrozoa - *Laingia* - homonymy – new replacement name – *Magapia*.

Bouillon (1978b) introduced the genus name *Laingia* for a remarkable hydro-medusa found near Laing Island, Papua New Guinea. The classification of this medusa (*Laingia jaumotti* Bouillon, 1978b) poses considerable problems in presenting a mixture of characters found in two otherwise rather distant groups of Hydrozoa, the Narcomedusae and Anthomedusae. Bouillon (1978b) thus assigned the genus to a family and a subclass of its own, Laingiidae and Laingiomedusae.

Kantiella enigmatica Bouillon, 1978a, originally included in the hydrozoan family Proboscoidactylidae, shares characters with *Laingia jaumotti* and was also assigned to Laingiidae by Bouillon (1978b). Later, *Fabienna* Schuchert, 1996 was also included in Laingiidae (Bouillon & Barnett, 1999).

When naming *Laingia*, Bouillon was unaware that the name was already in use for a genus of insects (*Laingia* Theobald, 1922; *Laingia psammae* Theobald, 1922; family Aphidae). *Laingia* Bouillon, 1978b is thus an invalid junior homonym and must be replaced [International Code of Zoological Nomenclature, ICZN Art. 60]. No available and potentially valid synonyms for the name are known [ICZN Art. 60.3], and a new substitute name is proposed here. The genus name *Laingia* is also used for some marine red algae (*Laingia* Kylin, 1929; Rhodophyta).

Jean Bouillon became aware of the homonymy discussed here in 2008, and despite his deteriorating health he planned to publish new replacement names for the genus and family he had established. In early 2009, he discussed the plans and names he had in mind with his friend Ferdinando Boero in Lecce, Italy. Prof. Bouillon unfortunately passed away on 29 March 2009 without finalizing a manuscript draft and Prof. Boero thus asked the first author to publish the new name according to the wishes of J. Bouillon.

A new replacement name, *Magapia*, nom. nov., is proposed herewith for the preoccupied genus name *Laingia* Bouillon, 1978b. The type species of the genus remains *Laingia jaumotti* Bouillon, 1978b [ICZN, Art. 67.8], now *Magapia jaumotti*, comb. nov. (Bouillon, 1978b).

The family-group name Laingiidae Bouillon, 1978b is also invalid and must be replaced [ICZN Art. 39]. Magapiidae, nom. nov., is proposed as a new replacement name for this hydrozoan family. The subclass name Laingiomedusae Bouillon, 1978b need not be replaced.

The name *Magapia* was chosen in memory of Miller Magap, manager of the biological station Leopold III on Laing Island (see Bouillon *et al.*, 1987). Prof. Bouillon spent many months at the station and discovered many remarkable new species there, including *Magapia jaumotti* (see Bouillon, 1978b-c, 1980-1984; Bouillon *et al.*, 1988-1986).

Miller Magap, a Papua New Guinean, offered invaluable assistance to scientists visiting the station, and he was much appreciated by all. Aged 49, he was brutally murdered on 24 March 1997. While travelling back to the station on a truck, he and several scientists were ambushed by local bandits intent on robbery. A stone thrown by the attackers – meant to stop the vehicle by breaking the window – hit his head, and he died within minutes. His untimely death while at work deeply touched Prof. Bouillon and other scientists.

ACKNOWLEDGEMENTS

I wish to thank Prof. N. Boero for bringing the homonymy problem to my attention and for his confidence by entrusting to me the task to fulfil Jean Bouillon's plans.

My sincere thanks go also to Prof. Dale Calder who read and commented a first draft of this publication. As with so many other publications, his corrections considerably improved the style and language of this contribution.

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The European athecate hydroids and their medusae (Hydrozoa, Cnidaria): Filifera Part 5

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The European athecate hydroids and their medusae (Hydrozoa, Cnidaria): Filifera Part 5. - This study reviews all European hydroids belonging to the filiferan families Bythotiaridae, Proboscidiactylidae, Magapiidae, Ptilocodiidae, Eucodoniidae, Russelliidae, Niobiidae, Protiaridae, and Trichydridae. *Protiara tetranema* (Péron & Lesueur, 1810) is considered as an unrecognizable species. The gonozooids of *Halitiara formosa* and *Trichydra pudica* are described, both have reduced blastostyles in a gonotheca-like casing.

Keywords: Cnidaria - marine - Hydrozoa - revision - taxonomy - north-eastern Atlantic - Mediterranean.

INTRODUCTION

This study is the sixth in a series of taxonomic revisions and reviews of the European athecate hydroids and their medusae (Order Anthoathecata = Anthomedusae = Athecata). The previous ones are: Schuchert (2004; Oceaniidae and Pachycordylidae), Schuchert (2006; Acaulidae, Boreohydridae, Candelabridae, Cladocorynidae, Cladonematidae, Margelopsidae, Pennariidae, Protohydridae, Tricyclusidae), Schuchert (2007; Bougainvilliidae, Cytaeididae, Rathkeidae, and Pandeiidae), Schuchert (2008a; Hydractiniidae, Rhysiidae, Stylasteridae), Schuchert (2008b: Eudendriidae). This publication concludes the Filifera with the families Bythotiaridae, Proboscidiactylidae, Magapiidae, Ptilocodiidae, Eucodoniidae, Russelliidae, Niobiidae, Protiaridae, and Trichydridae.

MATERIAL AND METHODS

See also Schuchert (2008a), for a general introduction to the Hydrozoa see Bouillon *et al.* (2004, 2006).

Where possible, it was attempted to supplement the species descriptions by sequence information from part of the 16S mitochondrial rRNA gene. The methods to obtain DNA sequences are described in Schuchert (2005, 2007). All sequences have been submitted to the EMBL database (accession numbers FN422378-FN422379). DNA of some specimens was also given to other researches who determined 16S or other gene sequences. The origin and identity of the material used to obtain the 16S sequence data as well as the accession numbers are given for each species in the section "Material examined".

ABBREVIATIONS

BMNH	The Natural History Museum, London, England
ERMS	European Register of Marine Species (Costello <i>et al.</i> , 2001)
MHNG	Muséum d'histoire naturelle de Genève, Switzerland
ICZN	International Code of Zoological Nomenclature
IRSN	Institut Royal des Sciences Naturelles de Belgique, Bruxelles
ZMUC	Zoological Museum Copenhagen, Denmark
ZMA	Zoological Museum Amsterdam, The Netherlands
ZMB	Zoological Museum Berlin, Germany

TAXONOMIC PART

FAMILY BYTHOTIARIDAE MAAS, 1905B

SYNONYMS: Calycopsidae Mayer, 1910: 104. – Bythotiaridi Mayer, 1910: 183.

DIAGNOSIS: Medusa without apical projection, marginal bulbs very indistinct or absent; four, eight or more hollow marginal tentacles, each terminating in large swelling covered by nematocysts, basal portion of tentacles usually adnate to exumbrella; with or without rudimentary or dwarf solid tentacles; four or eight radial canals, simple or branching, with or without centripetal canals growing from circular canal towards centre; without gastric peduncle, mouth with four simple or crenulated lips; gonads on manubrial wall, simple or horizontally folded, adradial or interradial. Rarely abaxial ocelli on tentacle bases.

Hydroid stage only known for *Bythotiara*, living in prebranchial cavities of tunicates, colonial or solitary, monomorphic; without perisarc; hydrorhiza root- or plate-like, hydranths unbranched, hydranth composed of a body and a sometimes indistinctly demarcated naked pedicel; with up to five irregular whorls of filiform tentacles concentrated in a narrow band below hypostome; medusa buds arising from polyps at junction of pedicel and hydranth body. Cnidome includes microbasic euryteles and large desmonemes.

REMARKS: See Bouillon *et al.* (2006) for more details and a key to all genera. The subdivision of the family in genera is not well resolved and progress is hampered by the fact that many polyp stages of this family remain unknown. The genera sometimes intergrade and it is sometimes difficult to draw a clear line separating them.

KEY TO THE GENERA OF BYTHOTIARIDAE MEDUSAE OF THE ERMS ZONE:

- 1a centripetal radial canals present, blindly ending or joining base of stomach *Calycopsis*
- 1b without centripetal radial canals 2
- 2a radial canals not bifurcated or more usually bifurcated once (some few additional branches may occur as abnormalities) *Bythotiara*
- 2b radial canals branching repeatedly at various levels *Sibogita*

Genus *Bythotiara* Guenther, 1903

SYNONYMS: *Ascidioclava* Kirk, 1915, type species *Ascidioclava parasitica* Kirk, 1915. – *Crypta* Fraser, 1911 [name preoccupied]. – *Endocrypta* Fraser, 1912, type species *Crypta huntsmanni* Fraser, 1911.

TYPE SPECIES: *Bythotiara murrayi* Guenther, 1903 by monotypy.

DIAGNOSIS: Bythotiariidae medusae with four simple or bifurcated radial canals, without centripetal canals; with or without secondary (rudimentary) tentacles, these entirely covered with nematocysts; gonads interradial, with transverse furrows; no ocelli. Polyp stage as given in family diagnosis.

REMARKS: Pagès *et al.* (1992) provided a table with the characteristics of all known *Bythotiara* medusae. Recently, Raskoff & Robison (2005) described a new *Bythotiara* polyp from pelagic tunicates, making it necessary to modify slightly the diagnosis of the polyp stage. Only one *Bythotiara* species occurs in the ERMS zone.

***Bythotiara murrayi* Guenther, 1903**

Fig. 1

Bythotiara murrayi Guenther, 1903: 424, pl. 10 figs 4-5. – Mayer, 1910: 185, figs 97-98. – Vanhöffen, 1911: 213, figs 9a-c. – Kramp & Damas, 1925: 281. – Hartlaub, 1914: 355, figs 304-306. – Kramp, 1924: 12, figs 8-12. – Kramp, 1926: 97, figs 38-40. – Ranson, 1936: 98, pl. 1 fig. 12. – Russell, 1940: 515, figs 8-10. – Russell, 1953: 215, figs 113a-b, 114a-b, 115-116, pl. 13 fig. 1. – Kramp, 1959: 125, figs 1, 132. – Kramp, 1961: 118. – Kramp, 1968: 54, fig. 142. – Van der Spoel & Bleeker, 1988: 167, fig. 17. – Pagès *et al.*, 1992: 7, fig. 7. – Schuchert, 1996: 22, fig. 8.

TYPE MATERIAL: Not located (not found in BMNH).

MATERIAL EXAMINED: BMNH 1985.10.21.1-4; North Atlantic; depth 821 m; 3 medusae collected 20.07.1955 to 20.06.1957.

DIAGNOSIS: Medusa about 20 mm high and wide, thick walls; stomach small; four interradial gonads with transverse furrows, no vertical subdivision. Four primary radial canals each bifurcating once (but additional branching may occur); eight or more tentacles (as many tentacles as radial canals); with small secondary and minute tertiary tentacles.

DESCRIPTION (after Russell (1953) and own observations): Umbrella hemispherical or somewhat bell-shaped, about as high as or slightly higher than wide, with rounded apex, jelly thick, no gastric peduncle.

Stomach small, somewhat rhomboid in shape; mouth with four short simple lips. Four gonads, one covering each interradial wall of stomach, with few transverse folds subdividing them into several masses, top mass triangular and with central depression (Fig. 1B).

Four primary radial canals, each bifurcating near point of origin from stomach to form eight straight, narrow, smooth canals joining narrow ring canal; each primary canal leaves stomach as short narrow funnel (= mesentery); additional branchings and irregularities of radial canals frequent (Fig. 1C-F). No ocelli.

Eight or more primary marginal tentacles (as many tentacles as radial canals), large, smooth, hollow, without bulbs or basal swellings, tentacles at base flattened orally and adnate to umbrella margin, each tentacle terminating in large hemispherical nematocyst cluster composed of desmonemes; one to five small hollow secondary marginal tentacles between every two primary marginal tentacles, secondary tentacles contain ?euryteles and desmonemes, otherwise similar to primary tentacles; additional tertiary dwarf tentacles may be present.

Nematocysts: ? microbasal euryteles and desmonemes, discharged desmonemes with five coils.

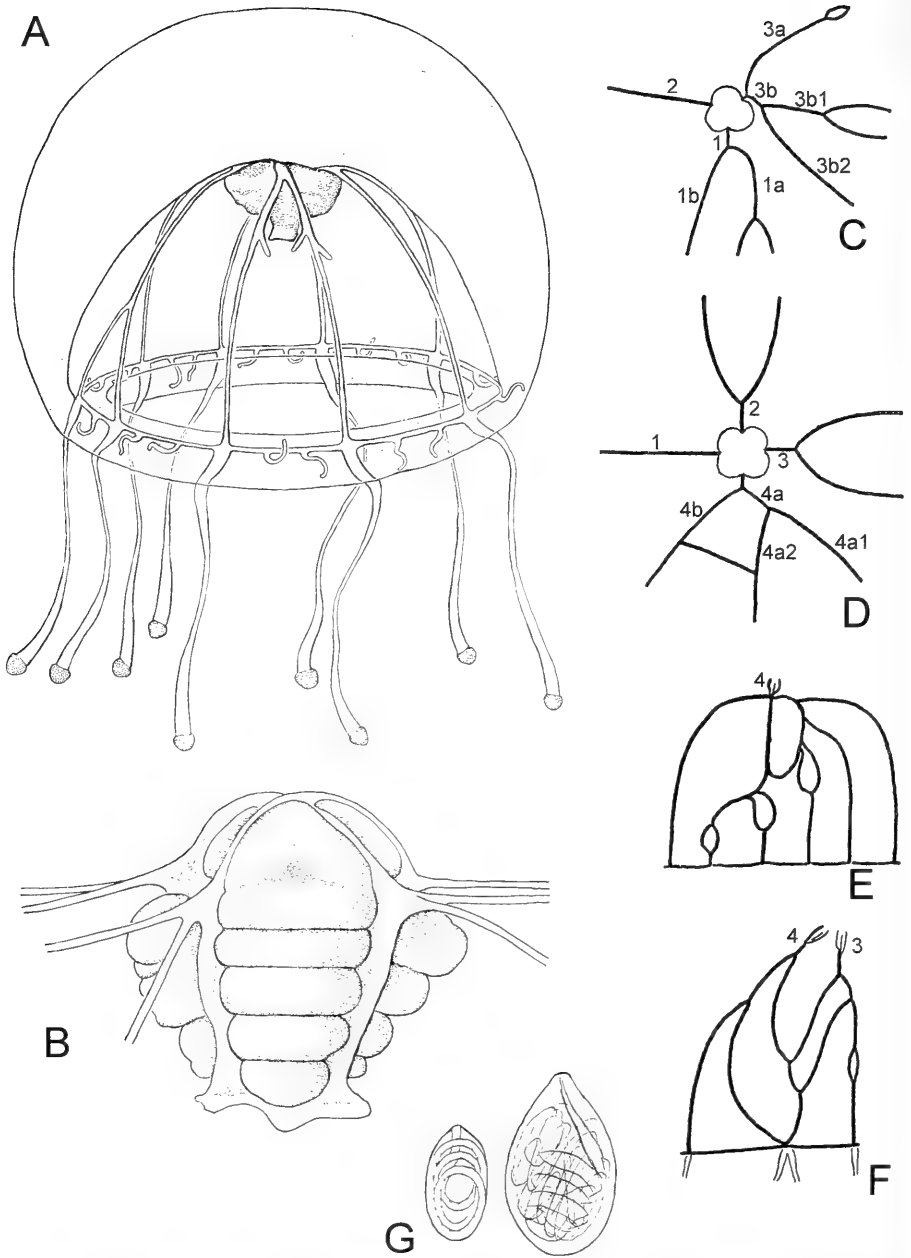


FIG. 1. *Bythotia murrayi* Guenther, 1903. (A) Mature medusa, maximal diameter about 25 mm, modified after Hartlaub (1914). (B) Manubrium with gonads, interradial view, modified after Russell (1953). (C-F) Variation of the branching pattern of the radial canals, from Kramp (1924), C-D in aboral view, E-F in lateral view, numbers and letters identify the radial canals and their branches. (G) Nematocysts: desmoneme and ? microbasic eurytele, for dimensions see text, from Russell (1940).

Colour of umbrella faint violet; gonad-covered part of stomach brick red; remainder of medusa colourless.

Polyp unknown.

DIMENSIONS (Russell, 1940; 1953): Mature medusae 5-21 mm in height. ? Euryteles (17-20)x(10-11) μ m; desmonemes (13-14)x(6) μ m.

DISTRIBUTION: Eastern Atlantic from Norway to South Africa; Mediterranean; north-western Atlantic; tropical parts of the Indian Ocean; Indonesia; Papua New Guinea, New Zealand (Hartlaub, 1914; Kramp & Damas, 1925; Russell, 1953; Kramp, 1968; Bouillon, 1980; Winkler, 1982; Van der Spoel & Bleeker, 1988; Pagès *et al.*, 1992; Schuchert, 1996). Type locality: 52.30167°N 15.89833°W (SW of Ireland).

BIOLOGY: *Bythothiarra murrayi* is an oceanic medusa that is only rarely encountered in inshore waters. It can be caught at depths of several hundred meters only.

REMARKS: The smallest medusa stages found by Russell (1953) measured 5 mm, but they already had mature gonads.

Genus *Calycopsis* Fewkes, 1882b

TYPE SPECIES: *Calycopsis typa* Fewkes, 1882b.

DIAGNOSIS: Bythotiariidae medusae with four initially unbranched radial canals and with four or more centripetal canals arising from the ring canal, blind or joining the cruciform base of stomach or the perradial canals. Gonads interradial, usually with eight adradial rows of deep transverse furrows, alternatively transversely folded, or smooth, or with pits; basal portion of tentacles adnate to umbrella margin; tentacles hollow, usually tentacles all alike, rarely two types may be present, nematocysts only in terminal knobs. Without ocelli.

REMARKS: The genus *Calycopsis* and its species are discussed in Kramp (1959) and Lindsay *et al.* (2008). The polyps remain unknown. Below follows an identification key to the *Calycopsis* medusae of the Atlantic north of the Equator (adapted from Kramp, 1959). A species not yet known from the ERMS zone has been included in brackets. It is not unlikely that it will ultimately also be found in the ERMS zone.

KEY TO THE *CALYCOPSIS* SPECIES OF THE ERMS ZONE:

- 1a umbrella with funnel-shaped apical depression; 3-4 centripetal canals in each quadrant *C. typa*
- 1b umbrella without an apical depression 2
- 2a with only 4 perradial tentacles; one interradial centripetal canal; tentacle-base with adaxial appendage *C. krampi*
- 2b with 8 or more tentacles, no adaxial appendages on tentacle bases 3
- 3a umbrella margin with exumbrellar papillae; 2 centripetal canals in each quadrant; 8-12 tentacles [*C. papillata*]
- 3b marginal lobes of umbrella without papillae 4
- 4a gonads smooth or with few, irregular transverse folds; one centripetal canal in each quadrant; 8 tentacles; all alike *C. simplex*

- 4b gonads with 8 adradial rows of deep, transverse furrows; more than 8 tentacles 5
- 5a 7 or more centripetal canals in each quadrant, most of them joining base of stomach or upper part of neighbouring canals; 16-32 tentacles . . . *C. chuni*
- 5b 1 or 2 centripetal canals in each quadrant 6
- 6a one centripetal canal in each quadrant, blind; 8-16 long and several small tentacles *C. bigelowi*
- 6b 1-2 centripetal canals in each quadrant, joining base of stomach; about 40 long tentacles *C. gara*

Calycopsis tya Fewkes, 1882

Fig. 2

Calycopsis tya Fewkes, 1882b: 304, pl. 1 fig. 34. – Mayer, 1910: 131, fig. 70. – Hartlaub, 1914: 359: figs 293-294, 307. – Kramp, 1959: 21, 127, fig. 139, revision. – Kramp, 1961: 121, synonymy. – Van Soest, 1973: 121, fig. 2a.

Sibogita nuarchus Bigelow, 1909b: 206, pl. 1 figs 1-8. – Bigelow, 1913: 21, synonym of *C. tya*.

Not *Calycopsis tya*. – Vanhöffen, 1911: 214, pl. 22 fig. 6. [= *C. chuni* Vanhöffen, 1911]

Not *Calycopsis tya*. – Vanhöffen, 1912: 364 [?= *C. papillata*]

Sibogita tya. – Mayer, 1910: 491.

? *Calycopsis tya*. – Pagès *et al.*, 1992: 7, fig. 8A-C.

TYPE MATERIAL: United States National Museum, catalogue number 9727 (not seen).

DIAGNOSIS: *Calycopsis* medusa with a characteristic funnel-shaped depression at apex, 3-4 blind centripetal canals in each quadrant, 16 long tentacles.

DESCRIPTION: Medusa umbrella spherical to barrel-shaped, jelly thick, solid, with a characteristic funnel-shaped depression at apex, umbrella somewhat laterally flattened, plane in which flattening occurs is either radial or interradial. Umbrella margin lobed through embayments for the tentacles.

Manubrium large and voluminous, length $1/2$ to $2/3$ of bell cavity, urn-shaped, about two-thirds as broad as long, aboral end cruciform in section, mouth with four short perradial lips, mouth rim smooth or crenulated.

Gonads interradial, discontinuous in the perradii, with eight adradial rows of about 20 horizontal furrows, irregular, projecting lobes of gonads may be developed.

Four radial canals, widening near manubrium and forming short mesenteries, 3-4 blind centripetal canals in each quadrant, interradial centripetal canal the furthest developed, reaching nearly to the base of the manubrium, maximally usually around 16 canals in total, maximum number of canals observed 21.

Connected with each canal is a well-developed tentacle, thus around 16 in total, between long tentacles usually occur very small tentacles (16), long tentacles adnate to umbrella margin in furrows at the rim, long tentacles with club-like swollen ends, concentration of nematocysts at tip.

Colours: gonads deep brownish-red; terminal knobs pale yellowish.

DIMENSIONS: Up to 37 mm high and 40 mm wide. Bigelow (1909b, as *Sigogita nuarchus*) gives a table with measurements, tentacle- and canal numbers.

BIOLOGY: A deep-water species, usually occurring at depths of several hundred metres (Kramp, 1959).

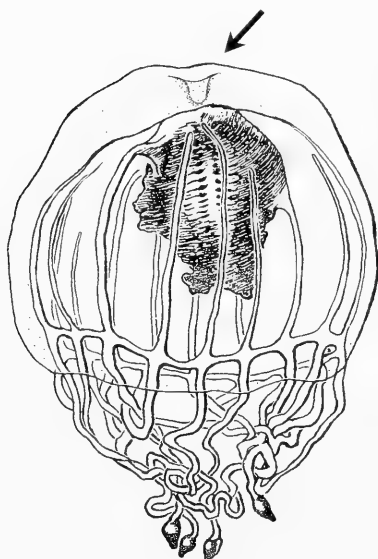


FIG. 2

Calyropsis tya Fewkes, 1882; modified after Bigelow (1909b) and Hartlaub (1914), note the characteristic apical funnel (arrow).

DISTRIBUTION: Atlantic Ocean, off the north-eastern coast of the USA, Cape Verde Islands (Kramp, 1959), Azores (Van Soest, 1973), ? South Africa (Pagès *et al.*, 1992). Type locality: Atlantic, off the New England, coast USA.

REMARKS: This species is rare in the ERMS area, it is only known from one specimen caught in deep waters NE of the Azores. The South African medusae described by Pagès *et al.* (1992) matched the description given above, but additionally they had knobs of nematocysts on the adaxial sides of the tentacle bases. Such knobs have never been mentioned for *C. tya* by other authors and perhaps the South African medusae belong to a new, unnamed species.

***Calyropsis krampi* Petersen, 1957**

Fig. 3

Calyropsis krampi Petersen, 1957: 31, figs. 2-3. – Kramp, 1959: 126, fig. 135. – Kramp, 1961: 120. – Fraser, 1974: 13.

MATERIAL EXAMINED: ZMUC; holotype, without registration number; Dana Station 9806; 50.917°N 14.000°W; net tow with 120-200 m wire out; 21 August 1955.

DIAGNOSIS: *Calyropsis* medusa up to 4 mm high, 4 tentacles, 4 centripetal canals, at base of each tentacle an adaxial appendage pointing into bell cavity.

DESCRIPTION: Medusa spherical, jelly thick. Manubrium large and voluminous, length 3/4 of bell cavity. Four large interradial gonads leaving only mouth-region and perradial parts of manubrium visible; each gonad with very deep, vertical interradial furrow and three to four irregular transverse folds. The perradial surfaces of the stomach form four prominent longitudinal ridges, continued as short mesenteries where they join the radial canals.

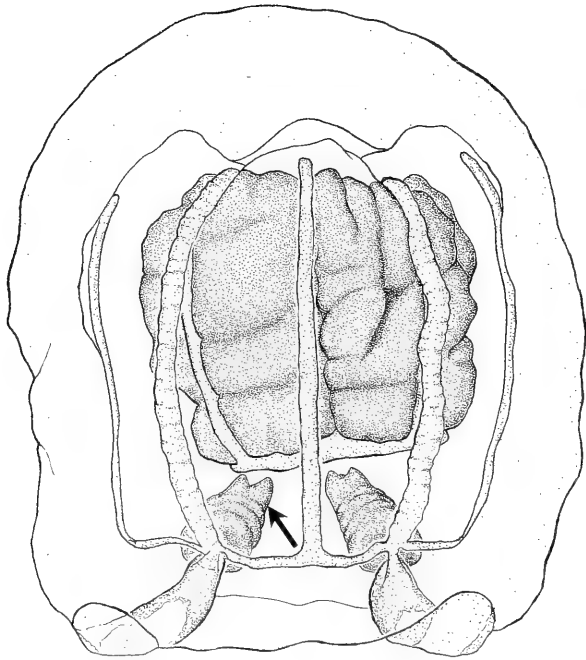


FIG. 3

Calycopsis krampi Petersen, 1957; modified after Petersen (1957), size 4 mm, the arrow points at one of the characteristic adaxial projections.

Four complete radial canals and four narrower, blind centripetal canals reaching almost to the top of the bell.

Four perradial tentacles without tentacular bulbs, proximal parts adnate to bell margin, structure of distal ends unknown. Four prominent adaxial appendages at the places where the radial canals join the ring canal, one in each perradius, projecting obliquely into bell cavity (arrow in Fig. 3). Each projection forms a direct adaxial continuation of the basal part of the tentacle attached to the exumbrella, the projection is about half the diameter of the bell opening long, nearly half as broad as long, tapering a little distally, drawn into two 'papillae' at the tip, aboral side with a longitudinal ridge.

DIMENSIONS: Umbrella 4 mm high and 3 mm wide.

BIOLOGY: Likely restricted to depths below 100 m, Fraser (1974) recorded it from deep waters east of Rockall.

DISTRIBUTION: A very rare species occurring west of the British Isles (Petersen, 1957; Fraser, 1974). Type locality: Porcupine Seabight SW of Ireland, 50.917°N 14.00°W, max. 200 m depth.

REMARKS: This species is known from only three specimens. Its perradial projections are unique and render the species quite distinct. The transversal folds of the gonads seen in the type specimen could be a fixation artifact.

***Calyropsis simplex* Kramp & Damas, 1925**

Fig. 4

Calyropsis simplex Kramp & Damas, 1925: 282, figs 23-25. – Kramp, 1959: 126, fig. 133. – Kramp, 1961: 121. – Goy, 1973: 986, fig. 8. – Gili *et al.*, 1998: 116, fig. 2.

TYPE MATERIAL: Bergen Museum, Norway (not seen).

MATERIAL EXAMINED: MNHN1647; Mediterranean, France, Bay of Villefranche-sur-Mer; 16 December 1966; one medusa, material of Goy (1973).

DIAGNOSIS: *Calyropsis* medusa up to 9 mm, hemispherical; gonads smooth or with few, irregular transverse folds; 4 blind interradial centripetal canals; 8 tentacles all alike.

DESCRIPTION: Medusa globular to hemi-spherical, jelly moderately thick, umbrella margin with embayments for tentacles.

Manubrium conical, length 1/2 of bell cavity, cruciform cross-section, mouth small, corners not much drawn out. Gonads cover manubrium almost entirely as eight large adradial pads, adnate interradially but separated by deep vertical furrows, separated perradially, surface either smooth or with few, irregular transverse folds.

Four complete radial canals and four blind centripetal canals reaching to middle or top of the bell.

Eight tentacles, four perradial, four interradial, all alike, without tentacular bulbs, proximal parts adnate to bell margin, distal ends swollen, elongated club-like. No ocelli.

DIMENSIONS: Umbrella diameter 8-9 mm.

DISTRIBUTION: Norway (Kramp & Damas, 1925), Mediterranean (Goy, 1973; Gili *et al.*, 1998). Type locality: Hjørundfjord, Norway, deeper than 400 m.

BIOLOGY: Likely a deep water species, two of the three records were from more than 400 m depth.

***Calyropsis chuni* Vanhöffen, 1911**

Fig. 5

Calyropsis chuni Vanhöffen, 1911: 217, pl. 22 fig. 8. – Bigelow, 1940: 290. – Kramp, 1959: 23, 127, fig. 140, revision. – Kramp, 1961: 119. – Kramp, 1968: 55, fig. 148.

Calyropsis valdiviae Hartlaub, 1914: 360. – Kramp, 1959: 23, synonym.

Calyropsis typa. – Vanhöffen, 1911: 214, pl. 22 fig. 6. [not *Calyropsis typa* Fewkes, 1882]

TYPE MATERIAL: Naturkundemuseum Berlin, Germany, syntypes ZMB Cni 14845 and ZMB Cni 14838 (not seen).

DIAGNOSIS: *Calyropsis* medusa around 30 mm high and wide, jelly thick, 32 or more radial canals, 16 long tentacles and up to 16 short ones; gonad in each quadrant with two vertical rows of 19-32 transverse clefts.

DESCRIPTION (Vanhöffen, 1911; Kramp, 1959): Umbrella spherical to somewhat oblong, jelly thick and rigid.

Manubrium about half as long as bell cavity, mouth rim crenulated, perradial corners of mouth drawn out into four simple lips, manubrium-base cruciform.

Gonad covering most of manubrium, with eight adradial rows of 19-32 parallel transverse furrows.

Four perradial canals and usually 28 centripetal canals, occasionally up to 60, all communicate with stomach in fully grown specimens, usually directly joining the

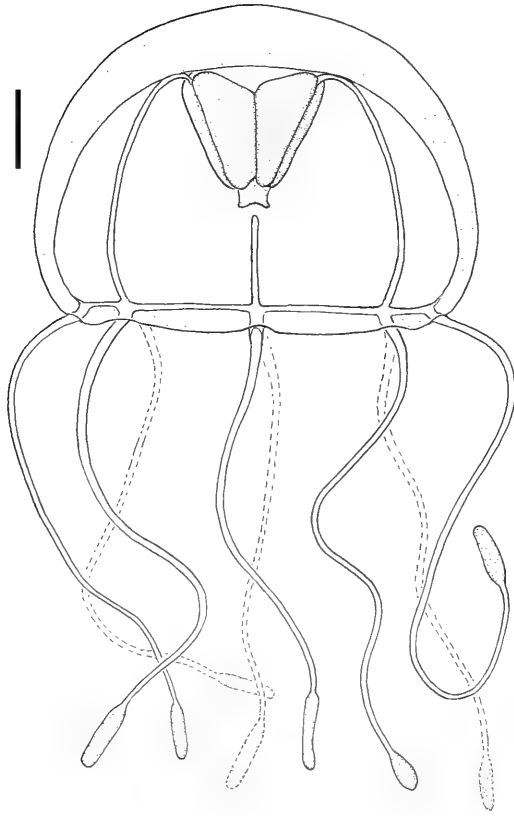


FIG. 4

Calycopsis simplex Kramp & Damas, 1925; after preserved material from the Mediterranean, scale bar 2 mm.

stomach and thus like radial canals, but sometimes fused with a neighbouring canal close to manubrium. In younger specimens some centripetal canals ending blindly.

16 large tentacles (max. 24) with terminal swellings and up to 16 small, hook-shaped tentacles, all tentacles in phase with radial and centripetal canals.

DIMENSIONS: Bell diameter 21-34 mm, height up to 38 mm (Kramp, 1959).

BIOLOGY: Occurs in deep and intermediate water layers (Kramp, 1959).

DISTRIBUTION: *Calycopsis chuni* has been recorded in the ERMS zone off the coast of Morocco and near the Canary Islands (Kramp, 1959). It is known to occur in the Indian Ocean from East Africa to the Malayan Archipelago, along the east coast of Australia, the Gulf of Panama, the West Indies, and the Atlantic coast of West Africa (Kramp, 1968). Type locality: Gulf of Aden, 1200 to 2000 m depth.

REMARKS: The high numbers of radial canals (including former centripetal canals that have joined the manubrium) characterize this rare species.

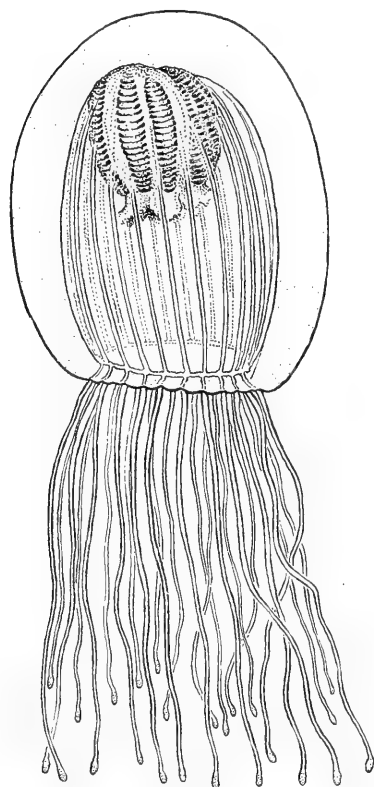


FIG. 5

Calycopsis chuni Vanhöffen, 1911; modified after Kramp (1959) and Vanhöffen (1911), bell size about 3 cm.

***Calycopsis bigelowi* Vanhöffen, 1911**

Fig. 6

Calycopsis bigelowi Vanhöffen, 1911: 218, fig. 12. – Kramp, 1957: 21, map fig. 4. – Kramp, 1959:127, fig. 136. – Kramp, 1961: 119. – Kramp, 1968: 56, fig. 149. – Van der Spoel & Bleeker, 1988: 167, fig. 16. – Schuchert, 1996: 26, fig. 10a-b.

TYPE MATERIAL: Holotype in Naturkundemuseum Berlin, Germany, ZMB Cni 14837 (not seen).

MATERIAL EXAMINED: BMNH 1957.2.1.760-764; Discovery stations 100, 100c, 101, 983, west of Cape Good Hope; 6 mature medusae, some rather damaged, material described in Kramp (1957). – See also Schuchert (1996).

DIAGNOSIS: *Calycopsis* medusa 8-16 mm high and wide, jelly thick, 8-16 long tentacles and up to 40 short ones; four radial canals and four blind interradial centripetal canals; gonad in each quadrant with two vertical rows of up to 16 deep, regular, transverse clefts.

DESCRIPTION: Medusa umbrella ovoid to spherical, jelly thick, soft and adhesive. Velum somewhat shifted into subumbrella.

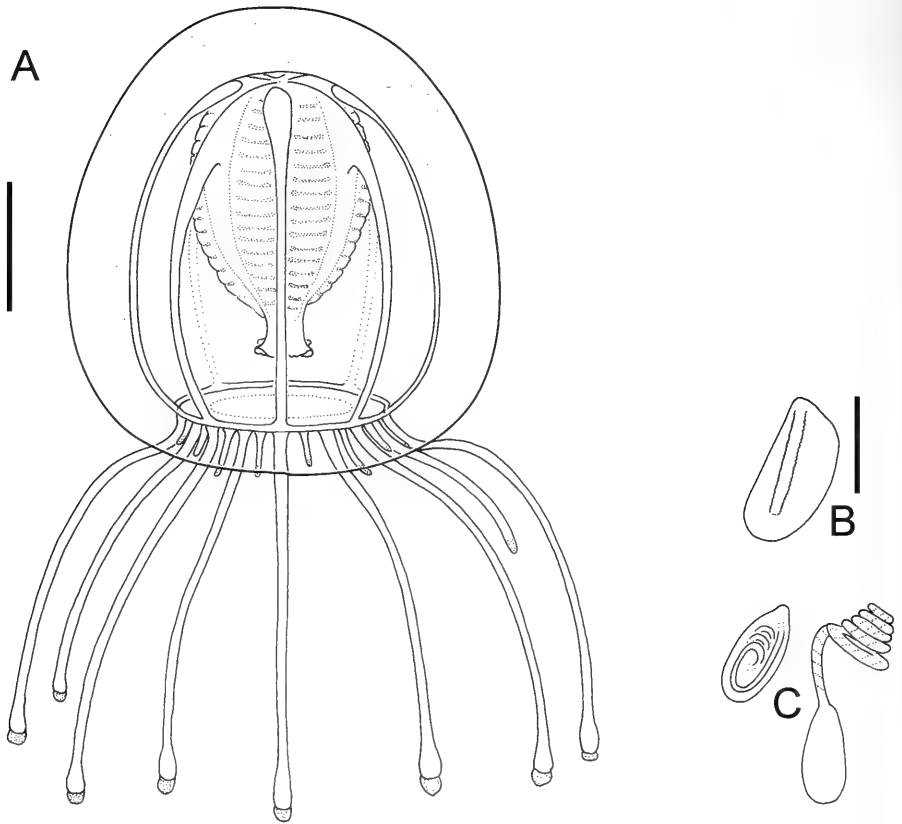


FIG. 6

Calycopsis bigelowi Vanhöffen, 1911; after Schuchert (1996). (A) Medusa, only frontal tentacles shown; scale bar 5 mm. (B) Heteroneme, scale bar 10 μ m. (C) Intact and discharged desmonemes, same scale as B.

Manubrium large and voluminous, length 2/3 of bell cavity, with cross-shaped base. Mouth with slightly undulating margin and with four small perradial lips. Four large, interradial gonads leaving only perradial parts of manubrium visible. Gonads with eight adradial rows of up to 16 horizontal furrows, occasionally some additional pits.

Four complete radial canals, widening near manubrium and forming mesenteries. Four additional centripetal canals which reach almost to the manubrium top, likely ending blindly, terminal region somewhat broadened. All radial canals are rather broad and are connected to the equally broad circular canal. No tentacular bulbs present.

Up to 16 long tentacles, four perradial, four interradial, and up to eight adradial ones. Perradial and interradial tentacles usually fully developed in mature animals and longer than bell height, most of the adradial tentacles are also fully developed but some are shorter and in mid-development. In addition to these 16 long tentacles, 16-40 short

tentacles. All tentacles hollow and with bases adnate to the umbrella margin. Long tentacles end in a terminal swelling with a concentration of nematocysts. Shorter tentacles without terminal swelling, but with a concentration of nematocysts. Without ocelli.

Nematocysts: rare heteronemes (Fig. 6B) and frequent, elongated desmonemes (Fig. 6C). Desmonemes on tentacle tips, discharged with five coils, thread with spiral pattern of small bristles

Colours: gonads yellow-green colour (Kramp, 1957) or red (Vanhöffen, 1911).

DIMENSIONS Mature medusa 9-16 mm high and wide, umbrella wall 3 mm. Desmonemes (11-12)x(5-6) μ m, heteronemes (14-15)x(7-8) μ m (Schuchert, 1996).

BIOLOGY: Oceanic species, prefers deep waters down to 2500 m (Kramp, 1957), usually around 400-600 m.

DISTRIBUTION: Gulf of Aden; South Africa; Indo-Malayan region; tropical Indian Ocean; New Zealand; Scotland, ? British Columbia (Kramp, 1965, Van der Spoel & Bleeker, 1988; Fraser, 1974; Schuchert, 1996; Brinckmann-Voss & Arai, 1998). Type locality: Gulf of Aden, depth 1100 m.

REMARKS: This is a rare species and in the ERMS region it is only known from a single specimen collected in deep water west of Scotland (Fraser, 1974). A very similar species is *Calyropsis gara* Petersen, 1957. It differs from *C. bigelowi* in having more (up to 46) long tentacles and four to eight centripetal canals. As only very few specimens of *C. bigelowi* and *C. gara* are known, their morphological variation is not sufficiently known and the status of *C. gara* is somewhat uncertain.

Calyropsis gara Petersen, 1957

Fig. 7

Calyropsis gara Petersen, 1957: 29, fig. 1. – Kramp, 1959: 127, fig. 137. – Kramp, 1961: 120. – Winkler, 1982: 37. – Bleeker & Van der Spoel, 1988: 231, fig. 17.

TYPE MATERIAL: ZMUC (not seen).

DIAGNOSIS: *Calyropsis* medusa 10-20 mm high, 8 radial canals, sometimes a few additional centripetal canals, gonads with 15-16 transverse clefts in eight vertical rows, 40-50 tentacles.

DESCRIPTION (Petersen, 1957): Medusa umbrella ovoid to spherical, evenly rounded, somewhat laterally compressed along two interradia, jelly thick.

Manubrium large and voluminous, length $\frac{2}{3}$ of bell cavity, half as wide as long, with cross-shaped base. Mouth rim smooth, four small perradial lips. Four large, interradial gonads leaving only perradial parts of manubrium visible. Gonads with eight vertical, adradial rows of up to 16 horizontal furrows, some can be irregular. The perradial edges of the stomach form meridional ridges which in their uppermost parts connect with the radial canals to form short funnels (=mesenteries).

Four radial canals, rather wide, usually four centripetal canals joining the base of the manubrium, sometimes additional blind centripetal canals. No tentacular bulbs present.

40-50 tentacles, some short, ending in a terminal swelling with a concentration of desmonemes.

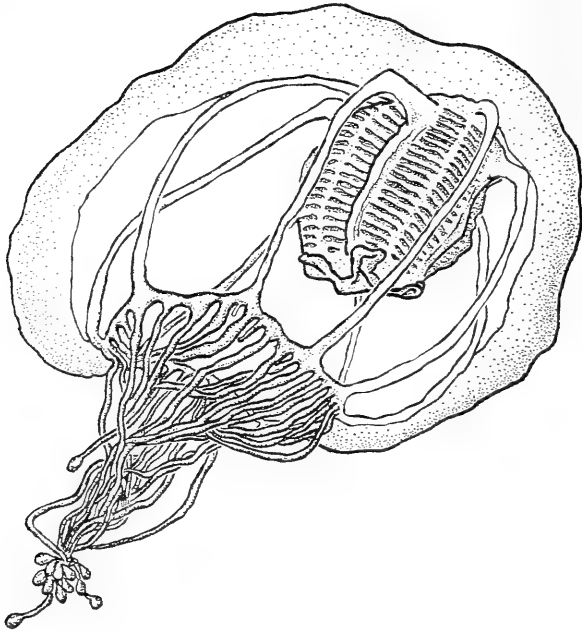


FIG. 7

Calycopsis gara Petersen, 1957; modified after Petersen (1957), bell size 11 mm.

DIMENSIONS: Bell diameter 11-21 mm, height 10-22 mm (Winkler, 1982).

BIOLOGY: All known records are from less than 200 m depth.

DISTRIBUTION: Central North Atlantic Ocean (Petersen, 1957; Winkler, 1982; Bleeker & Van der Spoel, 1988). Type locality: 50.883°N 34.417°W, 0-100 m.

REMARKS: See above under *C. bigelowi*.

Genus *Sibogita* Maas, 1905b

TYPE SPECIES: *Sibogita geometrica* Maas, 1905b.

DIAGNOSIS: Bythotiaridae with four primary radial canals which branch repeatedly at various levels; no centripetal canals, gonads with eight rows of transverse furrows. No ocelli. Polyps unknown.

REMARKS: This is currently a monotypic genus. Bigelow (1919) assumed that the side branches of the radial canals were actually centripetal vessels that arose from the ring canal and only later in life joined the radial canals. He therefore synonymized the genus with *Calycopsis*. Kramp (1959) outlined the taxonomic history of the genus and contested Bigelow's view of the growth direction of the radial canals. Kramp thinks that the branching radial canals arise indeed through branching during ontogeny and he thus has an argument to maintain the genus. The diminution of the canal width towards the periphery is a good argument in favour of this view. Nevertheless, the

difference to *Bythotiara* is not so clear-cut and *Sibogita* can admittedly be seen as a synonym of the former. As we neither know the polyp stage of *Bythotiara murrayi* nor of *Sibogita geometrica*, further discussions on the validity of *Sibogita* are premature.

***Sibogita geometrica* Maas, 1905b**

Fig. 8

Sibogita geometrica Maas, 1905b: 17, pl. 3 figs 16-18. – Mayer, 1910: 186, fig. 99. – Kramp, 1965: 49. – Kramp, 1968: 57, fig. 151a-b. – Van Soest, 1973: 121, fig. 2c. – Winkler, 1982: 37, figs 9-11. – Bleeker & van der Spoel, 1988: 234, figs 18-19. – Pagès *et al.*, 1992: 9, fig. 9.

Sibogita geometrica occidentalis Kramp, 1959: 28, 129, pl. 2 figs 2-3, text-figs 4-5.

Calycopsis geometrica. – Bigelow, 1919: 290, pl. 40 fig. 5-7, pl. 41 fig. 2.

TYPE MATERIAL: ZMA COEL no 3853 (not seen).

DIAGNOSIS: See genus diagnosis.

DESCRIPTION: Medusa umbrella globe- to pumpkin-shaped, top rather flat or even slightly concave, walls straight, thick, bell can be laterally compressed, without gastric peduncle, bell-margin undulated through embayments for tentacles.

Manubrium relatively short, square to cross-shaped in section, 1/4 to 1/2 of the height of the subumbrellar cavity, mouth with four more or less distinct lips, mouth rim undulated. Four large, interradial gonads with eight adradial rows of 6-19 horizontal furrows.

Four primary radial canals divided irregularly at different levels giving rise to a total of 16-43 radial canals joining the ring-canal, anastomoses of radial canals rarely present, no centripetal canals. Radial canals widening somewhat where they join the ring-canal, intersection containing dark pigment granules.

About half as many to as many long tentacles as there are radial canal endings, originating in line with radial canals, base adnate, highly contractile, distal end swollen, club-like. Between successive pairs of long tentacles usually a short, inward-directed tentacle.

Living specimen colourless except for faintly yellow manubrium (Kramp, 1959).

DIMENSIONS: Bell height usually around 2 cm (max. 4 cm), diameter 2 cm. Winkler (1982) gives the following data for Atlantic specimens: height 15 mm, diameter 21 mm, jelly 3 mm, manubrium 8 mm long and 5 mm wide. Kramp (1965) gives a table with the correlation of the bell-size and the number of radial canals.

BIOLOGY: A quite rare, oceanic species, usually found at depths of some 100 metres. Bleeker & van der Spoel (1988) found evidence for diel vertical migration as all night samples taken were above and all day samples below 200 m depth.

DISTRIBUTION: Malayan Archipelago and tropical Indian Ocean (Maas, 1905b; Bigelow, 1919), Bay of Biscay, Azores and Mid-Atlantic (Kramp, 1959; Van Soest, 1973; Winkler, 1982; Bleeker & van der Spoel, 1988), Benguela Current off South Africa (Pagès *et al.*, 1992) Type locality: northeast of Sulawesi, 1.633°N 124.46°E, 0-900 m.

REMARKS: Kramp (1959) thought that the Atlantic population differs slightly from the Pacific one and he introduced for the former the subspecies *Sibogita geo-*

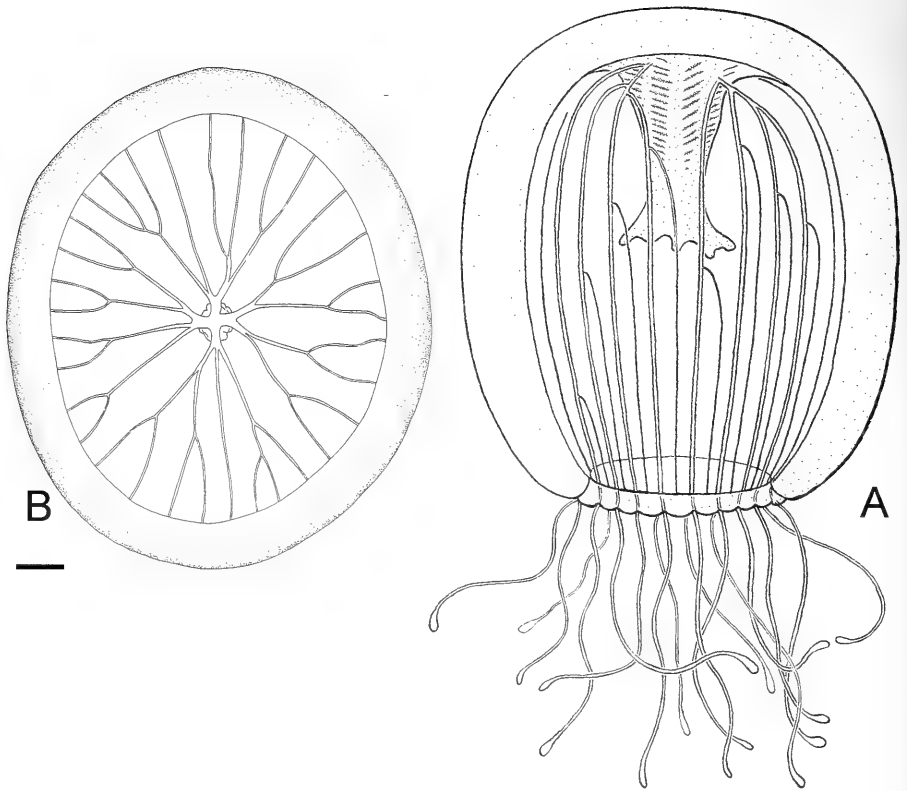


FIG. 8

Sibogita geometrica Maas, 1905b. (A) Medusa from Pacific in side-view, bell height 38 mm, modified after Maas (1905) and Mayer (1910). (B) Aboral view of medusa from Atlantic showing branching pattern of radial canals, from Winkler (1982), scale bar 3 mm.

metrica occidentalis. The differences to the nominal Pacific species were given as a smaller bell-size, fewer gonadal folds, and radial canals dividing already close to the centre. After having seen more specimens from the Pacific, Kramp (1965) then synonymized the subspecies *occidentalis* with the nominal Pacific species. Also other authors (e. g. Winkler, 1982; Bleeker & van der Spoel, 1988) confirmed this. Both forms occur in the Atlantic and the Pacific and they are connected by intermediate forms.

FAMILY PROBOSCIDIACTYLIDAE HAND & HENDRICKSON, 1950

SYNONYMS: Willsiadae Forbes, 1848 [family name incorrectly derived from genus *Willisia*]. – Laridae Hincks, 1868 [preoccupied by Laridae Rafinesque, 1815, Seagulls]. – Hydrolaridae Allman, 1872 [type species *Lar sabellum* Gosse, 1857 by monotypy]. – Williadi Haeckel, 1879 [invalid emendation of original name]. – Williadi Mayer, 1910. – Willsiadae Stechow, 1913 [correct derivation of name].

DIAGNOSIS (Bouillon *et al.*, 2006): Hydroid usually on rim of sabellid polychaete tubes, with creeping, naked stolons; hydranths almost sessile, polymorphic;

gastrozoid with rounded hypostome, separated from body by a constriction; hypostome with large pad of nematocysts somewhat displaced onto one side, two filiform tentacles arising close together beneath hypostomial constriction, opposite to nematocyst cluster; gonozooids and dactylozooids without tentacles, mouth-less and smaller than gastrozooids; medusa buds close to gonozooid tip.

Medusa umbrella mostly hemispherical; with exumbrellar nematocyst buttons or bands alternating with tentacles; radial canals branched, obliterated canals sometimes present; usually instead of circular canal a solid gastrodermal marginal strand; manubrium base with four, six or more radial gastric lobes, extending along proximal portions of radial canals, lobes in some species inconspicuous; gonads surrounding manubrium and extending onto gastric lobes; tentacles hollow, with swollen hollow base connected to the lumen of radial canals.

REMARKS: For the taxonomic history and naming of this family see e. g. Browne (1905), Maas (1905a), Bigelow (1909a), Hartlaub (1917), Stechow (1923), Kramp (1939), and Hand & Hendrickson (1950).

Hand and Hendrickson (1950) argued that the family name must be changed to Proboscidactylidae because Uchida & Okuda (1941) had previously synonymized *Willsia* with *Proboscidactyla*. But this renaming was not necessary, and the correct and valid name of this family would have been Willsiidae, as was argued by Stechow (1923). The name Willsiidae has, however, hardly been used and after 1950 many general treatises (e. g. Russell, 1953; Kramp, 1961) adopted the name Proboscidactylidae. Later authors exclusively used this name. In the interest of nomenclatural stability, the usage of the name Proboscidactylidae should thus be continued. This is explicitly endorsed by article 40.2 of the ICZN, because Hand and Hendrickson (1950) replaced the name Willsiidae with Proboscidactylidae before 1961.

Kramp (1939) referred the family to the Limnomedusae (subclass Trachylinae). The occurrence of desmonemes, the gonads on the manubrium, and the lack of statocysts argue strongly against this. It is nowadays again included in the Anthomedusae (=Anthoathecata = Athecata). Molecular phylogenies confirmed that they do not belong to the Trachylinae but to the Hydroidolinae, although the precise relationships within the latter subclass are not yet resolved (Cartwright *et al.*, 2008).

This family currently comprises only the genus *Proboscidactyla* (see Bouillon *et al.*, 2006). Schuchert (1996) also included the genus *Fabienna* Schuchert, 1996 in this family, replacing in part *Pochella* Hartlaub, 1917, a genus that had originally been included in the Proboscidactylidae by Russell (1938a) (now in Trichydridae). Although *Fabienna* has a close affinity with the family Proboscidactylidae (Schuchert & Reiswig, 2006; Cartwright *et al.*, 2008), it is here in the interim kept separate in the family Magapiidae (former Laingiidae) following Bouillon *et al.* (2006). See also the remarks for this family.

The medusae of the Proboscidactylidae have reportedly a solid strand instead of a radial canal. It is not clear if is true for all species. A detailed histological of several species would be most helpful.

Genus *Proboscidactyla* Brandt, 1835

SYNONYMS: *Willsia* Forbes, 1846 [type species *Willsia stellata* Forbes, 1846 by monotypy]. – *Lar* Gosse, 1857. – *Willia* Agassiz, 1862 [invalid emendation]. – *Dyscannota* Haeckel,

1879 [type species *Dyscannota dysdipleura* Haeckel = *P. ornata*]. – *Dicranocanna* Haeckel, 1879 [type species *Dicranocanna furcillata* Haeckel, 1879 = ? *P. ornata*]. – *Willetta* Haeckel, 1879. – *Misakia* Uchida, 1927 [type species *Misakia typica* Uchida, 1927, synonym of *Proboscidactyla ornata*]. – *Psythia* Agassiz & Mayer, 1902 [type species *Psythia prolifera* Agassiz & Mayer, 1902].

TYPE SPECIES: *Proboscidactyla flavicirrata* Brandt, 1835.

DIAGNOSIS: As for family.

KEY TO THE GENERA OF THE *PROBOSCIDACTYLA* SPECIES OF THE ERMS ZONE:

- 1a medusa with 4 primary radial canals, occurring in Mediterranean . . . *P. ornata*
 1b medusa with 6 primary radial canals, occurring in northern Atlantic . *P. stellata*

Proboscidactyla ornata (McCrary, 1859)

Figs 9-10

Willisia ornata McCrary, 1859: 149, pl. 9 figs 9-11.

Willia ornata. – Agassiz, 1865: 171, figs 274a-279. – Fewkes, 1882b: 299, pl. 1 figs 22-24.

Dyscannota dysdipleura Haeckel, 1879: 152.

? *Dicrocanna furcillata* Haeckel, 1879: 156.

Willetta ornata. – Haeckel, 1879: 157.

Willia gemmifera Fewkes, 1882b: 300, pl. 1 fig. 24.

Proboscidactyla ornata. – Browne, 1905: 726. – Mayer, 1910: 189, fig. 100, pl. 20 figs 1-10. – Neppi & Stiasny, 1913: 35, pl. 2 fig. 24, pl. 3 fig. 25. – Hartlaub, 1917: 368, figs 316-323. – Menon, 1932: 12, pl. 2 fig. 18. – Kramp, 1957: 13, pl. 3 fig. 7. – Kramp, 1961: 235, synonymy. – Kramp, 1962: 342, figs 7-10, synonymy. – Kramp, 1959: 178, fig. 255. – Kramp, 1965: 103. – Kramp, 1968: 108, fig. 290. – Calder, 1970: 130, fig. 1. – Calder, 1971: 44, pl. 3 fig. A, pl. 7 Fig. A. – Brinckmann & Vannucci, 1965: 357, figs 2-6. – Bouillon *et al.*, 2004: 74, fig. 43C-D. – Goy, 1973: 997.

Proboscidactyla tropica Browne, 1905: 727.

Proboscidactyla gemmifera. – Browne, 1905: 727.

Proboscidactyla varians Browne, 1905: 728, pl. 54 figs 1-2.

Proboscidactyla flavicirrata var. *stolonifera* Maas, 1905b: 21, pl. 4 figs 24-28.

Proboscidactyla ornata var. *stolonifera*. – Bigelow, 1909a: 220, pl. 6 figs. 1-2; pl. 41 figs. 1-7. – Mayer, 1910: 191, fig. 101.

Proboscidactyla ornata var. *gemmifera*. – Mayer, 1910: 192, fig. 101a, pl. 21, figs 1-3.

Misakia typica Uchida, 1927: 237, fig. 15.

? *Proboscidactyla conica* Menon, 1932: 13, pl. 2 fig. 18.

Proboscidactyla mutabilis. – Nair, 1951: 57. [not *Proboscidactyla mutabilis* Browne]

? *Proboscidactyla ornata*. – Goy *et al.*, 1991: 118, fig. 46.

TYPE MATERIAL: Based on a single medusa, not located.

MATERIAL EXAMINED: MHNG INVE 54619; Indonesia, Moluccas, Ambon; as *Proboscidactyla flavicirrata* var. *stolonifera*, material of Maas (1906), one medusa, umbrella shrunken.

DIAGNOSIS: *Proboscidactyla* medusa with square- to cross-shaped stomach base, without distinct gastric lobes, 4 primary radial canals, branching 1-2 times, 12-16 tentacles, medusa-buds may arise from corners of stomach or radial canals. Medusa buds on polyps with 4 tentacle bulbs.

DESCRIPTION (Mayer, 1910; Brinckmann & Vannucci, 1965; Calder, 1970): Hydroid colonial, arising from creeping, apparently naked stolons, polyps usually confined to end of polychaete tube, polyps polymorphic with gastrozooids and gonozooids (blastostyles). Gastrozooids in a single circle around the rim of the worm tube, almost sessile, body near base somewhat constricted and thus forming an indistinct

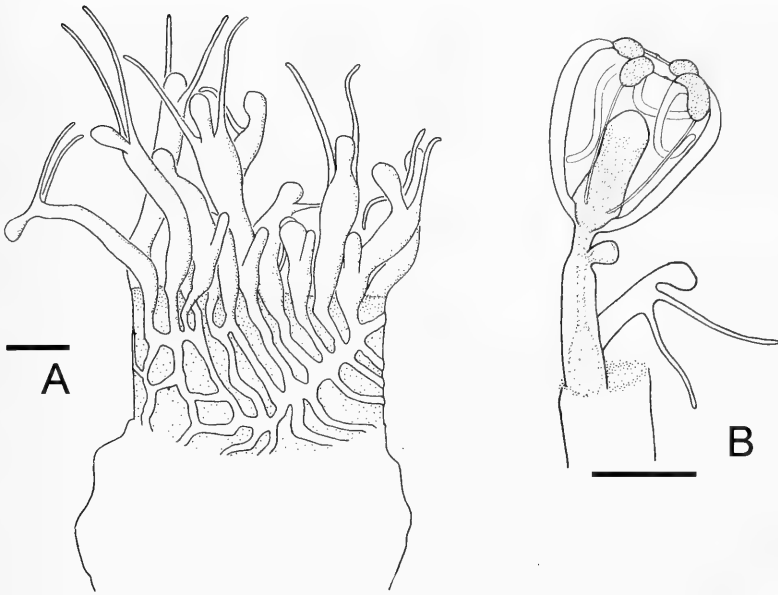


FIG. 9

Proboscidactyla ornata (McCrary, 1859); from Brinckmann & Vannucci (1965). (A) Hydroid on rim of polychaete tube, some incipient gonozooids (blastostyles) at bases of gastrozooids are visible; scale bar 0.5 mm. (B) Gonozooid with advanced medusa bud, at rear a gastrozooid; scale bar 0.25 mm.

pedicel, oral end enlarged to form a head-like proboscis separated from the rest of body by a constriction (neck). Two smooth tentacles arise close together from base of neck, tentacles arise on side facing the opening of the polychaete tube and give the hydranths a bilateral symmetry. Apex of proboscis with a cap-like nematocyst cluster containing white pigment granules.

Gonozooids usually smaller than gastrozooids (max 3/4), arising near base of gastrozooid on the side opposite the tentacles, body thin and tentacle-like, terminating in a small, spherical nematocyst cluster, without mouth. Gonozooids of more advanced stages can also be isolated from gastrozooid, occasionally several mm down the worm tube, but remaining in contact with the rest of the colony via the hydrorhiza. Gonozooids with up to four medusa buds in a single whorl located in upper half of polyp, buds in more advanced stages with four large tentacle bulbs. Nematocysts: desmonemes, microbasal euryteles of two size classes, and large macrobasal euryteles with indistinct swelling of shaft and thus difficult to distinguish from mastigophores.

Newly liberated medusa bell-shaped, with umbilical canal, stomach cylindrical and about half the length of the subumbrellar cavity, lips simple, four unbranched radial canals, no gonads present. Alternating with the tentacles are small clusters of nematocysts, evenly spaced on the exumbrella just above the margin. Nematocysts: macrobasal euryteles and desmonemes with unusually long threads in many loops, discharged with up to 15 loops.

Mature medusa bell-shaped, slightly higher than wide; jelly thick, rigid, shallow gastric peduncle can be present, near rim of exumbrella up to 16 small nematocysts clusters, one in-between each tentacle-pair, connected to rim of umbrella by meridional line on exumbrella. Manubrium flask-shaped, height 1/2 to 1/1 of subumbrellar height, base square- to cross-shaped, four perradial recurved lips, mouth margin with some crenulations. Gonads on sides of stomach, may extend onto radial canals, surface smooth.

Four primary radial canals, narrow, branching up to two times in well spaced branching points so that normally 16 canals reach the bell margin, rarely up to 20 canals, some populations with only up to 12 canals. No ring canal, but instead a solid strand of gastrodermal cells.

Usually as many tentacles as radial canals (around 16, range when mature 4-20), with relatively large marginal bulbs containing a brownish pigment.

Some populations have medusae that form stolon-like blastostyles bearing medusa buds, these blastostyles may arise from the corners of the stomach (= *gemmifera* form) or the branching points of the radial canals (= *tropica* form). Colours of Eastern Atlantic form: gastrodermis ochre-yellow or greenish-yellow, bulbs brown. Nematocysts: not described, but likely as in young medusa.

DIMENSIONS: Gastrozooids in nature 0.35-1.3 mm high, tentacles up to 1.5 mm long (Brinckmann & Vannucci, 1965; Calder, 1970). In culture, the polyps get larger (up to 1.8 mm, Brinckmann & Vannucci, 1965). The gonozooids are smaller (max. 3/4 of gastrozooids). Polyp nematocysts (Mediterranean form, Brinckmann & Vannucci, 1965): small microbasic euryteles (5-6)x(2-2.5) μ m; large microbasic euryteles (7.5-9.5)x(2.5-3.5) μ m; macrobasic euryteles (16-19)x(9-12.5) μ m. For data of a Western Atlantic population see Calder (1970).

The newly liberated medusa is about 1 mm in height and 0.8 mm wide (Brinckmann & Vannucci, 1965). The mature medusa can reach bell diameters of up to 5 mm (Kramp, 1968), but in the Mediterranean they remain much smaller (about 1 mm, Goy, 1973; Goy *et al.*, 1991; 3.4 mm Neppi & Stiasny, 1913) and they reach rarely or never the 16 tentacle stage. They can even have mature gonads at the four-tentacle stage. For nematocyst dimensions see Brinckmann & Vannucci, (1965) and Calder (1970).

BIOLOGY: The polyps occur exclusively on the tubes of sabellid polychaetes. Calder (1970; east coast of the USA) found it on *Sabella microphthalmia* Verrill living in somewhat brackish waters (salinities from 18ppt to 23ppt). In the Mediterranean, Brinckmann & Vannucci (1965) found it on the tubes of *Branchiomma vesiculosum* (Montagu) and other sabellids. In the Bay of Naples, the polyps are locally quite abundant (in depths of about 100 m), but the medusa is very rare (Brinckmann & Vannucci, 1965). It is also rare in other regions of the Mediterranean (Mediterranean (Neppi & Stiasny, 1913; Goy, 1973; Goy *et al.*, 1991). The liberated medusa develops gonads rather rapidly (after 2-6) days and is fully grown within 3-4 weeks (Brinckmann & Vannucci, 1965; Calder, 1970).

The medusa seems not to tolerate temperatures below 17-18°C (Brinckmann & Vannucci, 1965). It can be found close to the surface (Kramp, 1965).

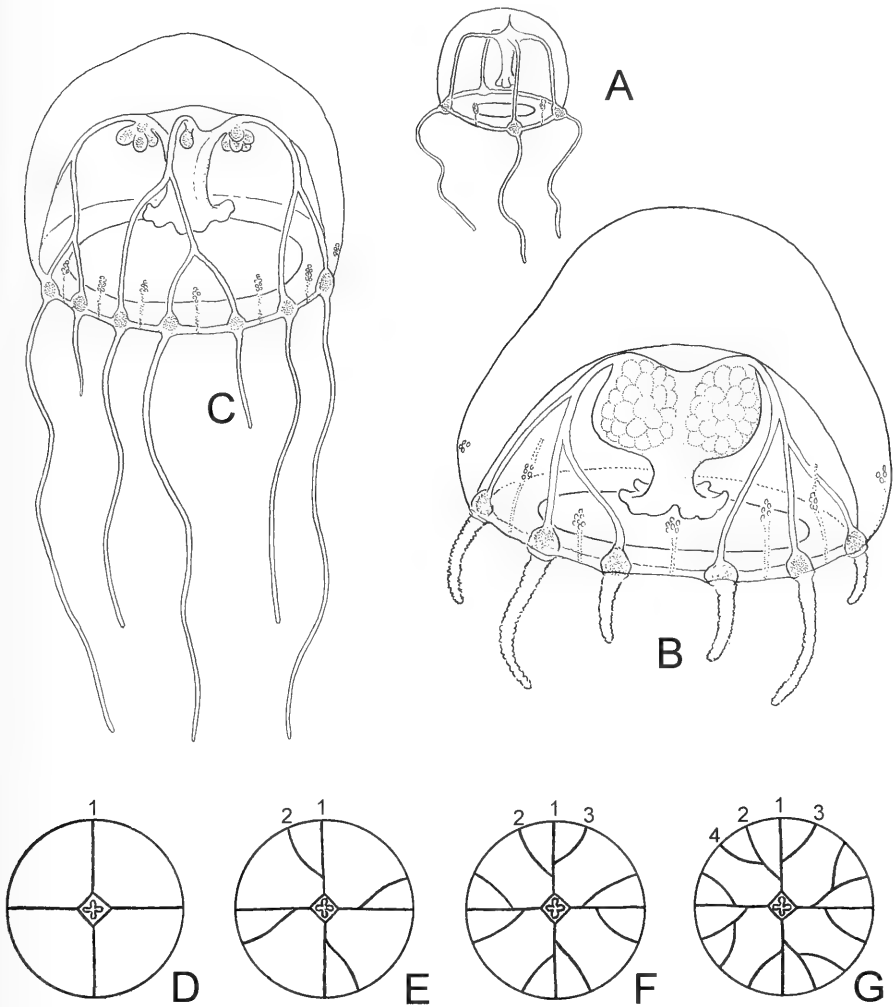


FIG. 10

Proboscoidactyla ornata (McCrady, 1859); modified after Mayer (1910), see text for dimensions. (A) Young medusa. (B) Mature female medusa. (C) Immature medusa with medusa buds on the corners of the stomach. (D-G) Sequence of the branching of the radial canals.

Uchida & Sugiura (1975) examined the medusa budding. Kawamura & Kubota (2008) investigated the influence of temperature and salinity on the asexual budding of the medusa.

Many biological observations made by Hand & Hendrickson (1950) on a Californian *Proboscoidactyla* species are certainly also valid for *P. ornata* (see also Hand, 1954).

DISTRIBUTION: The medusa has a circumglobal distribution in warm and coastal waters (Kramp, 1965). In Europe it occurs only in the Mediterranean (Bouillon *et al.*, 2004). The polyp stage is known from the Chesapeake Bay, USA (Calder, 1970) and the Mediterranean (Brinckmann & Vannucci, 1965). Type locality: Charleston Harbor, South Carolina, USA.

REMARKS: The life cycle of this species has been observed by Brinckmann & Vannucci (1965) for Mediterranean animals and by Calder (1970) for hydroids from Virginia, USA. Calder tabulates also differences between the two populations, mainly concerning the size of the nematocyst capsules. He interpreted the small differences as due to intraspecific variation and different culture conditions.

The medusae of *P. ornata* are quite variable and a number of species and subspecies have been proposed, mainly based on the presence and position of vegetative medusa buds. Kramp (1957; 1965) found good evidence that all these variants likely belong to the same species. Kramp (1962) also found a single medusa in Vietnam with a polyp growing out of the manubrium. This polyp had a dome-shaped hypostome surrounded by a whorl of 18 tentacles, thus is very much unlike all other *Proboscoidactyla* polyps known so far. The hydroids of the Pacific *P. ornata* have never been observed and it remains to be shown that they are identical to the Atlantic and Mediterranean ones. It could well be that our current concept of *P. ornata* nevertheless comprises several species.

The Mediterranean *P. ornata* medusae are relatively small and develop fewer tentacles and radial canals (max. 12). Gonads can even be present at the four tentacle stage and with unbranched radial canals (Neppi & Stiasny, 1913; Goy, 1973). The medusa from Lebanese waters described by Goy *et al.* (1991) also had these characteristics, in addition to medusa buds on the manubrium. This location of the medusa buds has so far never been observed in other populations.

***Proboscoidactyla stellata* (Forbes, 1846)**

Figs 11-12

Willisia stellata Forbes, 1846: 268. – Mayer, 1910: 193.

Lar sabellarum Gosse, 1857: 113, pl. 20. – Hincks, 1868: 36, fig. 2. – Hincks, 1872: 313, pl. 19. – Browne, 1896: 468, pl. 16 figs 3-4, synonym. – Browne, 1897: 818, figs 1-9.

Willia stellata. – L. Agassiz, 1862: 346. [incorrect subsequent spelling]

Willia stellata. – Browne, 1905: 725, 729. – Hartlaub, 1917: 374, figs 324-328. – Ranson, 1937: 323, fig. 1. – Russell, 1938b: 154, fig. 45. – Kramp, 1939: 503, figs 1-5.

Willisa cornubica Peach, 1867: 355, pl. 1 figs 1-2. – Russell, 1953: 393, synonym.

Willia furcata Haeckel, 1879: 158. – Russell, 1953: 393, synonym.

? *Proboscoidactyla brooksi* Mayer, 1910: 194, fig. 101C-F. – Russell 1953: 393, ? synonym.

Proboscoidactyla stellata. – Russell, 1953: 386, figs 250-256, pl. 23 figs 3-4. – Hand, 1954: 64. – Kramp, 1959: 178, fig. 256. – Kramp, 1961: 236, bibliography. – Pagès *et al.*, 1992: 37, fig. 41. – Galea, 2007: 29, pl. 1 fig. J. – Buecher *et al.*, 2005: 44.

TYPE MATERIAL: Not located, likely lost.

MATERIAL EXAMINED: France, Roscoff; living medusae, used for DNA extraction; 2 April 1998; plankton in 10 m depth; 16S sequence accession number **AM183138**. – BMNH 1962.11.7.34, polyps with medusae buds; Norway, Bergen, Espeland; 30 m depth; collected 09.08.1962; on *Pseudopotamilla reniformis* (curled tube). – BMNH 1985.9.1.13 polyps with medusae buds; Great Britain, Plymouth; collected 28.06.1937; leg. & det. W. J. Rees.

DIAGNOSIS: *Proboscoidactyla* medusa with star-shaped stomach with 6 lobes and 6 primary radial canals, 24 tentacles. Medusa buds on polyps have 6 tentacle bulbs.

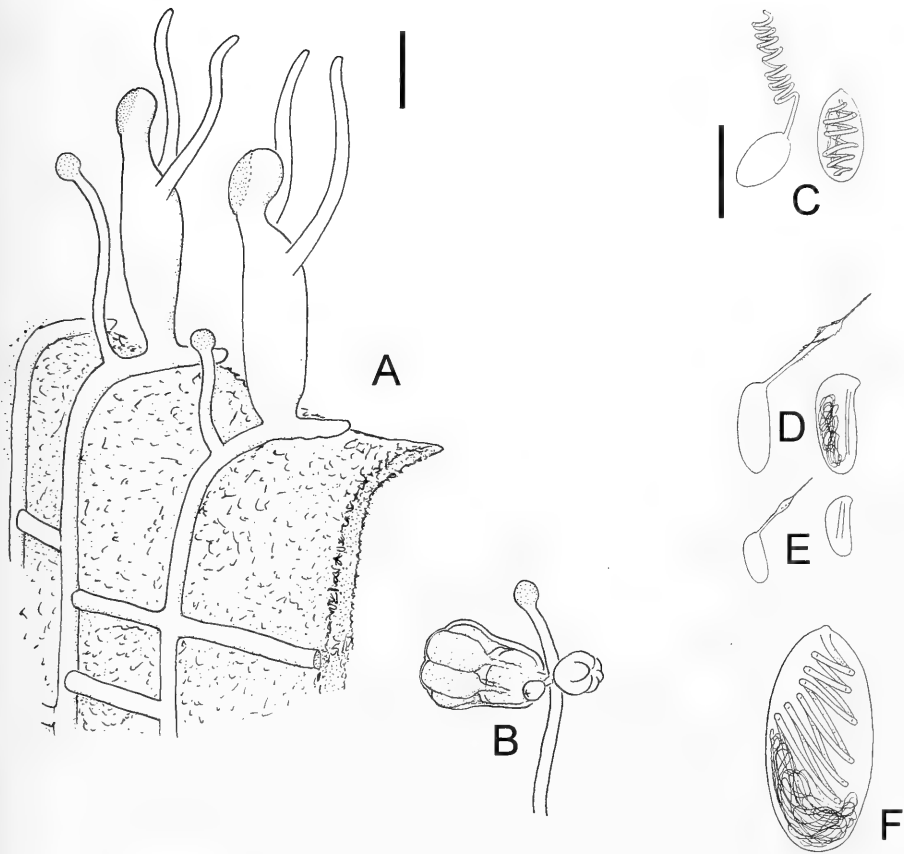


FIG. 11

Proboscidactyla stellata (Forbes, 1846); A-B, after preserved material from Norway, C-F modified after Russell (1938b). (A) Gastrozooids and gonozooids without medusa buds on the rim of a polychaete tube. Note that the tentacles are directed towards the opening of the tube, while the nematocyst clusters on the heads are directed in the opposite direction, scale bar 0.2 mm. (B) Gonozooid with medusa buds of different developmental stages. (C) Discharged and intact desmoneme, scale bar 10 μ m. (D) Discharged and intact large microbasic eurytele, same scale as C. (E) Discharged and intact small microbasic eurytele, same scale as C. (F) Intact macrobasic heteroneme, same scale as C.

DESCRIPTION (Russell, 1938b, 1953; own observations): Hydroid colonial, arising from creeping, apparently naked stolons, covering region near rim of polychaete tube, stolons net-like, more or less parallel to worm tube and with connections at right angles. Polyps usually confined to end of polychaete tube, polyps polymorphic with gastrozooids and gonozooids (blastostyles), gonozooids without medusa buds often present, can be interpreted as dactylozooids.

Gastrozooids in a single circle around the rim of the worm tube, almost sessile, body near base somewhat constricted and thus forming an indistinct pedicel, oral end enlarged to form a head-like proboscis separated from the rest of body by a constrict-

tion (neck). Two smooth tentacles arise close together from base of neck, tentacles arise on side facing the opening of the polychaete tube. Proboscis with a cap-like nematocyst cluster on side opposite to the tentacles. The nematocyst cluster and the two tentacles give the hydranths a bilateral symmetry.

Gonozooids usually smaller than gastrozooids (1/2), arising on stolons close to gastrozoid on the side opposite the tentacles, body thin and tentacle-like, terminating in a small, spherical nematocyst cluster, without mouth. Medusa buds in upper part of gonozooids, up to four in one whorl, buds not covered by membrane, buds in more advanced stages with six large tentacle anlagen (bulbs). Some gonozooid-like polyps without medusa buds can be present and may act as defensive dactylozooids.

Nematocysts of polyp stage: large macrobasic heteronemes (mastigophores or euryteles with faint swelling of shaft end), present only on proboscis; microbasic euryteles of two size classes; desmonemes with unusually long threads in many coils, discharged with up to seven coils.

Newly liberated medusa bell-shaped, with umbilical canal, velum broad, stomach cylindrical and about half the length of the subumbrellar cavity, attached to a very short gastric peduncle, gonads not yet developed, base with six short prolongations or lobes from which six primary radial canals start, radial canals unbranched. Six marginal tentacles, equal in size, on margin of umbrella, one opposite termination of each radial canal. Base of each marginal tentacle large and conspicuous, containing dark brown or blackish pigment. Alternating with marginal tentacles are small clusters of nematocysts, evenly spaced on exumbrella just above bell-rim. During the ensuing growth of the medusa the radial canals branch three times.

Umbrella of mature medusa dome-shaped, slightly wider than high; jelly thick. Velum narrow. On exumbrella near rim small pads of nematocysts, usually one per tentacle and one in-between each tentacle-pair (around 24 in total), the two series at different levels, usually a number of pads lost, all connected to margin of bell by a thin, meridional line of thickened epidermis.

Stomach short, six-sided, with six basal lobes prolonged for a short distance over the subumbrellar surface resulting in star-shaped base. Mouth with six folded lips. Very short gastric peduncle. Gonads situated at base of stomach wall and continued along the six lobes of stomach.

Six primary radial canals, each giving rise to three additional branches making twenty-four in all; all branching subject to considerable variation. Radial canals narrow. No ring canal, but instead solid strand of gastrodermis.

Twenty-four rather short marginal tentacles, each situated at end of a radial canal branch, filiform, hollow, with adaxial basal nematocyst cushion.

Colour of tentacle bases yellowish brown, dark purple-brown or black; colour of stomach and gonads yellow or reddish yellow. Nematocysts: not described.

VARIATION: Rarely only four primary canals are present. The population of Japan shows more variability (Uchida, 1927).

DIMENSIONS: Medusa when full grown 8 mm high and 9 mm wide. Newly liberated medusa about 1 mm high. Gastrozooids 0.6-2.5 mm high. Nematocysts of polyp stage (Russell, 1938b): large macrobasic heteronemes (24-33) \times (9-13) μ m; euryteles (9-13) \times (4-5) μ m, and (6.5-7) \times (2.5-3) μ m; desmonemes 10 \times 5 μ m.

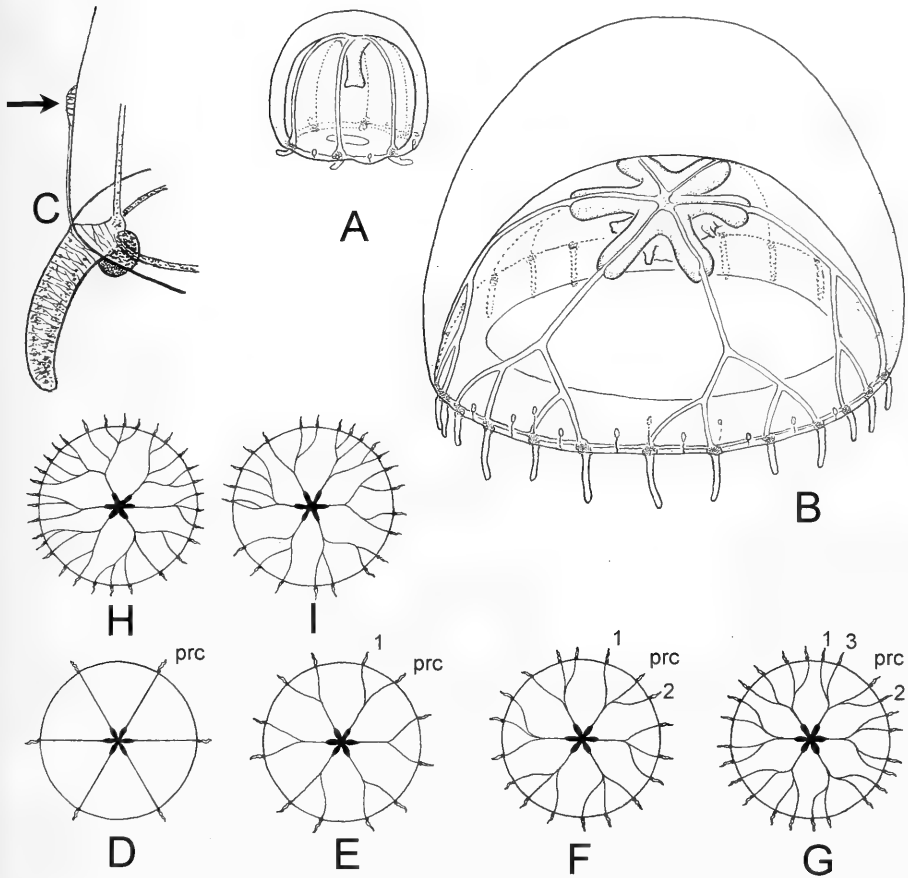


FIG. 12

Proboscidactyla stellata (Forbes, 1846); A-C, modified after Russell (1953); D-I, modified after Browne (1897). (A) Newly liberated medusa, bell height approx. 1 mm. (B) Mature medusa, bell diameter 4.2 mm. (C) Rim of medusa in side view showing tentacle and exumbrellar nematocyst clusters (arrow). (D-G) Development of the tentacles and the branching of the radial canals, prc = primary radial canal, 1 = first side-branch, 2 = second side branch, etc. (H-I) Irregular canal branching.

BIOLOGY: The life cycle of this species was elucidated by Browne (1896). The hydroid occurs exclusively on the tubes of sedentary polychaetes like *Megalomma vesiculosum* (Montagu), *Potamilla torelli* (Malmgren), *Pseudopotamilla reniformis* (Müller), or *Sabellaria* spec. The known depth range is from subtidal to about 50 m. (Gosse, 1857; Hincks, 1872; Russell, 1957; own data).

In the British Isles, the medusa may be found in any month of the year (Russell, 1953; Ballard & Myers, 2000). It occurs in the upper water layers.

DISTRIBUTION: In Europe from the northern part of the Bay of Biscay over the British Isles to Norway (Hartlaub, 1917; Rees, 1952; Russell, 1953; Russell, 1957;

Kramp, 1959; Teissier, 1965; Fraser, 1974; Ballard & Myers, 2000). The medusa has also been reported from Japan (Uchida, 1927), South Africa (Pagès *et al.*, 1992; Buecher *et al.*, 2005), and the Fjords of Chile (Galea, 2007). Perhaps also present along the Atlantic coast of the USA (Kramp, 1961, as *P. brooksi*). Type locality: Bay of Oban, Scotland.

REMARKS: Russell (1938b) identified the large heteronemes of the polyp as mastigophores, although he depicted one shaft that is clearly a eurytele. Hand & Hendrickson (1950) concluded that there are likely only euryteles in *P. stellata* and that Russell's mastigophores were a fixation artefact. In other *Proboscidactyla* hydroids the large heteronemes are of the eurytele type (Hand & Hendrickson, 1950; Brinckmann & Vannucci, 1965). Some heteronemes of hydrozoans can have a faint, variable swelling of the shaft and cannot be classified unambiguously as mastigophores or euryteles. Similar observations were made by Brinckmann & Vannucci (1965).

FAMILY MAGAPIIDAE SCHUCHERT & BOUILLON, 2009

DIAGNOSIS (modified after Bouillon *et al.*, 2006): Medusa umbrella almost hemispherical, margin lobed through furrows for tentacles; four radial canals; four tentacles with nematocysts concentrated terminally; no typical circular canal but a solid strand of gastrodermis; tentacles solid, issuing on exumbrellar surface above bell margin; alternating with tentacles there may be narrow exumbrellar nematocyst bands or triangular ciliated fields; manubrium simple, tubular or with cruciform base, mouth opening quadrangular to circular, no lips; gonads in four masses on the manubrium or on interradial pockets of the manubrium; no sense organs; cnidome: macrobasic mastigophores or macrobasic euryteles. Hydroid stage unknown.

REMARKS: This family was previously known as Laingiidae. Because the genus name *Laingia* is preoccupied, Schuchert & Bouillon (2009) introduced the replacement names *Magapia* and Magapiidae. The family Magapiidae is here placed in the order Anthoathecata and not in a subclass Laingiomedusae of its own as suggested by Bouillon (1978b). The medusae of the Magapiidae have a lobed umbrella margin and tentacles originating more or less on the exumbrellar side of the bell. They thus exhibit some characters otherwise found in the Narcomedusae. However, a similar situation is also found in *Thecocodium quadratum* (Anthoathecata, family Ptilocodiidae; see Jarms, 1987). In any case, with their gonads on the manubrium and the fully developed radial canals they match more typically anthomedusae rather than Narcomedusae and they are thus here classified as Anthoathecata Filifera. Molecular analyses (Collins *et al.*, 2006; Cartwright *et al.*, 2008) have shown that *Fabienna*, a genus placed in Laingiomedusae by Bouillon & Barnett (1999), does not belong to the Trachylinae and is closely related to some *Proboscidactyla* species. Admittedly, a final decision on the status of the Laingiomedusae can only be made once the position of its name-giving species, *Laingia jaumotti* Bouillon, 1978b, has been determined by a molecular phylogenetic analysis.

KEY TO THE LAINGIIDAE GENERA:

- 1a with exumbrellar nematocyst bands *Kantiella*
 1b without exumbrellar nematocyst clusters 2
 2a bell margin with interradial ciliated fields; marginal bulbs only slightly displaced from bell rim *Fabienna*
 2b no ciliated fields, tentacles shifted high up to exumbrella [*Magapia*]*

* not in ERMS zone

Genus *Kantiella* Bouillon, 1978

TYPE SPECIES: *Kantiella enigmatica* Bouillon, 1978.

DIAGNOSIS: Magapiidae medusa with radial exumbrellar nematocyst bands; gonads on four interradial pouches of manubrium; four short marginal tentacles with terminal cluster of nematocysts, tentacle bulbs not on bell margin but on exumbrellar side at some distance from margin.

REMARKS: The genus is currently monotypic.

Kantiella enigmatica Bouillon, 1978a

Fig. 13

Kantiella enigmatica Bouillon, 1978a: 158, fig. 13-14. – Bouillon, 1978b: 477, fig. 2, pl. 1. figs 1-3. – Goy *et al.*, 1991: 116, fig. 43.

HOLOTYPE: In IRSN (Bouillon *et al.*, 1995), not seen.

MATERIAL EXAMINED: IRSN, Papua New Guinea, Laing Island; 20 medusae collected July 1978 by J. Bouillon.

DIAGNOSIS: See genus diagnosis.

DESCRIPTION: Medusa umbrella hemispherical, mesogloea thick at apex (ca. 1/3 of total height), margin lobed through deep perradial embayments where tentacles originate, 4-8 short radial exumbrellar nematocyst bands originating from margin; short and broad gastric peduncle present.

Manubrium quadrangular, reaching almost to level of velum, mouth margin quadrate or circular, without marked lips, mouth rim with nematocysts. With or without medusa buds at apex of radial canals. Gonads covering interradial sides of manubrium, bulging, separated perradially by cleft.

Four simple radial canals, instead of circular canal a solid strand of gastrodermis.

Four short, solid tentacles, bulbs large, placed on exumbrellar side at some distance from margin, with short radial connection to circular strand, mesogloea of bell reduced below tentacles; nematocysts of tentacles confined to tip, initially in a terminal and an adaxial subterminal cluster, later both clusters fused. Nematocysts: ovoid holotrichous macrobasic mastigophores, on mouth rim, tentacle tips, tentacle bulbs, and exumbrellar bands.

Polyp stage unknown.

DIMENSIONS: Umbrella 3-4 mm wide, 2-3 mm high (Bouillon *et al.*, 2004). Macrobasic mastigophores (11-23) × (7-18) μm (Bouillon, 1978b).

BIOLOGY: A coastal species occurring in shallow depths.

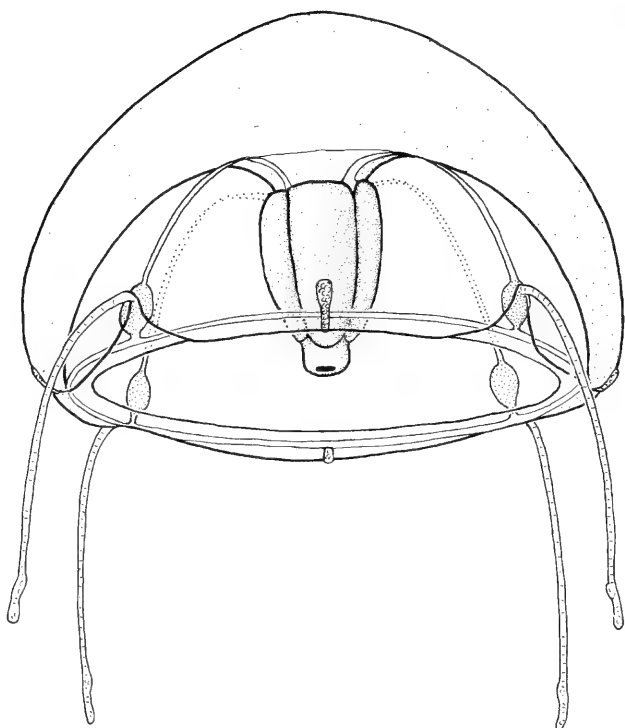


FIG. 13

Kantiella enigmatica Bouillon, 1978a; after preserved material from Papua New Guinea, bell diameter 4 mm.

DISTRIBUTION: Seychelles (Bouillon, 1978a), Papua New Guinea (Bouillon, 1978b), South Africa (Pages *et al.*, 1992), eastern Mediterranean (Goy *et al.*, 1991), Taiwan Strait (Xu & Huang, 2004). Type locality: Seychelles.

REMARKS: This species does not occur along the European coasts, but it has been found in the eastern Mediterranean (Lebanon; Goy *et al.*, 1991), thus within the ERMS zone.

Genus *Fabienna* Schuchert, 1996

TYPE SPECIES: *Fabienna sphaerica* Schuchert, 1996 by original designation.

DIAGNOSIS: Medusae with slightly lobed umbrella margin, four perradial tentacles that have their origin slightly displaced away from the bell margin, without exumbrellar nematocyst bands but instead interradial ciliary fields near umbrella margin. Manubrium with cruciform base, mouth simple. Nematocysts of tentacles concentrated in tip in one terminal cluster immediately followed proximally by a second adaxial cluster, the two clusters usually fused in older animals. Radial canal replaced by solid strand of gastrodermis. Cnidome includes macrobasic euryteles, no desmonemes. Gonads four large, interradial pads on manubrium.

REMARKS: The genus *Fabienna* shares with *Kantiella* the peculiar structure of the tentacles and to some degree also the cnidome (macrobasic heteronemes, absence of desmonemes). Species of both genera also show a strong overall similarity. The tentacle structure is likely a synapomorphy and the inclusion of *Fabienna* in the family Magapiidae by Bouillon & Barnett (1999, as *Laingiidae*) is therefore correct. Only one *Fabienna* species occurs in the ERMS zone.

***Fabienna oligonema* (Kramp, 1955)**

Pochella oligonema Kramp, 1955: 270, fig. 7, pl. 2, fig. 2. – Kramp, 1959: 179, fig. 259. – Kramp, 1961: 233. – Goy *et al.*, 1991:118. – Daly Yahia *et al.*, 2003: 650.
Fabienna oligonema. – Schuchert, 1996: 87. – Bouillon *et al.*, 2004: 115, fig. 60A.

MATERIAL OF *F. OLIGONEMA* EXAMINED: ZMUC, syntypes; Accra, Goldcoast, Atlantide station 77; 3 specimens examined for Schuchert (1996). The type material is lost as it dried out after it was returned to Copenhagen (observation made in 2005).

MATERIAL OF *F. SPHAERICA* FOR COMPARISON: MHNG INVE 33453; few medusae collected in surface plankton near Narrow Neck Beach, Devonport, New Zealand; 31 June to 2 July 2002; DNA sample taken from one specimen, 16S sequence GenBank accession number **AM183133**, 18S **AY920767**, 28S **AY920797**.

DIAGNOSIS: See genus diagnosis.

DESCRIPTION (Kramp, 1955; own data): Umbrella spherical to dome-shaped, jelly thick, especially at apex (about 1/3 of total height), with broad and shallow gastric peduncle (1/4 of manubrium height), margin somewhat lobed through shallow per-radial embayments where tentacles originate; exumbrella with scattered nematocysts, some interradial ciliated fields may be present near bell margin. Velum narrow.

Manubrium pyramidal, base cruciform, mouth simple, opening cruciform to quadrangular, perradial corners of mouth with nematocysts. Gonads four large, bulging, interradial pads covering large part of manubrium, shape ovoid, the four gonads separated perradially.

Four simple radial canals, ending in relatively large gastrodermal bulbs, bulbs somewhat displaced away from umbrella margin towards exumbrella, sometimes even with a short canal linking them to circular canal (strand?).

Tentacles about as long as bell height, bases adnate to umbrellar margin, solid, single row of gastrodermal cells, tentacle tips sometimes hook-shaped, nematocysts of tentacles concentrated in tip, in younger animals in one terminal and one adaxial, sub-terminal cluster, later both clusters fused, some additional nematocysts distributed along rest of tentacle. Nematocysts: unknown. Hydroid: unknown.

DIMENSIONS: Umbrella 2 mm high and wide.

DISTRIBUTION: Occurs in shallow depths.

DISTRIBUTION: A very rare species, known from waters off Lebanon and Algeria (Goy *et al.*, 1991; Daly Yahia *et al.*, 2003) and the Gulf of Guinea (western Africa, Kramp, 1955). Type locality: Accra, Ghana.

REMARKS: *Fabienna oligonema* is a very rare medusa, only a few specimens have been reported so far. It does not occur along the European coasts, but it has been found in the ERMS zone. Its currently known distribution suggests that it could also

occur in southern Spain, Italy, or Greece. It is well possible that it has been confounded repeatedly with *Hydractinia exigua* (see Schuchert, 2008a). This is easily possible for specimens that have lost their tentacles, as it is often the case for plankton-net samples.

This species was originally attributed to the genus *Pochella* Hartlaub, 1917. After the life cycle of the hydroid *Trichydra pudica* Wright, 1858 had been revealed (Rees, 1941; Edwards, 1973), it became evident that *Pochella polynema* Hartlaub, 1917 is the medusa stage of *Trichydra pudica*. Because *Pochella polynema* is also the type species of the genus, *Pochella* thus became a synonym of *Trichydra* Wright, 1858. Based only on its superficial similarity and pending more information on its life cycle, *P. oligonema* was provisionally also transferred to *Trichydra* by Edwards (1973a). Schuchert (1996) then regarded *Pochella oligonema* Kramp, 1955 as sufficiently distinct from *Trichydra* to be placed in a genus of its own, namely *Fabienna*.

The genus *Fabienna* comprises currently only two species, *F. sphaerica* Schuchert, 1996 and *F. oligonema*. Both are very similar and with the current state of knowledge hardly distinguishable. Schuchert (1996) lists the following differences: *F. oligonema* has a gastric peduncle, the tentacle bulbs get narrower towards the circular strand and are more displaced towards the exumbrella than in *F. sphaerica*, the gonads are more oval in shape compared to triangular in *F. sphaerica*. Unfortunately, a thorough comparison of the species was hampered by the suboptimal preservation of the syntypes of *F. oligonema*. It seems however that in one of the syntypes there were ciliated fields as in *F. sphaerica*. It was not possible to examine the nematocysts, nor could it be seen if the circular canal is solid or hollow.

Since my first description of *F. sphaerica* in 1996, I have seen more specimens, notably also fully mature living medusae (Fig. 14). The new observations make distinction of the two species even more difficult as fully grown *F. sphaerica* can also have a shallow gastric-peduncle as in *F. oligonema* (the gastric-peduncle of *F. oligonema* in the type specimens is much smaller than given in the figure of Kramp (1955).

Although *F. oligonema* and *F. sphaerica* could be conspecific, it seems better to retain both names for the time being, if only for biogeographic reasons. We do not know the polyp stage of both species (the youngest stages of *F. sphaerica* had an apical funnel and umbilical canal, thus were very likely budded from a polyp stage) and the cnidome of *F. oligonema* remains unknown. There is thus potential to find more and better defined differences. Evidently, we need a more detailed re-description of *F. oligonema* based on living animals.

FAMILY PTILOCODIIDAE COWARD, 1909

DIAGNOSIS: Polyps arising from reticular stolons or encrusting hydrorhiza without apparent perisarc. Polyps stolonial, naked, polymorphic; gastrozoid without tentacles; dactylozooids with four or more capitate tentacles, sometimes filiform tentacles. Gonophores on gonozooids or gastro-gonozooids; developing into fixed sporosacs, eumedusoids, or free medusae.

Mature medusa with more or less bell-shaped umbrella, with or without radial exumbrellar furrows, with marginal nematocyst ring from which usually arise several centripetal nematocyst bands or exumbrellar rows of refringent spots. With four marginal tentacles or tentacles absent. Manubrium with perradial nematocyst clusters,

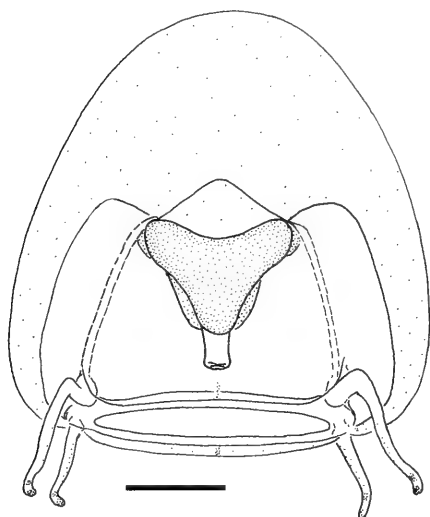


FIG. 14

Fabienna sphaerica Schuchert, 1996; drawn after a living, mature male medusa from New Zealand; scale bar 0.5 mm.

clusters may be on oral arms; gonads four interradial or eight adradial masses on manubrium; no ocelli.

REMARKS: For a recent revision of the family see Bouillon *et al.* (1997) or Bouillon *et al.* (2006).

KEY TO THE PTILOCODIDAE HYDROIDS:

- 1a dactylozooids of two types [*Hydrichthella*]*
- 1b dactylozooids of one type 2
- 2a hydrorhiza crust-like, not covered by visible perisarc [*Ptilocodium*]*
- 2b hydrorhiza a network of perisarc-protected tube-like stolons *Thecodium*

KEY TO THE PTILOCODIDAE MEDUSAE:

- 1a no marginal tentacles *Tregoubovia*
- 1b with marginal tentacles 2
- 2a four interradial gonads *Thecodium*
- 2b eight adradial gonads [*Hansiella*]*

* not represented in ERMS zone

Genus *Thecodium* Bouillon, 1967

TYPE SPECIES: *Thecodium brieni* Bouillon, 1967 by monotypy.

DIAGNOSIS: Hydroid with reticulate, tubular hydrorhiza, covered by perisarc. Polyps on stolons, sessile, naked, polymorphic, usually with gastro-gonozooids and dactylozooids. Gastro-gonozooids cylindrical or club-shaped, without tentacles, hypo-

stome with nematocysts. Dactylozooids thin, solid gastrodermis, terminal group of capitate tentacles. Gonophores fixed sporosacs or free medusae developing in a single whorl on gonozooids. Cnidome of polyp includes desmonemes.

Medusa with lobed bell margin, with marginal nematocyst ring from which usually arise several centripetal nematocyst bands or exumbrellar rows of refringent spots. Four radial canals and hollow circular canal, short mesenteries. Four marginal tentacles with bases embedded in umbrellar furrows, no ocelli. Manubrium with short, perradial mouth arms ending in nematocyst clusters; gonads interradial on manubrium.

REMARKS: For descriptions of fully developed *Thecocodium* medusa see Jarms (1987) and Kubota (1993). The ring circular canal of the medusa of *Thecocodium quadratum* is hollow (own unpublished observations on young medusae), unlike the Proboscidactylidae which have reportedly a solid circular strand.

KEY TO THE *THECOCODIUM* SPECIES OF THE ERMS ZONE:

- 1a dactylozooids with up to 5 capitate tentacles 2
- 1b dactylozooids with more than 7 capitate tentacles, gonophores liberated as medusae *T. penicillatum*
- 2a gonophores fixed sporosacs, shallow water form *T. brieni*
- 2b gonophores a medusa or medusoid, deep water form *Thecocodium* spec.

Thecocodium brieni Bouillon, 1967

Fig. 15

Ptilocodium repens. – Teissier, 1965: 13. [not *Ptilocodium repens* Coward, 1909]

Thecocodium brieni Bouillon, 1967: 1106, figs 1-11. – Brinckmann-Voss, 1970: 85, figs 100-106. – Edwards & Harvey, 1983: 41, fig. 2. – Boero & Fresi, 1986: 139. – Bouillon *et al.*, 2004: 76, fig. 44B. – Calder, 1998: 1849.

MATERIAL EXAMINED – IRSNB IG 27.838, holotype and paratype colonies; type colony collected 1961, Naples, on barnacle (sponge covered?) growing on piece of rock, second small colony on algae; paratype colonies on sponge covered rock, fertile.

DIAGNOSIS: *Thecocodium* with dactylozooids having 4-5 tentacles, gastrozooids without pedicel, gonophores sessile sporosacs, males styloid, females with radial canals reduced to pouches.

DESCRIPTION (Bouillon, 1967; Brinckmann-Voss, 1970; own observations): Colonies small, hydranths stolonial, issuing from creeping, mesh-like hydrorhiza formed by round stolons, these covered by very thin perisarc. Polyps polymorphic, with gastro-gonozooids and dactylozooids.

Gastrozooids without tentacles, bottle-shaped, sessile, with ovoid base tapering distally into neck-like hypostome, base without distinct pedicel, polyp thus sessile, gastrodermis of hypostome forming four thickened longitudinal ridges visible from outside, apical epidermis studded with nematocysts, lower part of hydranth sac-like.

Dactylozooids much more frequent than gastro-gonozooids, contractile, composed of slightly tapering or isodiametric stem ending in a whorl of capitate tentacles, usually four tentacles, occasionally five, rarely three, trunks of tentacles radiate from end of stem, held either horizontally or directed upwards depending on contraction, base of stem with shallow perisarc collar, gastrodermis of stem and tentacles chordoid.

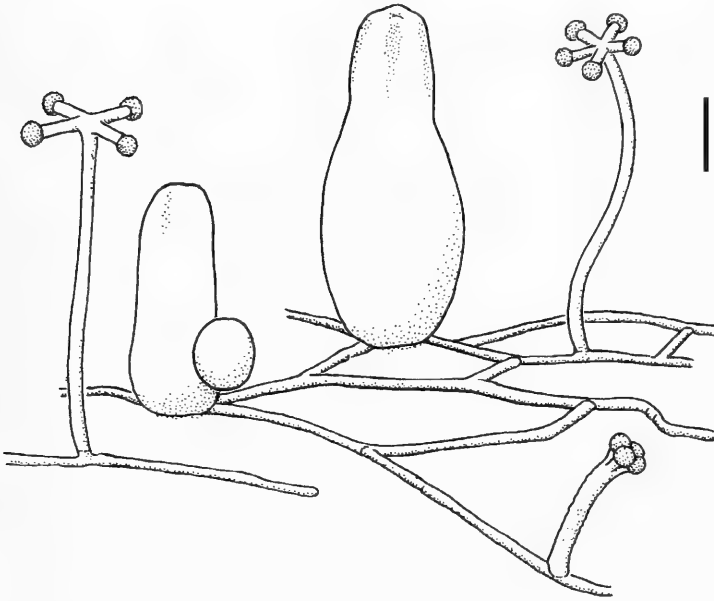


FIG. 15

Thecodium brieni Bouillon, 1967; after preserved type material; part of colony with three dactylozooids in different states of contraction and two gastrozooids, the left one bearing a gonophore at its side, scale bar approximately 0.2 mm.

Gonophores develop singly near base of gastrozooids, the latter can get reduced in size while gonophores mature. Gonophores are sessile sporosacs, male ones a simple bulbous evagination of body wall (styloid type), female gonophores with vestiges of radial canals forming four pouches surrounding the spadix, occasionally female gonophores also containing spermatogonia, several oogonia develop, but usually only two mature to eggs, eggs develop to planula in situ, animal thus larviparous.

Nematocysts: microbasic euryteles, discharged shaft about as long as capsule; desmonemes with relatively long capsules.

Colours: gastro-gonozooids pink with opaque white hypostomes, dactylozooids translucent colourless with white capitula, stolons pink (Edwards & Harvey, 1983).

DIMENSIONS (Bouillon, 1967; Brinckmann-Voss, 1970; own observations): Colony diameter usually smaller than 10 mm; gastrozooids 0.3-1.3 mm high, diameter up to 0.4 mm; dactylozooids up to 0.9 mm, diameter 0.05-0.1 mm (contractile), capitula diameter up to 65 μm , tentacle length up to 0.2 mm (contractile); sporosacs ca. 0.2 mm or more. Microbasic euryteles 15.4x5.6 μm , desmonemes 11.2x4.2 μm .

OTHER DATA: The histology of the polyps and gonophores has been described by Bouillon (1967) and Brinckmann-Voss (1970). Bouillon (1967) also depicts the nematocysts.

BIOLOGY: Occurs on stones, rocks, oyster shells, calcareous tubes of polychaete worms, algae, and tunics of ascidians, depth range 2-200 m (Brinckmann-Voss, 1970;

Calder, 1998). In the Mediterranean, fertile animals have been observed from April to November (Brinckmann-Voss, 1970; Boero & Fresi, 1986). The feeding behaviour was described in detail by Brinckmann-Voss (1970) and Edwards & Harvey (1983). Prey is caught by the dactylozooids, the gastrozooids then elongate towards them and swallow the prey.

DISTRIBUTION: Mediterranean (Naples: Bouillon, 1967; Brinckmann-Voss, 1970), northern Brittany (Bouillon, 1967); Western Scotland (Oban: Edwards & Harvey, 1983); Bermuda (Calder, 1998). Type locality: Naples (designation of type specimen by J. Bouillon).

***Thecocodium penicillatum* Jarms, 1987**

Fig. 16

Thecocodium penicillatum Jarms, 1987: 62, figs 8.5-8.6.

TYPE MATERIAL: The type material is likely lost (pers. com. P. Stiewe, Zoological Museum of the University of Hamburg).

DIAGNOSIS: *Thecocodium* with dactylozooids having 7-11 tentacles, gastrozooids with long pedicel. Gonophores free medusae, stomach with large vacuolated cells, exumbrella with meridional tracks of refractive spots, four tentacles.

DESCRIPTION (after Jarms, 1987; from in vitro culture): Colonies with stolonal hydranths issuing from creeping, mesh-like hydrorhiza formed by tubular stolons, covered by thin perisarc. Polyps polymorphic, with gastro-gonozooids and dactylozooids, without perisarc envelope.

Gastrozooids without tentacles, club-shaped, with stalk (pedicel), pedicel thin and cylindrical, distal part bottle-shaped, tapering distally into neck-like hypostome, up to five gonophores developing in a single whorl at junction of pedicel and hydranth-body.

Dactylozooids much more frequent than gastro-gonozooids, contractile, without mouth, composed of thin, slightly tapering or isodiametric stem ending in a radiating tuft of capitate tentacles, 7 to 11 (average 10) capitate tentacles with thin stalk, gastrodermis of stem and tentacles chordoid.

Newly released medusa bell-shaped, distinctly higher than wide, umbrella rather thick, without gastric peduncle, margin lobed through perradial embayments, exumbrella with perradial and interradial meridional furrows, interradial ones shallow, on exumbrella four interradial lines of refractive spots, some nematocysts scattered on exumbrella. Velum broad.

Manubrium conical, gastrodermis composed of remarkably large (vacuolated?) cells, mouth small and surrounded by many nematocysts, without any visible primordial gonads. Four radial canals, widening where entering manubrium and thus forming short mesenteries, narrow circular canal. Four short perradial tentacle stumps, slightly swollen near origin.

Adult medusa unknown.

Nematocysts: microbasic euryteles on polyp and medusae; desmonemes; holotrichous macrobasic euryteles occurring only on dactylozooids.

DIMENSIONS (Jarms, 1987): Gastrozooids including pedicels 2-3 mm high, pedicels 1.6-2 mm; dactylozooids up to 1.6 mm high, capitate tentacles 0.1-0.3 mm

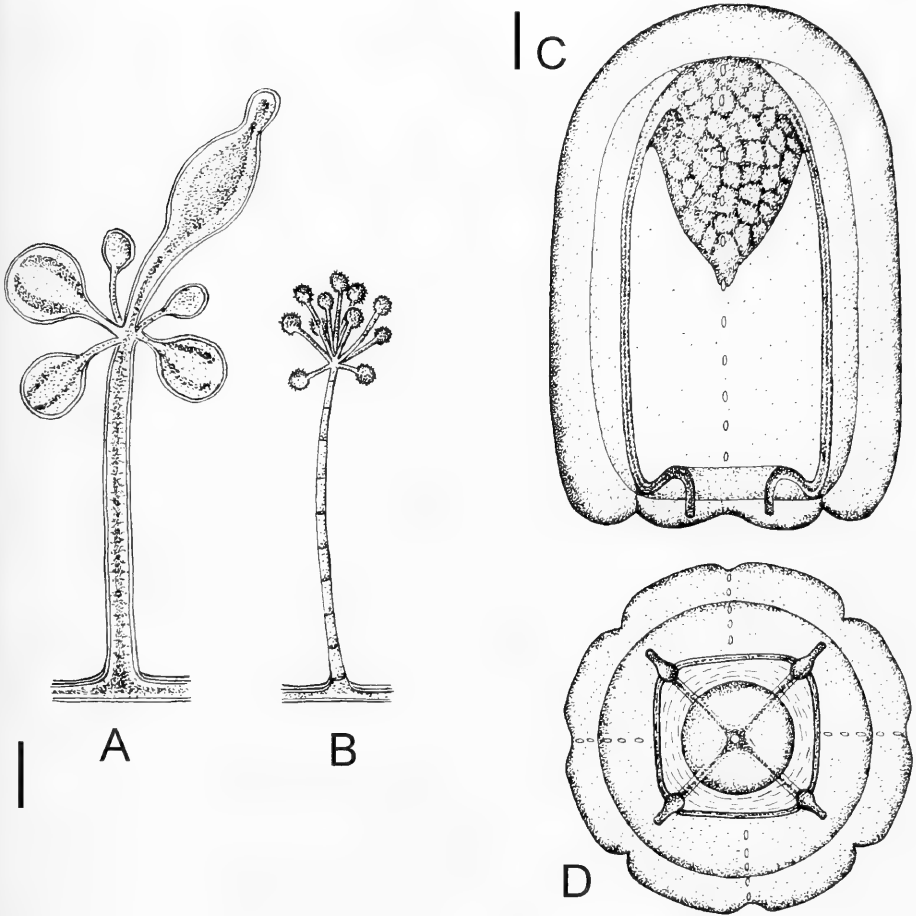


FIG. 16

Thecocodium penicillatum Jarms, 1987; from Jarms (1987). (A) Gastro-gonozooid, scale bar 0.25 mm. (B) Dactylozooid, same scale as A. (C) Newly released medusa in side view, scale bar 0.1 mm. (D) Same as C but oral view.

long; gonophores before liberation 0.45 mm in diameter; newly liberated medusa 0.8-0.95 mm high and 0.64 mm wide.

BIOLOGY: Deep water hydroid found on slag (clinker?).

DISTRIBUTION: Only known from type locality, Canary Islands, 25.4006°N 16.2342°W, 810 m depth.

REMARKS: See *Thecocodium* spec. below.

Thecocodium spec.

Fig. 17

MATERIAL EXAMINED: MHNG INVE 62870; Norway, Jan Mayen, Trollveggen vent field, 71.298°N 05.773°W, 574 m, 25.07.2008; coll. by 2008 G.O. Sars Cruise of the University of Bergen, growing on *Sertularella tenella*, gonozooids and dactylozooids present, stolons covered by orange-red mineral precipitate (iron oxide?); 16S sequence accession number **FN422378**.

DESCRIPTION: Gastro-gonozooids and dactylozooids identical to *T. brieni* (comp. Fig. 15), but gonophores are medusoids or medusae with a manubrium composed of large vacuolated cells, no tentacles or bulbs, stolons covered by thicker perisarc, deep water occurrence.

Nematocysts: elongated desmonemes in dactylozooids; large almond-shaped microbasic euryteles around mouth of gastrozooids and in capitula of dactylozooids, discharged shaft about as long as capsule and only faintly swollen; smaller ovoid microbasic heteroneme on gonophores.

DIMENSIONS: Desmonemes $(18.5-19) \times (5.5-6.5) \mu\text{m}$, large microbasic eurytele $(21-23) \times (6.5-8.5) \mu\text{m}$, small microbasic heteroneme $(8.5-9) \times (5.5) \mu\text{m}$.

DISTRIBUTION: Deep water (>500m), Jan Mayen, North Atlantic.

REMARKS: During the "GO Sars 2008 Expedition" of the Centre for Geobiology of the University of Bergen, some hydroids were collected in the vicinity of a deep-water hydrothermal vent area near the island of Jan Mayen. Among these hydroids was also a *Thecocodium* colony growing on *Sertularella tenella*. The colony consists of convoluted stolons bearing gono-gastrozooids and dactylozooids. The polyps of this *Thecocodium* colony resembles in almost all aspects *Thecocodium brieni* (Fig. 15). The dactylozooids have 4-5 capitate tentacles and the gono-gastrozooids are sessile with a whorl of gonophores in the lower region. However, the gonophores seem to be medusoid and not sessile sporosacs (Fig. 17). The most advanced gonophores (0.35 mm long, 0.2 mm wide) have a large spadix with vacuolated gastrodermal cells, but lack any traces of gametes. At the distal end of the manubrium/spadix there is a small zone with more dense tissue. There were no tentacles or bulbs visible. They thus resemble the medusoids of *T. penicillatum* described by Jarms (1987) (see Fig. 16C). The gonophores were covered by ovoid heteronemes which are smaller and rounder than the normal microbasic euryteles of the polyp. This type of nematocyst capsule is unknown in *T. brieni* (Bouillon, 1967). All these differences, together with its unusual habitat, suggest that this colony likely belongs to an undescribed species. However, it could also be a form of *T. penicillatum*, a deep-water *Thecocodium* species that produces medusoids or medusae. According to our current knowledge, *T. penicillatum* has dactylozooids with 7-10 tentacles and stalked gastro-gonozooids. Unfortunately, this species is only known from a single, in vitro culture. As we have no idea of its intraspecific variability, especially in material collected from nature, it is not possible to relate the present sample to this species.

As the only available sample did not permit to obtain sufficient information on the nature of the mature gonophores, the species is here not named in order to avoid the creation of further, ambiguous hydroid species. The 16S sequence will perhaps allow it to be identified in the future.

Genus *Tregoubovia* Picard, 1958

TYPE SPECIES: *Tregoubovia atentaculata* Picard, 1958 by monotypy.

DIAGNOSIS: Medusa small, spherical, without tentacles, bell margin with nematocyst ring from which originate centripetal, flat, nematocyst containing bands running meridionally on exumbrella. Manubrium large, cruciform base, the four perradial

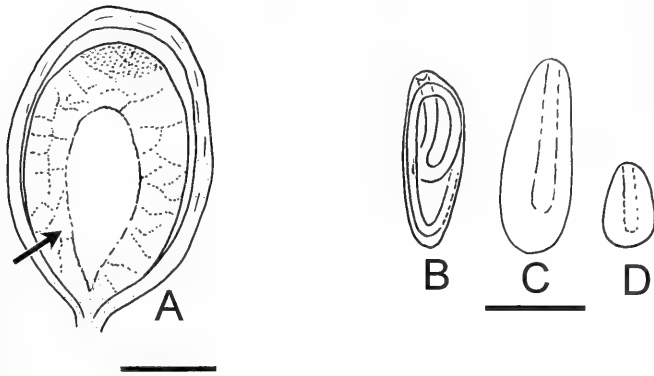


FIG. 17

Thecocodium spec. MHNG INVE 62870, preserved material from the North Atlantic. (A) Optical section of the most advanced gonophore; the gastrodermis of the manubrium is composed of very large, apparently vacuolated cells (arrow), only at the distal end there is some more dense tissue; scale bar 0.2 mm. (B) Desmoneme. (C) Large microbasic eurytele. (D) Small microbasic heteroneme. The scale bar for B-D equals to 10 μ m.

corners of mouth margin drawn into distinct oral tentacles with terminal nematocyst clusters. Gonads interradial on manubrium wall. Without desmonemes.

REMARKS: This is currently a monotypic genus. The polyp stage remains unknown.

***Tregoubovia atentaculata* Picard, 1958**

Fig. 18

Tregoubovia atentaculata Picard, 1958: 185, fig. – Goy, 1973: 979. – Bouillon *et al.*, 2004: 77, fig. 44C.

MATERIAL EXAMINED: MHNG INVE 39476, supposed holotype, collected 1955, ex. Picard collection.

DIAGNOSIS: See genus diagnosis.

DESCRIPTION: Medusa umbrella spherical to ovoid, mesogloea moderately thick, bell margin slightly lobed, without gastric peduncle, exumbrella with scattered nematocysts, velum rather narrow.

Manubrium large and voluminous, reaching to level of velum, base square to cross-shaped, the four perradial corners of mouth margin drawn into distinct oral arms, oral arms with chordoid gastrodermis, ends swollen and studded with nematocysts.

Gonads four large, oblong interradial pads on manubrium, well separated perradially.

Four relatively thick radial canals, widening where entering manubrium and thus forming short mesenteries. Diameter of ring canal and bell opening relatively narrow.

Without free tentacles. Along bell margin a ring of thickened tissue with nematocysts from which originate up to 16 centripetal bands (4 perradial, 4 interradial, 8 adradial) running meridionally on the surface of the exumbrella towards aboral pole,

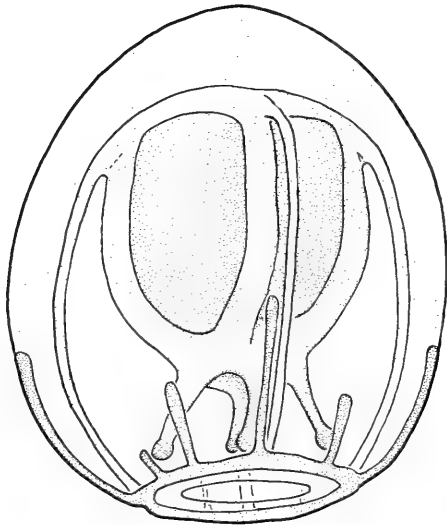


FIG. 18

Tregoubovia atentaculata Picard, 1958; redrawn from (Picard, 1958), male medusa, bell size about 1.5 mm.

reaching maximally to mid umbrella; these tentacle-like structures contain nematocysts and are like flat bands pressed into the surface of the exumbrella so that they are flush with the exumbrellar epithelium, but they are not covered by the exumbrellar epithelium.

Nematocysts: microbasic euryteles, desmonemes absent.

Polyp stage unknown.

DIMENSIONS: Umbrella 1.5-3.2 mm high when mature, euryteles $8 \times 4 \mu\text{m}$.

BIOLOGY: Deep water species.

DISTRIBUTION: Only known from the type locality: Mediterranean, Villefranche-sur-Mer.

REMARKS: This is a very rare species; so far only two or three specimens have been reported in the literature. *Tregoubovia atentaculata* lacks tentacles but has flat centripetal nematocyst bands originating from a nematocyst band at the bell margin. Similar structures are present in *Thecocardium quadratum* (Werner, 1927) and *Hansiella fragilis* Bouillon, 1980 (Bouillon *et al.*, 1997), which justifies its inclusion in the Ptilocodidae. Picard (1958) regarded these nematocyst bands as being derived from tentacles that developed inside the mesogloea. He claims to have seen that they are composed of a gastrodermal core enveloped by epidermal tissue with nematocysts. The presence of a gastrodermal core could not be verified with the available material. It was evident, however, that these bands are not covered by the normal exumbrellar epithelium, thus they are not really tentacles that have grown into the mesogloea. They more resemble flattened tentacles pressed into and fused to the surface of the exum-

rella. More details can only be obtained through new material and a histological examination using electron microscopic methods.

Family **Eucondoniidae** Schuchert, 1996

DIAGNOSIS: Anthomedusae without pointed apical projection, exumbrella without nematocyst tracks or clusters, with gastric peduncle; manubrium tubular; mouth quadrangular, with four inconspicuous nematocyst-clusters, with medusa budding on manubrium wall; gonads encircle manubrium without radial interruptions; four radial canals and circular canal present; four small perradial marginal bulbs and four tentacles; tentacles with a single terminal swelling; no ocelli; cnidome comprises microbasic euryteles and desmonemes.

REMARKS: This is a monotypic family, the polyps are unknown. See also the remarks under *Eucondonium brownei*.

Genus **Eucondonium** Hartlaub, 1907

TYPE SPECIES: *Eucondonium brownei* Hartlaub, 1907 by monotypy.

DIAGNOSIS: See family diagnosis.

Eucondonium brownei Hartlaub, 1907

Fig. 19A-B

Dipurena sp. Browne 1896: 473, pl. 16 fig. 2.

Eucondonium brownei Hartlaub 1907: 71, fig. 67. – Neppi & Stiasny, 1913: 14, pl. 1 fig. 6. – Kramp, 1937: 28, fig. 8c. – Russell, 1953: 93, fig. 40. – Picard, 1955: 95. – Vannucci, 1957: 43, figs 2-3. – Kramp, 1959: 91, fig. 44. – Kramp, 1961: 36. – Brinckmann-Voss, 1970: 19, figs 16-19, pl. 2 fig. 4. – Goy, 1973: 972. – Petersen, 1990: 217. – Schuchert, 1996: 89, fig. 53a-b. – Bouillon *et al.*, 2006: 56, fig. 33C.

TYPE MATERIAL: Not located (not found in BMHN).

MATERIAL EXAMINED: MNHN1618; France, Villefranche-sur-Mer; plankton 50-100 m; 3 medusae collected October 1963 and July 1964; material of Goy (1973). – See also Schuchert (1996).

DIAGNOSIS: See family diagnosis.

DESCRIPTION (Russell, 1953; Brinckmann-Voss, 1970; own observations): Medusa umbrella nearly hemispherical, sometimes slightly higher than wide, lateral walls thin, apex with thickened jelly, manubrium attached to a broad, well developed gastric peduncle, velum broad.

Manubrium cylindrical, 1/2 as long as bell cavity, tube-like, mouth quadrangular with four inconspicuous perradial lips, each containing a group of nematocysts. Immature animals produce secondary medusae via medusae buds on middle region of stomach. Mature animals without buds, gonads encircle the manubrium without radial interruptions.

Four very narrow radial canals and circular canal present. Four small marginal bulbs containing blackish pigment granules, without apparent ocelli.

Four equally developed tentacles with a conspicuous terminal swelling, swelling spherical to ovoid; tentacle gastrodermis chordoid; terminal swellings with enlarged gastrodermis and epidermis with fibrous structure. Nematocysts not only

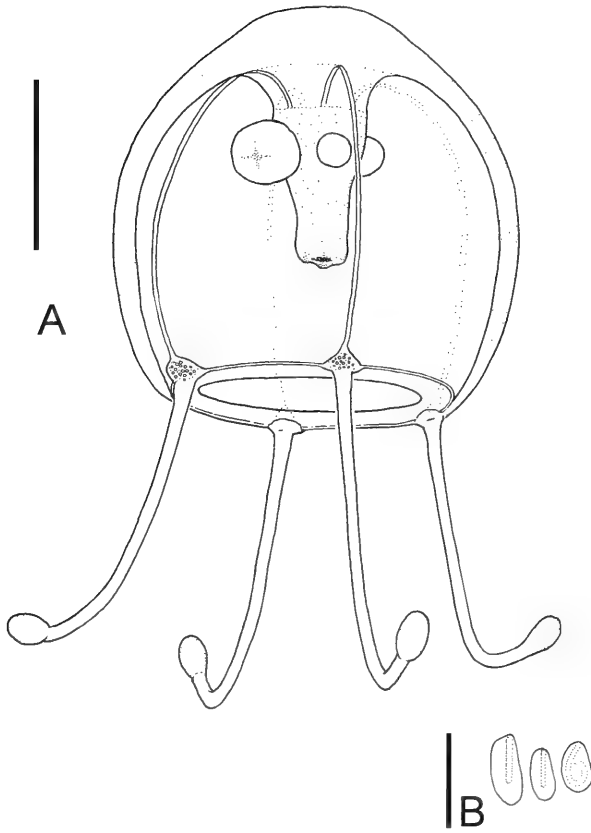


FIG. 19

Eucodonium brownei Hartlaub, 1907; preserved material from New Zealand, modified after Schuchert (1996). (A) Medusa with medusa-buds on manubrium, scale bar 0.3 mm. (B) Undischarged nematocysts: microbasic eurytele from tentacles, heteroneme from manubrium, desmoneme, scale bar 10 μ m.

present in terminal swelling but also along the tentacles, nematocysts in terminal swelling not so dense.

Nematocysts: microbasic euryteles on tentacles, heteronemes (microbasic euryteles?) from lips, desmonemes on tentacles.

Colour of marginal tentacles bulbs blackish, stomach blackish brown, terminal knob of marginal tentacles brownish.

DIMENSIONS: Bell diameter and height usually 0.8-1 mm. For nematocyst dimensions see Schuchert (1996).

BIOLOGY: The medusa can be found close to the water surface. In the Atlantic it is very rare, but Brinckmann-Voss (1970, 1987) found it in relatively high numbers near Naples from September to October. Also Daly *et al.* (2003) found it off Tunis in elevated numbers. Likewise, it was found in comparatively high numbers in northern

New Zealand during the summer months. Brinckmann-Voss (1970) observed that lowering the temperature from 20 to 13°C stopped the medusa budding irrespective of the season. The gonad maturation likely also depends on falling temperatures.

DISTRIBUTION: English Channel (Browne, 1896; Hartlaub, 1907; Franc, 1951; Russell, 1957), Faroe-Shetland Channel (Fraser, 1974), Denmark (Kramp, 1927), Mediterranean (Neppi & Stiasny, 1913; Picard, 1955; Brinckmann-Voss, 1970, 1987; Goy, 1973; Daly *et al.*, 2003; Medel & López-González, 1996), Brazil (Vannucci, 1957), SW Atlantic (Genzano *et al.*, 2008), New Zealand (Schuchert, 1996; Bouillon & Barnett, 1999). Type locality: Plymouth, England.

REMARKS: With its swollen tentacle ends combined with the medusa buds and the gastric peduncle this is quite a characteristic medusa (Fig. 19A). The tentacle swellings in European animals seem to be larger than in those observed in New Zealand.

The polyp stage of *Eucodonium* remains unknown, which makes it difficult to relate it to other species of Filifera. *Eucodonium* was initially placed among the Capitata, but the cnidome makes it obviously related to the Filifera (Picard, 1955; Schuchert, 1996). Picard (1955) thinks that it could be close to *Podocorynoides minima* (Trinci, 1903) (see Schuchert, 2007 for redescription). Indeed, both medusae are quite similar, except for the tentacle tips of *Eucodonium* and the oral tentacles of *Podocorynoides*, and Picard's suggestion could be correct.

FAMILY RUSSELLIIDAE KRAMP, 1957

DIAGNOSIS: Medusa umbrella with apical projection. Manubrium on gastric peduncle, four unbranched oral filiform tentacles attached above mouth margin, mouth simple, lips indistinct. Marginal tentacles in eight groups, four perradial and four inter-radial, each group with one large tentacle flanked by two small tentacles; large tentacles hollow, without basal swellings, basal part adnate to umbrella and sunk into deep furrows of umbrella margin, adaxial ocellus at base of free portion of each tentacle. Gonads in eight large adradial pads on manubrium wall.

REMARKS: The polyp stages of the Russellidae are unknown. The family comprises only one genus.

Genus *Russellia* Kramp, 1957

TYPE SPECIES: *Russellia mirabilis* Kramp, 1957 by original designation.

DIAGNOSIS: As for family.

REMARKS: The genus is currently monotypic.

Russellia mirabilis Kramp, 1957

Fig. 20A-D

Russellia mirabilis Kramp, 1957: 24, pl. 4 figs 1-6, text-fig. 4. – Kramp, 1959: 30, 129, fig. 142. – Kramp, 1968: 58, fig. 154. – Pagès *et al.*, 1999: 2431, fig. 1. – Bouillon *et al.*, 2004: 78, fig. 45A.

TYPE MATERIAL: BMNH (not seen).

DIAGNOSIS: See family diagnosis.

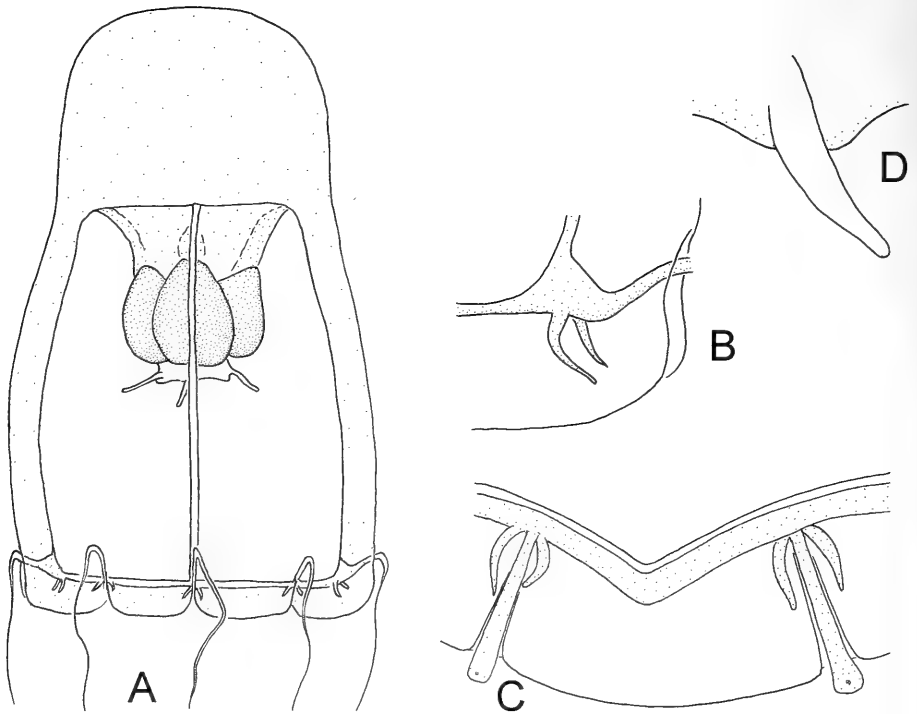


FIG. 20

Russellia mirabilis Kramp, 1957; redrawn from Kramp (1957). (A) Lateral view of medusa, bell height 13 mm. (B) Higher magnification of tentacle base in lateral view. (C) Oral view of a sector of the bell margin showing radial canal and two tentacle bases flanked by a pair of dwarf-tentacles. (D) Perradial corner of the mouth with an oral tentacle.

DESCRIPTION (Kramp, 1957): Umbrella distinctly higher than wide, with broad, dome-shaped apical projection measuring about 1/3 of total height, lateral walls moderately thick, bell-margin hanging in lobes somewhat below the level of the ring-canal, stomach mounted on a broad, conical peduncle, extending partly into the cavity of the stomach, peduncle about as high as stomach, which spans somewhat less than one fourth the height of the bell cavity. Velum narrow.

Base of stomach cross-shaped; stomach itself deeply folded inward in the inter-radii, and sometimes also in the perradii. In the preserved condition stomach slightly wider than long, the interior surface of the stomach densely wrinkled transversally and along each interradius a narrow, prominent ridge thrown into regular transverse folds, indicating that in living specimens the stomach may be extended to a greater length. Mouth quadrangular with very short and simple perradial lips, mouth rim smooth and entire, slightly thickened, without concentration of nematocysts in the rim itself, but with some scattered in the wall above it. At a short distance above the perradial corners of the mouth four oral tentacles, finger-shaped, tapering towards their distal end, without terminal cluster of nematocysts, but numerous nematocysts evenly scattered

throughout the entire length of the tentacle, not more concentrated towards the tip than in the basal part.

Gonads in eight adradial pads, occupying almost the entire length of the stomach, separated in the perradii and interradii by narrow lines, surface smooth, without transverse folds.

Tentacles in eight clusters, each consisting of one large and two small tentacles. Eight large tentacles of equal size, four perradial and four interradial, basal part (root) of each tentacle directed upward and outward and deeply sunken into a narrow cleft between two prominent lobes of the umbrella-margin; in the interradial tentacles ascending root directly adnate to the gelatinous tissue of the exumbrella, in the perradial tentacles root fused to the terminal part of the corresponding radial canal by a triangular connection (Fig. 20B). Distal to the adnate root, tentacles becoming free and very thin; with one adaxial, red ocellus where tentacles become free; terminal tentacle-structure unknown. At the base of each of the eight large tentacle-roots a pair of much smaller tentacles, structure similar to larger ones (Fig. 20B-C).

Four radial canals, their ascending part on the peduncle fairly wide, in transverse section like an equilateral triangle; descending portion along subumbrella narrow and flat, with smooth edges. Ring-canal narrow.

Polyp stage and cnidome unknown.

DIMENSIONS: Bell height up to 15 mm, diameter up to 9 mm, manubrium about 3 mm high.

BIOLOGY: The medusa *Russelia mirabilis* lives mainly in the 0–300 m depth range (Pagès *et al.*, 1999). Outside its main distribution (Antarctica) it occurs usually in deeper waters (200–1000 m: Kramp, 1959; Pagès *et al.*, 1999).

DISTRIBUTION: Antarctica; West Indies; Mediterranean (Kramp, 1959; Navas-Pereira & Vannucci, 1990; Pagès *et al.*, 1999). Type locality: 66.475°S 71.27083°W, Antarctica, West of Graham Land, 0–165 m.

REMARKS: The disjunct and rather surprising distribution pattern of this medusa is difficult to explain. Pagès *et al.* (1999) suspect that transport in the ballast water of a cargo ship is the most plausible explanation for its occurrence in the Mediterranean, but oceanic currents could have brought it to the Caribbean.

FAMILY NIOBIIDAE PETERSEN, 1979

DIAGNOSIS: Anthomedusae with two opposite simple and two opposite bifurcated radial canals, so that six canals reach the circular canal; gonads interradial on manubrium; marginal tentacular bulbs developing into secondary medusae; no ocelli, no gastric peduncle, no mesenteries.

REMARKS: This family currently comprises only one genus. The polyps of the Niobiidae are unknown and thus the systematic position of the family remains unsolved.

Genus *Niobia* Mayer, 1900

TYPE SPECIES: *Niobia dendrotentaculata* Mayer, 1900 by monotypy.

DIAGNOSIS: As for family.

REMARKS: This genus is currently monotypic.

Niobia dendrotentaculata Mayer, 1900

Fig 21A-E

Niobia dendrotentaculata Mayer, 1900: 36, pl. 42 figs 141-144, pl. 43 fig. 144. – Mayer, 1910: 187, pl. 19 figs 1-5. – Brinckmann, 1959: 334, figs 1-2. – Kramp, 1959: 115, fig. 104. – Kramp, 1961: 110, fig. 103. – Kramp, 1968: 41, fig. 103. – Bouillon *et al.*, 2004: 66, fig. 40a.

TYPE MATERIAL: Location not investigated.

DIAGNOSIS: As for family.

DESCRIPTION (Mayer, 1910; Brinckman, 1959): Medusa umbrella hemispherical or slightly flatter than a hemisphere, no apical projection, no gastric peduncle, jelly uniformly thin, relatively rigid.

Manubrium of mature medusa tubular, about as long as height of bell, with four simple but well developed lips, mouth cruciform, gonads in four interradial patches in upper part of manubrium, gonads usually – but not always – mature only after medusa budding from bulbs has stopped.

Four radial canals arise from the four corners of the stomach, but two opposite canals bifurcate closely to manubrium so that six radial canals reach the circular canal at the margin, each pair of radial canals about 60° apart.

Up to twelve marginal tentacles or bulbs present, one for each radial canal and one intermediate between each successive pair of radial canals. The tentacles develop successively and they are arranged in a bilaterally symmetrical manner in accordance with age. The oldest and the youngest tentacles are opposite, situated at the ends of the two simple radial canals, the remaining 10 tentacles are arranged in a bilaterally symmetrical manner in accordance with their various ages, the axis being in the diameter of the unbranched radial-canals and the oldest and youngest tentacles (Fig. 21E). Tentacle bulbs and tentacles transform successively into small medusae which detach from the parent (Fig. 21A-B).

Colours: gastrodermis of manubrium, bulbs, circular canal brownish-yellow, other parts transparent.

Newly-released medusa with 3-5 tentacles, radial canals and unevenly developed marginal tentacles render the medusa bilaterally symmetric (Fig. 21C).

Nematocysts: microbasic euryteles and microbasic mastigophores.

DIMENSIONS: Diameter of mature medusa 2.4-4 mm, height only about 0.6 times the width. Newly released medusa 1.2 mm wide. Microbasic euryteles 7x2.5µm, microbasic mastigophores 5x2.5µm (Brinckmann, 1959).

BIOLOGY: The medusa occurs close to the surface. It thrives well in culture (Mayer, 1910).

DISTRIBUTION: Rare, circumglobal in warm and temperate waters, recorded from Florida (Mayer, 1900); New England (Bigelow, 1915); Vietnam (Dawydoff, 1936); Mediterranean (Brinckmann, 1959); India (Nair, 1951); Argentina (Goy, 1979); Papua New Guinea (Bouillon, 1980). Type locality: Tortugas, Florida, USA.

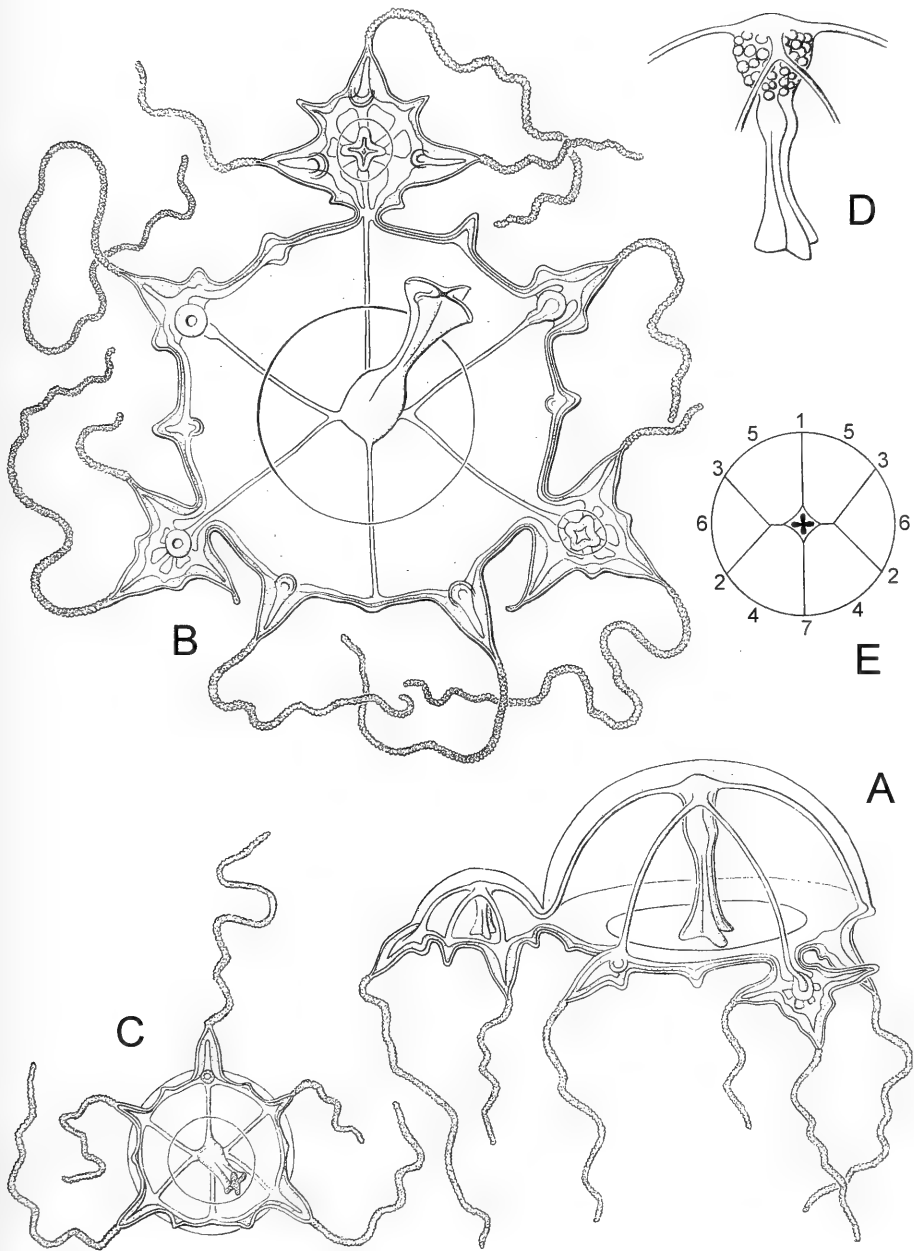


FIG. 21. *Niobia dendrotentaculata* Mayer, 1900; modified after Mayer (1910). (A) Side view of medusa showing the development of secondary medusae from the tentacle bases. (B) Oral view of a medusa, note the characteristic six radial canals and the bulbs that develop into small medusae. (C) Newly released medusa, note bilateral symmetry (mirror symmetry). (D) Manubrium of mature medusa with eggs. (E) Symmetry and sequence of tentacle development of medusa shown in section A, 1 denotes the most advanced, 7 the least developed tentacle.

FAMILY PROTIARIDAE HAECKEL, 1879

DIAGNOSIS (Bouillon *et al.*, 2006): Hydroid colonial, arising from creeping, tubular stolons; hydranths issued from short hydrocaulus; hydrotheca and hydrocaulus covered by perisarc, forming a hydrotheca-like tube; hydranth with one whorl of filiform tentacles, large nematocysts alternating with tentacles.

Medusa with four fully developed marginal tentacles arising from large, hollow tentacular bulbs; four simple radial canals and a circular canal, mouth with four simple lips; gonads interradial, with smooth surface; with or without mesenteries; without rudimentary bulbs; margin with or without cirri-like tentacles; exceptionally with ocelli.

REMARKS: The medusae of the Protiaridae and the Pandeidae (see Schuchert, 2007) appear very similar and the differences in the diagnoses are minimal. Both families have nevertheless rather dissimilar polyps. Protiaridae polyps resemble those of *Trichydra* (see p. 495) and the cnidome comprises merotrichous isorhizas, capsules otherwise only found in some leptomedusae (i.e., Eirenidae, Eucheilotidae, Haleciidae, Lovenellidae and Tiaropsidae; Bouillon, 1985; Bouillon *et al.*, 1988). The development of the medusae and the gonozooids are insufficiently known in this family. Dr. Brinckmann-Voss, however, has found and reared the polyps of *Halitiara formosa* (pers. com., unpublished) and she observed that the medusae are produced in gonothecae. The family could thus be more closely related to the order Leptothecata.

PROTIARIDAE GENERA OF THE ERMS ZONE:

- | | | |
|----|---|------------------|
| 1a | with cirri (= small free-hanging tentacles on bell margin, in addition to normal tentacles) | <i>Halitiara</i> |
| 1b | without cirri | 2 |
| 2a | without mesenteries, marginal tentacles without abaxial spurs | <i>Protiara</i> |
| 2b | with short mesenteries, marginal tentacles with abaxial spurs | <i>Paratiara</i> |

Genus *Halitiara* Fewkes, 1882a

TYPE SPECIES: *Halitiara formosa* Fewkes, 1882a by monotypy.

DIAGNOSIS: Medusa with four straight radial canals; four perradial marginal tentacles; with marginal cirri between long tentacles; mouth simple, cruciform; with or without mesenteries; gonads interradial, smooth, sometimes extending along mesenteries; without ocelli; cnidome where known including merotrichous isorhizae.

Hydroid diagnosis as for family.

REMARKS: Gershwin & Zeidler (2003) provide a table with the characteristics of all known *Halitiara* species.

KEY TO THE *HALITIARA* MEDUSAE OF THE ERMS ZONE:

- | | | |
|----|----------------------------------|-------------------|
| 1a | with apical process | <i>H. formosa</i> |
| 1b | without apical process | <i>H. inflexa</i> |

Halitiara formosa Fewkes, 1882a

Figs 22A-B, 23A-B

? *Dissonema gaussi* Vanhöffen, 1912: 361, pl. 24 fig. 2. – Kramp, 1965: 27, possible synonym.

Halitiara formosa Fewkes, 1882a: 267, pl. 4 fig. 2. – Kramp, 1959: 115, fig. 103. – Uchida, 1927: 203. – Menon, 1932: 7, pl. 1 fig. 4. – Kramp, 1961: 102. – Kramp, 1968: 40, fig. 102. – Brinckmann-Voss, 1970: pl. 11 fig. 1. – Goy, 1973: 983, fig. 7. – Bouillon, 1980: 332. – Goy *et al.*, 1991: 110, fig. 26. – Schuchert, 1996: 76. – Gershwin & Zeidler, 2003: table 3. – Bouillon *et al.*, 2004: 75, fig. 43E.

Protitara formosa. – Mayer, 1910: 107, pl. 6 figs 4-6, pl. 13 figs 1-2.

in part *Halitiara formosa*. – Kramp, 1965: 27. [some = *Leuckartiara simplex*]

TYPE MATERIAL: Location not investigated.

MATERIAL EXAMINED: ZMUC, without registration number; USA, Florida, St Andrews Bay; collected August 1959, 2 medusae, det. Kramp, leg. M. Hopkins. – MHNG INVE 63285; Mediterranean, France, Villefranche-sur-Mer, surface plankton; 10 April 1972; one mature, contracted medusa, one medusa without manubrium; specimens collected and identified by A. Brinckmann-Voss.

DIAGNOSIS: Medusa up to 3 mm high, with solid apical projection, manubrium about half as long as bell cavity; mouth opening cruciform; with indistinct mesenteries. Four long and 24-35 short, tightly coiled, cirrus-like tentacles; no ocelli.

DESCRIPTION: Polyp stage similar to *H. inflexa* and *Trichydra pudica* (A. Brinckmann-Voss, pers. comm.). Gonozooids are reduced hydranths without tentacles (=blastostyles) enclosed in a filmy, soft perisarc tube like a gonotheca, budding one or two medusae at a time.

Newly liberated medusa with 3-4 perradial tentacles and 1-3 cirri between each pair of successive perradial tentacles.

Mature medusa with bell-shaped umbrella, slightly higher than wide, with distinct, solid apical projection of somewhat variable shape; without gastric peduncle; velum narrow.

Manubrium pyriform to cruciform in section, about half as long as the depth of the bell-cavity, with simple, cruciform mouth. Gonads on interradial sides of the manubrium, large, covering most of manubrium, separated perradially, ova large and conspicuous.

Four straight, narrow radial canals and a slender circular canal, radial canals with elongated opening where joining manubrium, thus forming mesenteries, but these inconspicuous, shorter than half the manubrium height, may be absent in specimens with less developed gonads.

Four long perradial tentacles, with long, hollow, tapering basal bulbs, without exumbrellar spurs, without ocelli; in addition to long tentacles 24-35 short, solid, cirri-like tentacles, independent of long tentacles, often tightly coiled, gastrodermal cells chordoid.

Colours: gastrodermis of the manubrium and tentacle bulbs in the female green, but in the males light-brown (Mayer, 1910).

DIMENSIONS: Bell height of mature medusa 1-3 mm. Nematocysts of preserved Mediterranean specimen: large ovoid capsules, one long side more straight than other, (16-17)×(9-10)µm; smaller elongate almond-shaped capsules (8-8.5)×(2.5-3)µm. The capsule types could not be identified, but the undischarged capsules resemble those of *H. inflexa* depicted in Bouillon *et al.* (1988).

BIOLOGY: A coastal medusa occurring in shallow depths. The medusa is rare in the Mediterranean, but Mayer (1910) reported it as being very abundant at the

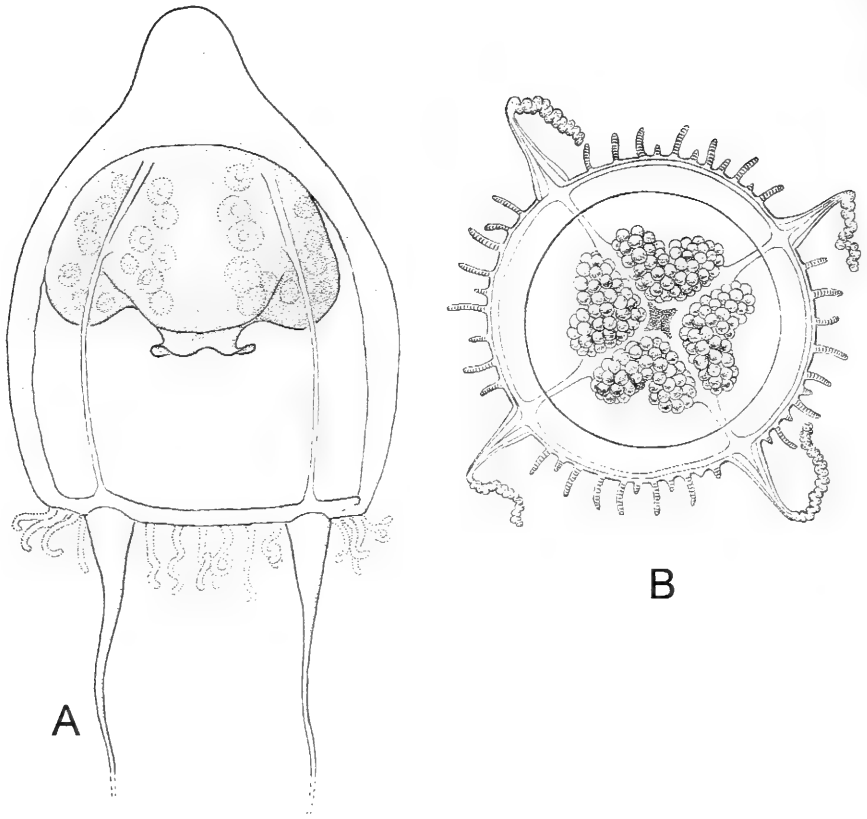


FIG. 22

Halitiara formosa Fewkes, 1882. (A) Lateral view of mature, female medusa, manubrium somewhat contracted, composite image drawn after several preserved specimens from Florida, height about 1.2 mm (B) Oral view of medusa, from Mayer (1910).

Tortugas, Florida. In the Mediterranean, the medusae were observed from August to November (Goy, 1973; Brinckmann-Voss, 1987; Goy *et al.*, 1991). Polyps budding medusae were observed in September (Brinckmann-Voss, 1987). They occur on oyster shells (A. Brinckmann-Voss, pers. com.).

DISTRIBUTION: Tortugas, Bahamas (Mayer, 1910); Mediterranean (Goy, 1973; Brinckmann-Voss, 1987; Goy *et al.*, 1991); Argentina (Genzano *et al.* 2008); tropical parts of the Indo-Pacific Ocean (Menon, 1932; Kramp, 1965; Bouillon, 1980); NW Pacific (Uchida, 1927; Kramp, 1965); records from New Zealand are likely erroneous (Schuchert, 1996). Type locality: Tortugas, Florida, USA.

REMARKS: Descriptions or illustrations of the polyp stage of *H. formosa* have not yet been published. Dr Anita Brinckmann-Voss found the polyp repeatedly near Naples and she was able to rear the medusa released from these colonies. Dr Brinckmann-Voss was so kind to send me her drawings and notes and they were here used for the description and the figure of the gonotheca (Fig. 23A-B).

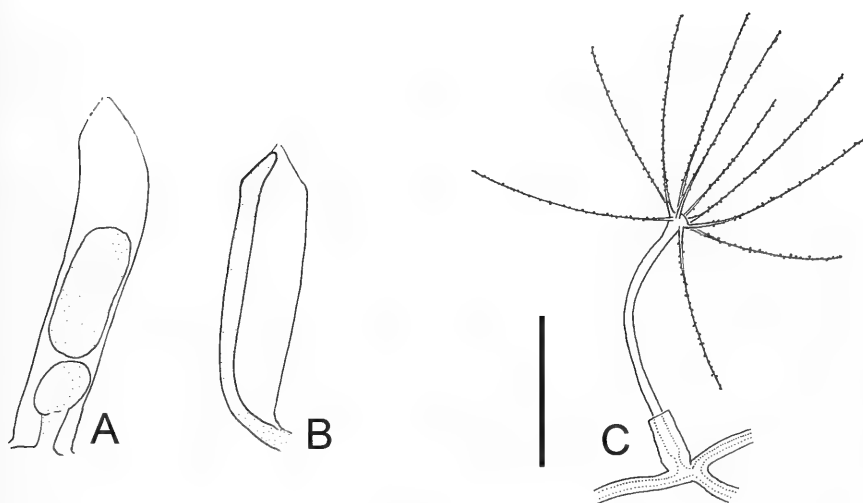


FIG. 23

(A-B) *Halitiara formosa* Fewkes, 1882; lateral view of gonothecae, living material from the Mediterranean, after unpublished sketches of Dr. A. Brinckmann-Voss. Note that the images are not represented at the same scale as C.

(A) Gonotheca with a developing medusa (oval mass). (B) Gonotheca after release of medusa, blastostyle drawn stippled.

(C) *Halitiara inflexa* Bouillon, 1980; polyp stage, modified from Bouillon (1985).

According to Kramp (1959), the medusa of this species has no mesenteries. Some authors (e. g. Goy, 1973) nevertheless described it as having mesenteries (but in the accompanying figure they are not apparent). The specimens examined for this study – coming from the same biogeographic region as the type material – clearly had mesenteries (Fig. 22A), although they were rather short and inconspicuous. The length is less than half of the manubrium height. The original figure given by Fewkes (1882a) also suggests slight mesenteries, but it is possible that their full development is correlated with the age or size of the animal and also the size of the manubrium and gonads.

Some specimens from the NE Pacific identified by Kramp (1965) as *H. formosa* (in ZMUC) were re-examined for this study and they turned out to be *Leuckartiara simplex* Bouillon, 1980.

The related species *Halitiara inflexa* Bouillon, 1980 has been reported from the eastern Mediterranean by Goy *et al.* (1991) (see also Bouillon *et al.*, 2004: 76, fig. 43F-G). This species differs from *H. formosa* by the absence of an apical process. The other purported difference, namely the presence of mesenteries, is likely incorrect or unreliable (see above). As also the apical process shows some variation, the Mediterranean records of *H. inflexa* could be just a variant of *H. formosa*. *Halitiara inflexa* is otherwise only known from Papua New Guinea and this population is likely distinct from *H. formosa* (see also Gershwin & Zeidler, 2003).

***Halitiara inflexa* Bouillon, 1980**

Fig. 23C

Halitiara inflexa Bouillon, 1980: 324, fig. 9. – Bouillon, 1985: 259, fig. 7. – Bouillon *et al.*, 1988: 211, fig. 8. – Goy *et al.*, 1991: 110, fig. 27. – Bouillon, 1995: 230, fig. 6. – Schuchert, 1996: 77, fig. 46a-b. – Bouillon *et al.*, 2004: 43F-G.

TYPE MATERIAL: IRSN Bruxelles (not seen).

DIAGNOSIS: Medusa up to 3 mm high and 2.4 mm wide, bell conical without apical projection, manubrium about half as long as bell cavity; mouth opening cruciform; with distinct mesenteries. Four long and 28-40 short, cirrus-like tentacles; no ocelli.

DESCRIPTION (Bouillon, 1980; Bouillon, 1985; Schuchert 1996): Hydroid colonies arising from creeping, perisarc-covered stolons. Polyps with a very short caulus, a long, narrow cylindrical body and a short conical hypostome. Below hypostome one whorl of ten long, filiform tentacles with irregular clusters of nematocysts. Alternating with the tentacles are large nematocysts. Caulus and base of polyp body are covered by a perisarc cup into which the polyp can almost completely retract. Gonozooids unknown.

Medusa umbrella bell-shaped, rather conical, jelly moderately thick, gradually thickening towards top to about two times the thickness of the lateral walls. Manubrium voluminous, quadrangular, length about 2/3 of bell cavity, joined to radial canals by mesenteries for 1/2 of their length. Mouth with four simple lips.

Gonads large, bulging, filling interradial position completely, leaving only a small perradial band of stomach and the mouth region free.

Four radial canals and circular canal, all narrow and with smooth margins.

Four long perradial tentacles, with broad conical base then tapering, base not laterally compressed. Nematocysts evenly distributed on tentacles. Between each pair of long tentacles 3 to 10 short, cirri-like tentacles, without bulbs, often coiled, with chordoid gastrodermis, tips with nematocysts (haplonemes). Nematocysts: atrichous isorhizas of two size classes, merotrichous isorhizas, mastigophores.

DIMENSIONS: Bell height up to 3 mm, diameter up to 2.4 mm. For nematocyst dimensions see Bouillon (1980) and Bouillon *et al.* (1988). Polyps up to 1 mm, with a very short caulus (80 μ m),

DISTRIBUTION: Papua New Guinea, New Zealand, Mediterranean (Bouillon, 1980; Bouillon, 1995; Goy *et al.*, 1991; Schuchert, 1996).

REMARKS: This species does not occur along the European coasts, but it has been found in the eastern Mediterranean (Lebanon; Goy *et al.*, 1991), thus within the ERMS zone. For figures see Bouillon (1980, 1985) and Schuchert (1996). See also remarks under *H. formosa*.

Genus *Paratiara* Kramp & Dumas, 1925

TYPE SPECIES: *Paratiara digitalis* Kramp & Dumas, 1925.

DIAGNOSIS: Protiaridae medusae without marginal cirri, four marginal tentacles with abaxial spurs, no ocelli, with smooth, interradial gonads, manubrium more or less twisted, four simple oral lips, with short mesenteries.

REMARKS: This is a monotypic genus.

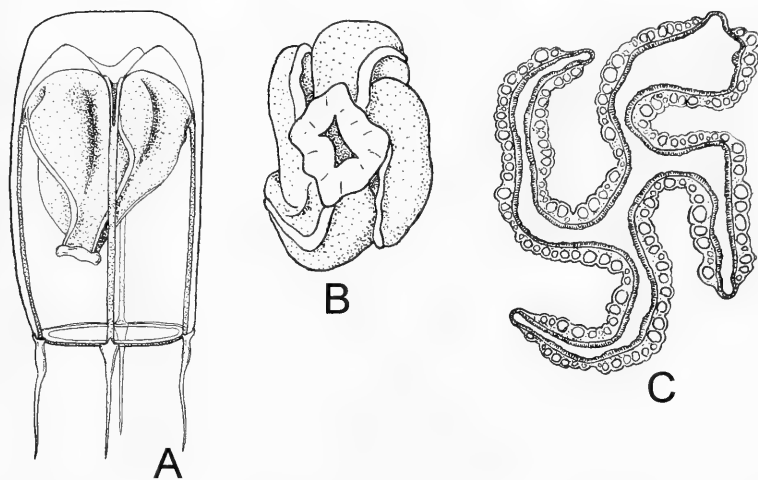


FIG. 24

Paratiara digitalis Kramp & Dumas, 1925; from Kramp & Dumas (1925). (A) Medusa in side view, bell height about 1 cm. (B) Oral view of manubrium, note characteristic torsion of its perradial wings. (C) Horizontal section of manubrium of a female medusa.

***Paratiara digitalis* Kramp & Dumas, 1925**

Fig. 24A-C

Paratiara digitalis Kramp & Dumas, 1925: 273, figs 18-20. – Kramp, 1926: 66, chart XI. – Kramp, 1961: 114s. – Fraser, 1974: 12.

TYPE MATERIAL: Location not investigated.

MATERIAL EXAMINED: ZMUC, DANA station 851 (NE of Bahamas), 22.3833°N 60.7667°W, 50 metres wire, 05.06.1920; one damaged medusa, material of Kramp (1959). – ZMUC, DANA station 891 (West-Indian Islands), 29.4667°N 69.4167°W, 50 metres wire, 24.07.1920; one much damaged medusa, material of Kramp (1959).

DIAGNOSIS: See genus diagnosis.

DESCRIPTION: Medusa bell higher than wide, cylindrical shape with thin walls and rather flat top, roof of subumbrella with four interradial pockets.

Manubrium flask-shaped, 2/3 of length of bell cavity, with short mesenteries (1/4 of manubrium height); four simple lips; manubrium cruciform in cross-section, sometimes twisted (Fig. 24B-C), the perradial edges all turned towards one side.

Gonads smooth, interradial, completely covering the stomach walls except in the perradii.

Four perradial tentacles with conical basal bulbs, each with a well developed, epidermal, abaxial spur; no ocelli.

Four radial canals, smooth, straight, joining manubrium in upper fourth and forming mesenteries; ring canal thin.

Polyp stage and nematocysts unknown.

DIMENSIONS: Bell height up to 10 mm, in tropical waters 4.5 mm high and 4 mm wide.

BIOLOGY: A rare medusa usually found close to the water surface, mostly caught during summer time.

DISTRIBUTION: Rockall (Fraser, 1974); between Shetland and Iceland (Kramp, 1926); North Cape (Kramp & Damas (1925); Sargasso Sea (Kramp, 1959). Type locality: Vardø, North Cape, Norway, North Atlantic Ocean, near surface.

REMARKS: The presence of mesenteries is a feature that distinguishes this species and genus from *Protiara tetranema*. A re-examination of some specimens identified by Kramp and also the figures in Kramp & Damas (1925, reproduced in Fig. 24) showed that they are rather short, spanning only about 1/4 of the manubrium height. The torsion of the manubrium is a unique feature of this species, but this seems not to be a constant feature as some examined medusae had a straight manubrium.

Genus *Protiara* Haeckel, 1879

TYPE SPECIES: *Oceania tetranema* Péron & Lesueur, 1810 by monotypy.

DIAGNOSIS: Protiaridae medusae without marginal cirri, four marginal tentacles, with or without ocelli, with four or eight smooth, vertical gonads in the adradial-inter-radial region, four simple oral lips, without mesenteries.

REMARKS: This genus is likely invalid as its type species is indeterminate. See the remarks below.

Protiara tetranema (Péron & Lesueur, 1810)

Fig. 25

zweyte karmirothe Beroe Slabber, 1775: 64, pl. 14, Fig. 1. [nomenclature not binomial]

Oceania Tetranema Péron & Lesueur, 1810: 347.

in part *Protiara beroe* Mayer, 1910: 106.

Protiara tetranema. – Haeckel, 1879: 47. – Hartlaub, 1914: 250, Fig. 206. – Kramp, 1959: 114, diagnosis. – Kramp 1961: 114. – Bouillon *et al.*, 2004:76, fig. 44A.

TYPE MATERIAL: Likely lost.

TYPE LOCALITY: Coast of The Netherlands.

REMARKS: This species is based on the description of a medusa given in Slabber (1775). Slabber describes and depicts a microscopically small, carmine-red medusa of which he had collected two living specimens from the Dutch coast (Fig. 25). It is characterized by four tapering tentacles, a cylindrical bell, and a short manubrium with four perradial lips. The most conspicuous trait is the carmine-red colour of the manubrium. Although Slabber's description and figure are quite accurate, it seems nevertheless impossible to relate this obviously immature medusa to any species known today.

Maybe Slabber had a young pandeid medusa (cf. also Vanhöffen (1891) who had similar thoughts), although the red manubrium remains problematic. *Neoturris pileata* can also have an intensively red manubrium and its youngest stages have four tentacles only, but it is rare in this region. A conspicuous red medusa of the region is *Turritopsis polycirrho* (see Schuchert, 2006; or Russell, 1953 as *T. nutricula*), but most young *Turritopsis* medusae are released with eight tentacles (although the newly liberated medusae of *T. polycirrho* has never been described). Slabber (1775) also describes another carmine-red medusa with 18 tentacles, which was almost certainly

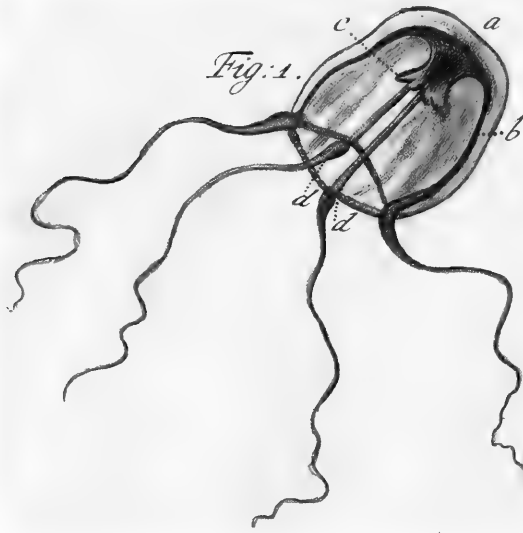


FIG. 25

Protiaira tetranema (Péron & Lesueur, 1810); original illustration of Slabber (1775) depicting the type specimen. Size given as "microscopic"; Slabber indicates: a = flat top of body [umbrella], b = inside of body [subumbrella], d = tubes which transport digested food [radial canals], c = stomach.

T. polycirra, and which he had collected only four days earlier. They were the size of sand grains, thus presumably not more than 2 mm. A similar size or more likely smaller must also be assumed for Slabber's second red medusa, now called *Protiaira tetranema*.

As Slabber's account did not use a binomial nomenclature, he named it his "second carmine-red *Beroe*", Péron & Lesueur (1810) gave it the name *Oceania tetranema*. They also noted the presence of numerous wart-like protrusions along the inside of the ring-canal. These knobs were not mentioned in Slabber's description, but they can be seen in his figure (Fig. 25). Could they be remnants of lost tentacles or incipient tentacles?

Haeckel (1879) then thought that he could recognize the species again in a medusa he collected in the English Channel. He had a relatively large medusa (4 mm high and wide), which had four tentacles with abaxial ocelli. A very unique feature of Haeckel's medusa was that it had four perradial gonads. He describes them as smooth, elongate, cylindrical bodies attached along the four perradial edges of the stomach. Unfortunately he provided no figure. Perradial gonads are rare in the Filifera, only in advanced stages of *Merga* species they can get fused perradially (see Bouillon, 1980; Schuchert, 2007). Formally, Haeckel's medusa resembles thus *Merga tregoubovi* Picard, 1960 (see Schuchert, 2007). In contrast to Haeckel's medusae, *Merga tregoubovi* has no ocelli, but Haeckel sometimes misinterpreted dark pigments in the tentacle bulbs as ocelli. Whatsoever, it is by no means convincing that Haeckel had the same species as Slabber.

The uncertainty of the scope of *Protiara tetranema* is also reflected in Mayer (1910), who erroneously also associated *Plotocnide borealis* Wagner with this species.

Hartlaub (1914) thought that Haeckel must have misinterpreted the gonads. He thinks that they were more likely the result of a perradial fusion of adradial bulges of very advanced gonads in a *Merga* species.

The species was not seen after Haeckel except for Pell (1938) who gives an un-commented record of a single medusa in the Adriatic Sea. It remains unclear what Pell used as criteria to identify the medusa and later intensive searches (Benovic & Lucic, 1996) never found it again. Pell perhaps mistook a *Merga* species for *Protiara tetranema*.

A second species of the genus *Protiara* was described by Hargitt (1902) as *Protiara haeckeli*, occurring in the Vineyard Sound, Massachusetts. This species has an apical process, lacks ocelli, and the manubrium is white. Hargitt remains somewhat vague concerning the position and form of the gonads. *Protiara haeckeli* has apparently also never been reported again and as its morphology remains incompletely known it is thus of limited help in elucidating the genus *Protiara*. A rather distinct, third *Protiara* species was described by Bigelow (1912) as *P. tropica*. Bouillon (1980) removed it from the genus *Protiara* to *Pseudotiara* (Family Bythotiaridae).

Summarizing, *Protiara tetranema* is a doubtful, unrecognizable species. Because the only other species of the genus, *P. haeckeli*, is also somewhat doubtful, this undermines seriously the usefulness and validity of the genus *Protiara* and the family Protiaridae.

FAMILY TRICHYDRIDAE HINCKS, 1868

DIAGNOSIS: Hydroid colonial, colony stolonal, stolons covered by thin perisarc; hydranths with a hydrotheca-like tube of perisarc at base into which polyp can withdraw, hydranths very small, sessile, with one amphicoronate whorl of filiform tentacles. Gonozooids are reduced hydranths without tentacles (blastostyles) enclosed in a filmy, soft perisarc-tube like a gonotheca.

Medusa bell-shaped, with apical process, without gastric peduncle; manubrium with four large, folded lips; four radial canals; numerous fine, branched, anastomosing centripetal canals connecting non perradial marginal bulbs to radial canals; gonads interradiial pads; marginal tentacles solid, with relatively large marginal bulbs; no ocelli.

REMARKS: The systematic position of this family and its sole genus is somewhat unclear. The majority of current authors (e. g. Bouillon *et al.*, 2006) place it among the Anthoathecata based on its medusa, which is undeniably typical for this order. Werner (1984), however, classified it under Leptothecata. This was likely a conclusion he derived from his knowledge of the gonotheca of the hydroid stage (briefly mentioned in Werner, 1984 and pers. comm. Dr Anita Brinckmann-Voss). *Trichydra* and *Halitiara* share identical polyp stages and both are likely more closely related than previously thought. The cnidome of *Trichydra* remains imperfectly known, but the one of *Halitiara* is rather unique and resembles more the cnidomes found in the Leptothecata (i.e., Eirenidae, Eucheilotidae, Haleciidae, Lovenellidae and Tiaropsidae; Bouillon, 1985; Bouillon *et al.*, 1988). The taxonomic position of *Trichydra* and *Halitiara*

remain thus unsettled and intriguing. Hopefully, molecular phylogenetic investigations will soon address the problem.

Genus *Trichydra* Wright, 1858

SYNONYM: *Pochella* Hartlaub, 1917 [type species *Pochella polynema* Hartlaub, 1917].

TYPE SPECIES: *Trichydra pudica* Wright, 1858 by monotypy.

DIAGNOSIS: See family diagnosis.

REMARKS: This is currently a monotypic genus. See also the remarks under *Fabienna oligonema*.

Trichydra pudica Wright, 1857

Fig 26-28

? *Oceania pusilla* Gosse, 1853: 384, pl. 13 figs 11-14.

not *Eudendrium pudicum* Van Beneden, 1867: 116, pl. 7 figs 1-2. – Rees, 1941:135.

Trichydra pudica Wright, 1857: 168. – Wright, 1858: 257, pl. 15. Fig. 1. – Wright, 1863: 440, pl. 22 figs 1-6. – Hincks, 1868: 216, fig. 26. – Rees, 1941: 135, figs 4-5. – Hamond, 1957: 296. – Edwards, 1973: 87, Fig. 1A-E. – Fraser, 1974: 19. – Arai & Brinckmann-Voss, 1980: 75, fig. 42. – Werner, 1984: 187, fig. 116.

Pochella polynema Hartlaub, 1917: 414, figs 344-346. – Russell, 1938a: 425, figs 1-3. – Russell, 1953: 394, figs 257-262. – Kramp, 1959: 179, fig. 258. – Kramp, 1961: 233. – Kramp, 1968: 109, fig. 296.

Proboscidactyla polynema. – Foerster, 1923: 30, pl. 3 figs 5-7, pl. 4 fig. 1.

? *Pochella polynema*. – Goy *et al.*, 1991: 118, fig. 45.

TYPE MATERIAL: Not located, likely lost.

MATERIAL EXAMINED: BMNH 1954.11.13.383; as *Pochella oligonema*; England, Plymouth; mature medusa collected 30 April 1898; material depicted in Russell (1953: fig. 260). – BMNH 1955.11.23.1938; as *Pochella oligonema*; England, Plymouth; mature medusa collected 25.05.1934; material depicted in Russell (1953: fig. 258). – BMNH 1954.11.13.126, slide preparation, as *Trichydra pudica*; Ireland, Valentia; hydroid collected April 1900, reared colony from aquarium of M. J. Delap; donated by E. T. Browne, likely the material mentioned in Rees (1941: 335).

DIAGNOSIS: See family diagnosis.

DESCRIPTION (Rees, 1941; Edwards 1973; own observations): Hydroid colonial, hydranths very small, connected by ramified, creeping, tubular stolons covered by thin perisarc. Hydranth with a basal hydrotheca-like tube of filmy perisarc into which the hydranth can partially or entirely contract, no operculum, the slightest disturbance makes them retract, hydranth very extensible, rather flexible, distal part can droop like a flower, hydranth body cylindrical, thin, hypostome conical, one whorl of 6-8 tentacles, tentacles thin, irregularly disposed nematocysts give spiny appearance to extended tentacles, fully extended often longer than polyp height.

Reproductive polyps reduced to blastostyles producing one to two medusae at a time, contained in a perisarc tube resembling hydrotheca of the hydranths, these gonothecae without distinct operculum, blastostyle a simple rod-like process without tentacles.

Newly liberated medusae very small, cup-shaped, jelly fairly thin, without umbilical canal; four short tentacles with conspicuous bulbs, four radial canals and a ring canal, radial canals without side-branches, stomach relatively large but without lips, velum broad, numerous nematocysts scattered over the exumbrellar surface; stomach and bulbs tinged with pale pinkish yellow.

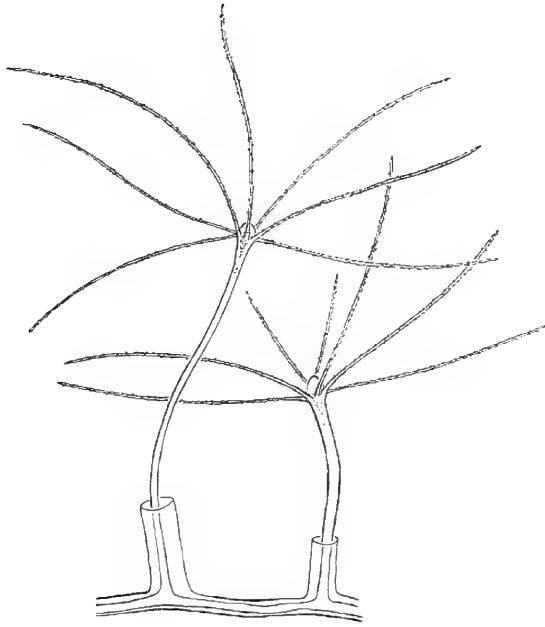


FIG. 26

Trichydra pudica Wright, 1857; living polyps, modified after Rees (1941).

Adult medusa with bell-shaped or hemispherical umbrella, slightly wider than high, jelly fairly thick, with broad, rounded apical process, without exumbrellar nematocyst tracks. Velum fairly broad. Stomach large, four-sided to cruciform in section, length about $\frac{1}{2}$ to $\frac{2}{3}$ the height of subumbrellar cavity; mouth cruciform through four rather large perradial lips, mouth-margin undulated. Four interradial gonads on stomach wall, cushion-like, each gonad when fully developed covering almost entirely the interradial wall of stomach. Thirty to forty or more solid marginal tentacles with large rounded basal swellings, without ocelli. Four straight smooth perradial canals fairly broad, usually also numerous fine, branched, anastomosing centripetal canals connecting non-perradial marginal bulbs to radial canals, connections of fine centripetal canals to perradial canals occurring at varying levels.

Colour of stomach and marginal tentacle bases brown.

Nematocysts inadequately known, almond-shaped capsules resembling macrobasic heteronemes or merotrichous isorhizas, desmonemes most probably absent.

DIMENSIONS: Polyps hydranths up to 1 mm, tentacles when expanded may reach a length of 1.2 mm, basal perisarc collar (hydrotheca) 0.15-0.35 mm high and 0.1-0.14 mm wide (Rees, 1941). Gonothecae 0.3-0.55 mm high and 0.15-0.2 mm wide. Newly liberated medusae from 0.15-0.2 mm in diameter and height (Edwards, 1973) to 0.3 mm wide and 0.4 mm high (Rees, 1941). Mature medusae may reach 3.85 mm in diameter and 3.47 mm in width (Edwards, 1973), mature medusae in the plankton have a diameter of 2-3 mm (Russell, 1953).

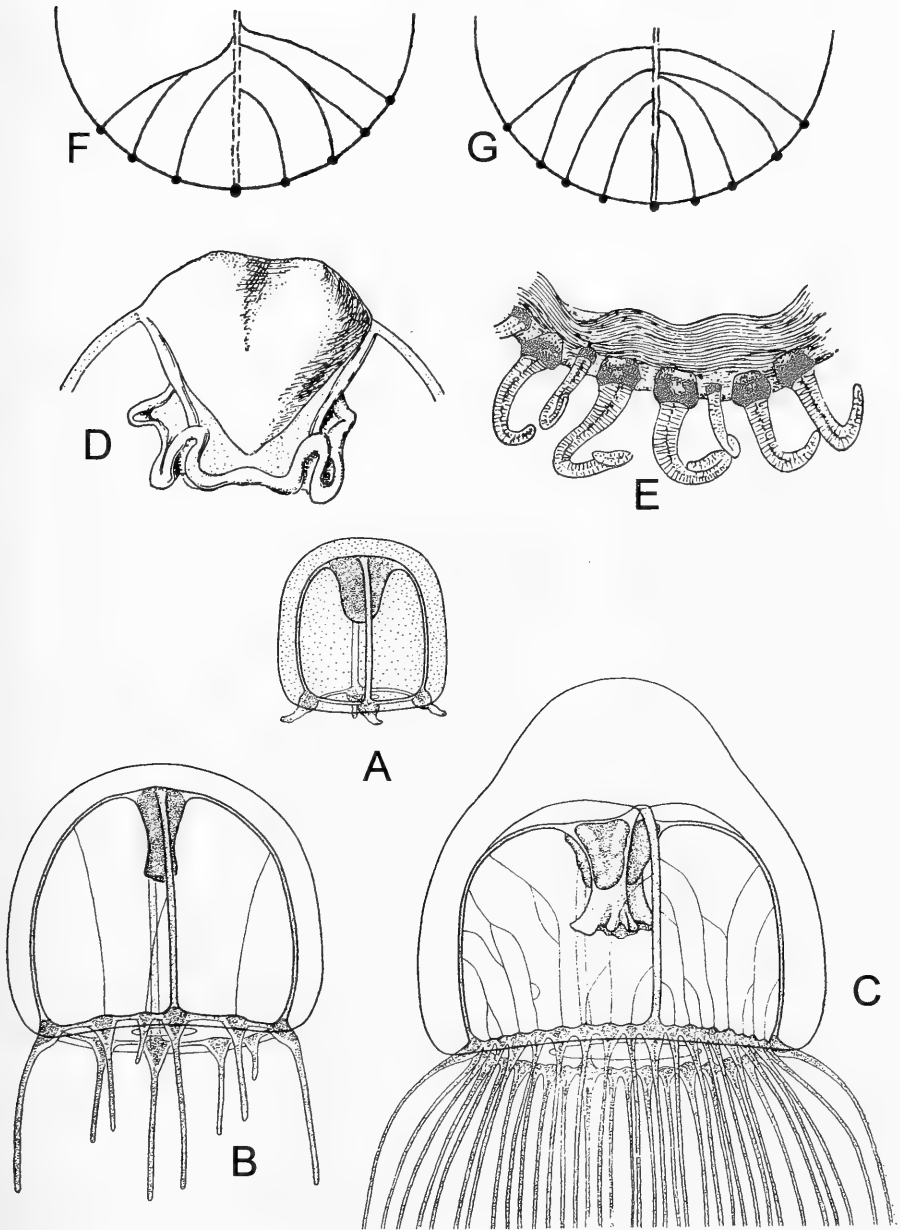


FIG. 27

Trichydra pudica Wright, 1857; medusa stage. A-C from Edwards (1973), D-E after Hartlaub (1917), F-G from Russell (1953). (A) Newly liberated medusa, height 0.15 mm. (B) Intermediate growth stage, diameter 1.2 mm. (C) Mature male medusa, bell height 3.3 mm, diameter 3.6. (D) Manubrium with mature gonads, medusa from plankton. (E) Bell rim with tentacle bases, note bulb-like swelling when the tentacles are contracted. (F-G) Schemata showing the variation of the branching pattern of the fine, centripetal canals.

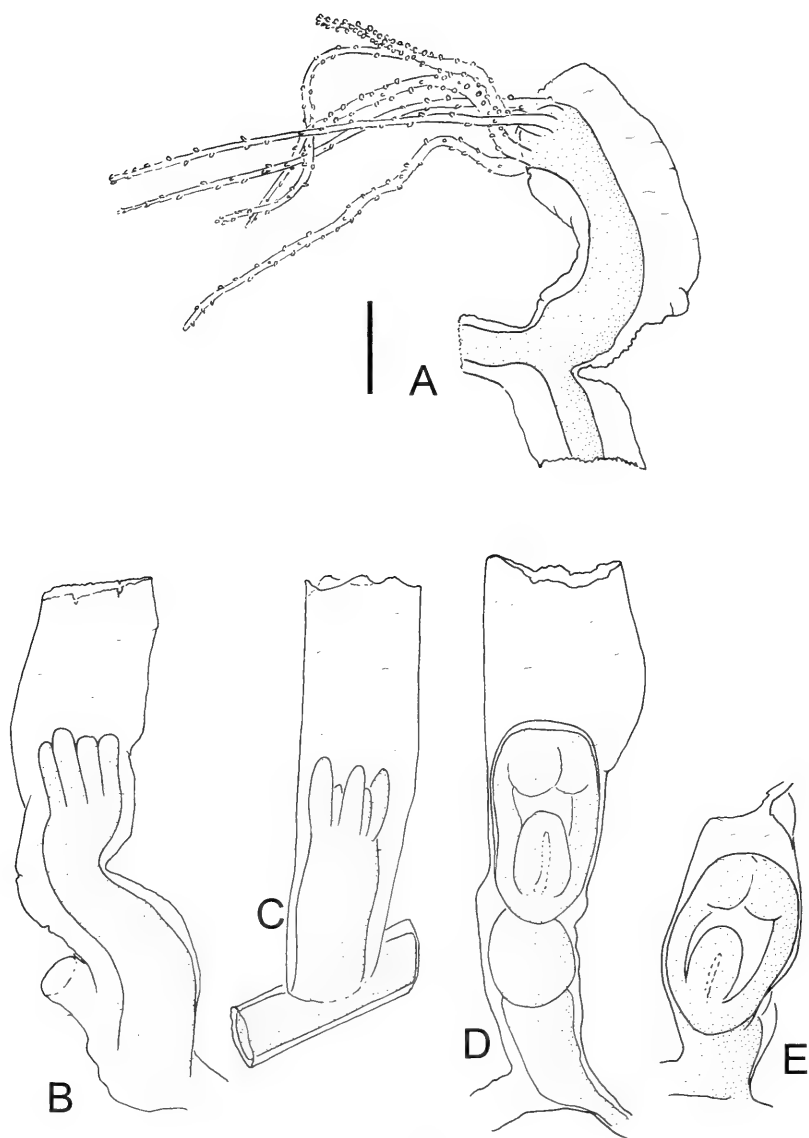


FIG. 28

Trichydra pudica Wright, 1857; after material from Ireland (BMNH 1954.11.13.126, permanent slide-preparation); scale bar valid for all section, equals 0.1 mm. (A) Polyp with extended tentacles. (B-C) Polyps that are completely retracted into perisarc tube. (C-D) Gonothecae with blastostyles and maturing medusae.

OTHER DATA: The development of the medusae and the correlation of size and tentacle number are described by Russell (1953) and Edwards (1973).

BIOLOGY: The hydroid was found on shells and stones (Wright, 1857; Hammond, 1957), clinker (=coal burning waste; Rees, 1941; Edwards, 1973), and the

ascidian *Microcosmos claudicans* (Savigny) (Hamond, 1957). The observations of Edwards (1973) indicate that medusae are liberated from April to June, becoming mature by July or August (Firth of Clyde). The length of life is about 2 months.

DISTRIBUTION: The hydroid is known from the British Isles (English Channel, North Sea, western and eastern Scotland, western Ireland; Wright, 1857; Hincks, 1868; Rees, 1941; Hamond, 1957; Russell, 1957; Edwards, 1973; this study). The medusa occurs in the British Isles (Russell, 1953; Fraser, 1974), the northern part of the North Sea (Hartlaub, 1917), and in the north-eastern Pacific along the coast of British Columbia (Foerster, 1923; Arai & Brinckmann-Voss, 1980). Goy *et al.* (1991) also reported it from the eastern Mediterranean, but their single medusa had only eight tentacles and the identification is not convincing. The occurrence in the Mediterranean needs reconfirmation. The remaining records of both medusae and polyp suggest a more northern Boreal distribution. Type locality: North Sea, Scotland, Firth of Forth; on shells and stones.

REMARKS: Most unusual for an Anthoathecata, this species has gonozooids in gonothecae, just like *Halitiara formosa*. The gonothecae of *Trichydra pudica* were first mentioned in a brief species diagnosis given by Werner (1984), presumably based on unpublished observations. The gonothecae observed in this study were found in a sample identified as *T. pudica* by M. J. Delap and E. T. Browne. As there is no information on the mature medusa connected to this sample, the identification remains somewhat uncertain. The polyps of *Halitiara formosa* are identical, but the medusa does not occur in the region. Some small Campanulinidae are also similar, though their hydrothecae usually have a pedicel and an operculum formed by perisarc flaps (comp. Cornelius, 1995a).

The medusa of *T. pudica* was first described as *Pochella polynema* by Hartlaub (1917) and it was Edwards (1973) who linked it unambiguously with the hydroid *T. pudica*. The hypothetical linking of *T. pudica* with *Lizzia blondina* by Rees (1941) thus proved to be incorrect. The medusa is very rare and at first glance, or in damaged material from net catches, can be mistaken for a *Podocoryna* species (see Schuchert, 2008a). The cruciform mouth and the absence of oral nematocyst clusters however allow them to be distinguished easily. Also the cnidome could be different, but unfortunately the cnidome of *Trichydra* remains inadequately known.

ACKNOWLEDGEMENTS

I gratefully acknowledge the help of my colleagues, especially Dr Dale Calder for advice on the ICZN, Drs C. Schandler & H. Rapp for the donation of the *Thecodium* specimen, and Dr A. Brinckmann-Voss for the gift of specimens and her permission to reproduce original drawings of *Halitiara formosa* and illustrations of her publications.

I am also deeply indebted to Dr Dhugal Lindsay who took the burden to read and comment an earlier draft of this manuscript. His comments helped to significantly improve the quality of the final manuscript, but all remaining errors are solely my fault.

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The *Hilara* species (Diptera, Empididae) of Switzerland, with respect to the fauna of the Alps and other central European mountains

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The *Hilara* species (Diptera, Empididae) of Switzerland, with respect to the fauna of the Alps and other central European mountains. - Within

the fauna of the Alpine region 118 *Hilara* species are recognized including some species which are not yet known from the region but may be expected. The species are keyed, and full distributional data are given for the Alps. Eight new species are described: *Hilara leukensis* sp. n., *H. luteihalterata* sp. n., *H. planti* sp. n. and *H. crossleyi* sp. n. from the Swiss Alps, *H. brevistriata* sp. n. from the Swiss and Austrian Alps, *H. parvimaior* sp. n. from the Swiss and Italian Alps, *H. sirbitzmatrona* sp. n. from the Austrian Alps, and *H. polleti* sp. n. from the Bulgarian Rhodope Mts; Several further species are fully redescribed and illustrated for the first time (*H. cinereomicans* Strobl, *H. sartor* Becker, *H. tiefii* Strobl, *H. tanychira* Strobl, *H. dimidiata* Strobl, *H. simplicipes* Strobl, *H. calinota* Collin, *H. pruinosa* Wiedemann in Meigen, *H. hystrix* Strobl, *H. pectinipes* Strobl), and the females of *H. helvetica* Chvála and *H. zermattensis* Chvála are described here for the first time. A lectotype is designated for *H. pilosopectinata* Strobl. The following new synonymies are proposed: *Hilara maior* Strobl, 1910 (= *Hilara tatra* Niesiolowski, 1991) and *Hilara tyrolensis* Strobl, 1892 (= *H. miriptera* Straka, 1976). The synonymy of *Hilara longesetosa* Strobl, 1910 with *H. pilosopectinata* Strobl, 1892 is explained. *Hilara longicornis* Strobl, 1894, described and still known only from the Hungarian lowlands, is fully redescribed and its correct classification within the genus *Hilara* is discussed in the section "additional species". The same applies to *Hilara flavocoxa* Straka, 1976, a species known only from a single locality in highlands of central Slovakia.

Keywords: Diptera - Empididae - *Hilara* - Central Europe - faunistics - taxonomy - key - new species - new synonymies.

INTRODUCTION

There are two recent basic monographs available for the genus *Hilara* (Diptera, Empididae) in Europe, one covering all Fennoscandian, British and partly central

European species (Chvála, 2005a), the second deals with the Mediterranean fauna (Chvála, 2008a). There is, however, a distinct group of species mostly of central European distribution, mainly mountain forms, which were included neither within the north European fauna, nor in the Mediterranean study. Such species were not keyed in the above two monographs. Therefore, the authors present here a publication which enables the identification of all species in temperate central part of Europe, covering in particular the special mountain and Alpine species of the genus. In addition, some mountain species that occur also in the north (mostly species of boreomontane distribution), or species known also from the warm coastal lowlands, are included here as well. Furthermore, all species which were found or may be found in Switzerland are discussed and keyed.

If the reader cannot identify "his" species with the present key, then he is recommended to consult the identification keys in Chvála (2005a) and Chvála (2008a). There is still a real possibility that some southern species are occurring in more northern regions, like the lowlands of the Alpine region. If the reader does not succeed even after that, then there is only a third possibility: he has a new, undescribed species before him.

The fundamental work on the Alpine *Hilara* (Diptera: Empididae) is undoubtedly the more than 100 years old monograph of Strobl (1892a), based mainly on the fauna of the Austrian Styrian Alps. Strobl recognized at that time already 62 species and several varieties or forms. Of the 27 described new species, 20 of them remain valid, and only 7 species were later regarded as junior synonyms. All the 5 new varieties or forms described by Strobl in this monograph were later raised to specific rank and are now considered to be valid species as well. The 7 taxa which were later synonymized include new descriptions of both sexes of *Hilara albitarsis* von Roser (unknown to Strobl), or the complex of the north European group of *H. longivittata* Zetterstedt. This species was described by Strobl as the new species *H. bivittata*, and all forms described as new by Strobl represent now well recognized species of the distinct *H. andermattensis* group of species, a complex of exclusively high alpine *Hilara* species. Strobl continued to study the Styrian *Hilara* species in the fundamental five-volume work "Die Dipteren von Steiermark" published in 1893 – 1910.

Two further monographs dealing with the Alpine *Hilara* species by Keiser (1947) and Franz (1989) do not reach the high quality of the Strobl's publications and, therefore, they are not discussed here more in detail. For instance, Keiser (1947: 126) recognized only 9 species of *Hilara* in the Swiss National Park. All species were listed from many localities. A re-examination of them by the first author (MC) revealed that these specimens belong to complexes of several related species. The same applies to the elaboration of the genus *Hilara* by Franz (1989: 321) in the two-volume monograph on the Alpine Diptera of Austria. Franz mentioned altogether 73 *Hilara* species on pp. 321-330, but many of these names are unavailable, or synonyms, and most species are based mainly on misidentifications of E. O. Engel and E. Lindner, who both were not at all specialists of this genus.

It was later Collin (1961) in his monograph of *Hilara* of the British Isles whose treatment is of a very high level. He understood the genus well but, since he did not study the Strobl collection, some of the species described by him (Collin, 1927) were later found to be younger synonyms of Strobl's taxa.

In all 65 *Hilara* species were recorded in Switzerland in the first Checklist (Chvála *et al.*, 1998), additional 13 species of the genus were included in the first Supplement (Merz *et al.*, 2002), and a further 8 species in the second Supplement (Merz *et al.*, 2007). The present revision includes a further 12 species found in Switzerland for the first time but 3 species are deleted because of misidentifications. Therefore, in total 95 species are recorded with certainty from Switzerland.

THE ALPINE FAUNA

The species composition of the 118 *Hilara* species recorded in the present publication is especially interesting. There is a large group of 18 clearly alpine endemics, i. e., species known from the Alps only (*H. alpicola* Chvála, *H. cinereomicans* Strobl, *H. planti* sp. n., *H. crossleyi* sp. n., *H. tiefii* Strobl, *H. sartor* Strobl, *H. leukensis* sp. n., *H. brevistriata* sp. n., *H. luteihalterata* sp. n., *H. helvetica* Chvála, *H. parvimaior* sp. n., *H. styriaca* Strobl, *H. merzi* Chvála, *H. zermattensis* Chvála, *H. andermattensis* Strobl, *H. simplicipes* Strobl, *H. sulcitaris* Strobl and *H. tyrolensis* Strobl); 11 species are boreo-montane faunal elements (some perhaps of boreo-alpine distribution if of the last glacial period origin), though scarcely they are of arcto-alpine distribution (for instance, *H. setosa* Collin, *H. eviana* Straka, *H. griseola* Zetterstedt, *H. intermedia* (Fallén), *H. bistrinata* Zetterstedt, *H. coracina* Oldenberg, *H. scrobiculata* Loew, *H. diversipes* Strobl and *H. hybrida* Collin). Finally, 8 species are exclusively mountain species of central temperate Europe which are known besides the Alps also from other central European mountains (*H. nigrita* Chvála, *H. goetzei* Chvála, *H. perversa* Oldenberg, *H. tetragramma* Loew, *H. quadrifaria* Strobl, *H. calinota* Collin, *H. trisetata* Chvála and *H. hystrix* Strobl). Four species are known in temperate central parts of Europe, which occur both in lowlands and high in mountains, including the Alps (*H. pilospectinata* Strobl, *H. borealis* Oldenberg, *H. pectinipes* Strobl and *H. bohémica* Straka).

It is difficult to classify at present the mountain *Hilara* species within special altitudinal zones, as it was done for instance by Ziegler (2008) for the fauna of Diptera in the Italian Stilfserjoch National Park. Collecting efforts in the long and diverse Alpine chain from western Austria to the Mediterranean coast of France and Italy are very scattered and insufficient and many regions are unstudied. Therefore the available data is too scarce to allow a classification of ecological or distributional patterns of the species.

The other *Hilara* species occurring in the Alpine region are widely distributed in Europe, from the Fennoscandia in the north, and through central temperate Europe south at least to the Alpine region, very often right up to the Mediterranean. In central parts of Europe they are distributed mainly in lowlands and submountain regions, and absent from higher altitudes.

There is, however, a small group of about 7 species representing faunal elements of south-western Europe, which are mainly widely distributed in Spain, often including the Pyrenees, and distributed north-west along the French coast right up to the western part of the Alpine region, especially south east France and the adjacent parts of Italy and Switzerland. As examples may be mentioned the following species: *H. morenae* Strobl, *H. ponti* Chvála, *H. veletica* Chvála, *H. pygialis* Chvála, *H. prui-*

nosa Wiedemann, but also for instance *H. pseudocornicula* Strobl, a very common species in Spain and the Mediterranean which was known for a long time also from western parts of Europe along the Atlantic coast as *H. subpollinosa* Collin. These species are discussed in the corresponding paragraphs on "Distribution". There are still possibilities that some further southwestern species of the Spanish fauna will be found in the Alpine region in the future.

There are, however, a further two not clearly mountain *Hilara* species which are mentioned here, as they were not included in the previous two main monographs on the genus *Hilara* in Europe.

First, it is *Hilara longicornis*, described by Strobl (1894) from 10♂ and 3♀ collected by Prof. Thalhammer on 1.v.1893 at Hajós in Hungary. Five syntypes (3♂ and 2♀) are in the Strobl Collection in Admont. Becker (1894) erroneously supposed it was a species of the genus *Itaphila* Zetterstedt, 1838 (cited as *Steleocheta* Becker, 1887) of the empidid subfamily Oreogetoninae because of some morphological peculiarities (very long antennae, simple unmodified legs, the open rather "*Empis*"-like radial fork). However, *H. longicornis* is a typical *Hilara* species possessing all the main generic characters. The species is keyed below within the mountain species, and it is redescribed in the section "additional species".

Secondly, it is *Hilara flavocoxa*, described by Straka (1976) from the locality Turček at Kremnické vrchy (Kremnické hills) in the lowlands of central Slovakia. This species seems to be closely related to *H. merula* Collin and, like the preceding *H. longicornis*, it is also fully redescribed and discussed in the section "additional species".

THE FAUNA OF SWITZERLAND

Austria has a long dipterological tradition, in particular for the genus *Hilara*, thanks to the activity of Strobl. On the other hand, Switzerland did not receive a particular attention for this genus in the past. Before 1930 only few specimens were collected by Th. Becker and L. Oldenberg during their short visits in few places in the Alps. Later, F. Keiser collected extensively in the Swiss National Park and published his identifications (Keiser, 1947). However, he did not specifically search for *Hilara* and, therefore, the fauna remains poorly known even for this region. Later, Ringdahl (1957) mentioned 4 further species. The main efforts with specific collecting of *Hilara* started only recently with G. Bächli (from 1971), J.-P. Haenni (from 1980) and the second author (BM) (from 1994) who organized several shorter and longer field trips to various localities in the Swiss Midlands and the Alps, sometimes helped by students or visitors. Their specimens were mostly included in the numerous revisions of the first author, the checklist and the two supplements (see references). As only few dipterists have made a special effort they were not collecting at all suitable localities, and many regions in Switzerland remain unstudied. This is in particular the case for the Jura mountain chain for which almost no specimens are available and which may host further nordic species as it is for instance the case of the Chloropidae (Merz *et al.*, 2005).

NEW SYNONYMIES

Three new synonymies of the Alpine *Hilara* species are given below. First, it is *Hilara tatra* Niesiolowski, 1991, described from the Polish Tatra Mts, which is conspe-

cific with *H. maior* Strobl, 1910, the only widely distributed species in mountains of central Europe of the otherwise clearly Alpine *Hilara andermattensis* group of species. The second is *Hilara longesetosa* Strobl, 1910, described from the Styrian Alps, which Strobl (1892a) inadequately described already earlier as *Hilara pilosopectinata* from the Austrian locality Gmund. However, Chvála (2008b) already briefly mentioned this synonymy within a revision of the Diptera described by Gabriel Strobl. Finally, the third is *Hilara miriptera* Straka, 1976, described from the Slovenian Julian Alps, which is conspecific with *Hilara tyrolensis* Strobl, 1892.

MATERIAL AND METHODS

The present study is primarily based on several thousand specimens from the Styrian and Swiss Alps. The basic collection was that of Pater (Father) Gabriel Strobl in the Styrian Admont, who built up his large and very important scientific collection of Alpine *Hilara* between 1887 and 1910 (see also Chvála, 2008b). Results of his field studies were first published in the monograph of Austrian *Hilara* species (Strobl, 1892a), followed by further data in the five volume monograph of Strobl "Die Dipteren von Steiermark" where the *Hilara* species were treated in three volumes in 1893, 1898 and 1910 (see references). This region of the Styrian Alps, covering the Ennstaler Alpen including the Gesäuse, and the Rottenmanner and Schladminger Tauern, was later very intensively studied again by the first author (MC), from 1995 until now. The second well studied area is Switzerland. The second author (BM) collected, often together with his collaborators and students, with priority in the Alps (Grisons, Valais, Ticino), but also in the Swiss Midlands around Zürich (1988-1998) and Geneva (from 1999 until now). G. Bächli and J.-P. Haenni have kindly loaned for study further material from Switzerland. Especially interesting were specimens collected by P. Stucki at light traps, and by C. Besuchet at the window of his winter garden, both in the vicinity of Geneva. The second author (BM), and also J.-P. Haenni, A. C. Pont, M. Barták and E. Castella & M. C. D. Speight, collected numerous specimens in the French Alps and the adjacent mountains. J.-P. Haenni and M. Barták helped also with specimens from the Italian Alps. Finally, A. R. Plant put at our disposal many interesting specimens from the Slovenian Julian Alps and the hilly country on the Slovenian-Croatian border. It should be noted that over 90% of the specimens were collected by sweeping with an insect net on vegetation or over the water surface. Only few specimens were obtained with traps (Malaise trap, light trap) or other methods.

The specimens studied are housed in the collections cited below. It should be noted that the entire collection of the first author (MC) is now deposited in the UMO where also the large collection of J. E. Collin is preserved. A major part of the specimens collected by the second author (BM) before 1999, sometimes with his former students (for instance, C. Wolf and P. Rüegg) is deposited in the ETHZ. The specimens collected since 1999, as well as a reference collection of all species, are now stored in the MHNG.

In the following systematic treatment only records from the Alpine region (Austria, France, Italy, Slovenia, Switzerland) are listed under "Material examined" for the common species which occur also elsewhere. Detailed collecting data for these species were published in the revisions and monographs of Chvála (see references).

BSA	Benediktinerstift Admont (coll. G. Strobl) (Austria)
CGB	Private collection G. Bächli, Dietikon (Switzerland)
ETHZ	Eidgenössische Technische Hochschule, Zürich (coll. J. Escher-Kündig, G. Huguenin, B. Merz part, W. Sauter) (Switzerland) (curator: A. Müller)
MHNG	Muséum d'histoire naturelle Genève (coll. B. Merz, part) (Switzerland)
MHNN	Muséum d'histoire naturelle Neuchâtel (coll. J.-P. Haenni) (Switzerland)
NHMB	Naturhistorisches Museum Basel (coll. F. Keiser) (Switzerland) (curators: M. Brancucci, D. Burckhardt, F. Keiser)
NML	Natur Museum, Luzern (coll. L. Rezbanyai-Reser) (Switzerland) (curator: L. Rezbanyai-Reser)
UMO	University Museum Oxford (coll. J. E. Collin, coll. M. Chvála) (U.K.)
ZMB	Zoologisches Museum der Humboldt Universität, Berlin (coll. L. Oldenberg, T. Becker) (Germany) (curators: H. Schumann, J. Ziegler)

For the descriptions and diagnosis we adopt the terminology of morphological structures of Chvála (2005a, 2008a). The following abbreviations are used for setae and legs:

for setae (bristles)	for legs
<i>acr</i> - acrostichals	<i>bt</i> - basitarsus (i.e., first tarsomere)
<i>dc</i> - dorsocentrals	<i>cx</i> - coxa
<i>h</i> - humeral	<i>f</i> - femur
<i>ih</i> - intrahumeral	<i>t</i> - tibia
<i>ntpl</i> - notopleural	<i>1, 2, 3</i> - indicate fore, mid and hind legs
<i>pa</i> - postalar	
<i>ph</i> - posthumeral	
<i>sa</i> - supra-alar	
<i>sc</i> - scutellar	

KEY TO THE ALPINE *HILARA* SPECIES

The key is based on dry-pinned specimens. It should be noted that specimens which were collected in alcohol and dried only later, which are still stored in alcohol, or which are teneral, are often paler (in particular the legs and the haltere) or either smaller (shrivelled for teneral specimens) or larger (full of liquid for alcohol-preserved specimens) and may therefore lead to confusions.

It is recommended to use the following key in conjunction with the illustrations in Collin (1961) and Chvála (2005a, 2008a).

- 1 Small, slender, weakly built species with slender yellowish legs, body with a tendency to be yellowish, *h* (and usually also *ih*) bristle absent or very inconspicuous, but pronotum (unlike *H. maura*-group) always with a distinct bristle on each side. Body and legs devoid of distinct bristles; legs covered with only weak bristly-hairs, simple and slender, male *bt*₁ and female *t*₃ unmodified, slender (group 1, *H. flavipes*-group) 2

- Body and legs with distinct bristles or bristly-hairs (with the exception of the *H. maura*-group, but then pronotum without a distinct bristle on each side, and legs modified); if male bt_1 slender and unmodified, as stout as following tarsomeres (*H. tyrolensis*, *simplicipes*, *perversa*), then legs extensively blackish 5
- 2(1) ♂: eyes touching on frons, upper ommatidia distinctly enlarged; no frontal bristles, and anterior four tibiae with distinct fine bristly-hairs beneath. ♀: haltere yellow 3
- ♂: eyes narrowly separated on frons, all ommatidia equally small, frons about as deep as anterior ocellus. Long frontal bristles present in both sexes 4
- 3(2) Thoracic pleura blackish-grey. Ocellar bristles longer than upper occipitals. ♂: tarsi not very long, bt_1 together with 2nd tarsomere shorter than t_1 , and mid tarsus shorter than t_2 . ♀: frons dull light grey, no distinct frontal bristles 1. *H. flavipes* Meigen
- Thoracic pleura translucent yellowish. Ocellar bristles small, not differentiated from upper occipital bristles. ♂: tarsi very elongated, bt_1 together with 2nd tarsomere longer than t_1 , and mid tarsus clearly longer than t_2 . ♀: frons velvety-black, frontal bristles long . . . 2. *H. flavidipes* Chvála
- 4(2) ♂: abdomen contrastingly snow-white on anterior four to five segments. ♀: haltere darkened, knobs grey to blackish-grey; *h* and *ih* bristles not differentiated 4. *H. albiventris* von Roser
- ♂: abdomen uniformly dark on dorsum, terga brownish-black with narrowly paler membranous hind-margins. ♀: haltere yellow 4a
- 4a(4) Antennae uniformly blackish, segment 2 rarely slightly brownish; *h* and *ih* setae distinct, well visible, even if fine. Legs yellow on femora, more or less brownish on posterior four tibiae and tarsi. ♂: Frons rather wide, about as wide as anterior ocellus, and parallel-sided 3. *H. morenae* Strobl
- Basal antennal segments yellowish-brown; *h* and *ph* setae minute. Legs extensively yellow, only tarsi darkened towards tip. ♂: Frons very narrow above, almost linear, narrower than anterior ocellus, and distinctly widening below towards antennae 3a. *H. sturmi* Wiedemann in Meigen
- 5(1) Body and legs devoid of distinct bristles; *h*, *ih*, and *ph* bristles absent, pronotum (except for *H. media*) without a bristle on each side. A distinct sensory pit below prothoracic spiracle. Legs with f_3 often thickened and abruptly narrowed at tip, black (only partly translucent yellowish in *H. media* and *H. discalis*), bt_1 in ♂ very thickened (except for *H. simplicipes*) (group 13, *H. maura*-group) 6
- Body and legs with distinct bristles or bristly-hairs, the strong marginal bristles on scutum only rarely absent, and pronotum always with one or more distinct bristles on each side. No sensory pit below prothoracic spiracle, and f_3 not clearly thickened (except for *H. coracina* and *H. albitarsis*) 17
- 6(5) f_3 more or less thickened, often abruptly narrowed at tip, and hairs on apical third beneath arising from small warts. The sensory pit below prothoracic spiracle covered with fine hairs 7

- f_3 slender, not dilated, and the hairs beneath towards tip not arising from small black warts (except for *H. diversipes* ♀, but then a large species, 3.5 – 5 mm long) 13
- 7(6) Scutum with 3 dark stripes which, when viewed from in front, coalesce into a broad rusty brown median stripe; when viewed from behind, this stripe becomes velvety black and is sharply separated from the silvery sides. f_3 dilated in both sexes, but not abruptly narrowed at tip; *acr* irregularly 4- to 6-serial, *dc* 2- to 3-serial, all minute. Prothoracic spiracle almost whitish. ♂: lateral genital lamella with a cluster of golden-yellow hairs towards tip (as in *H. diversipes*). ♀: t_3 evenly dilated towards tip. Large, about 4 – 4.5 mm long 104. *H. maura* (Fabricius)
- Scutum rather uniformly shining or subshining black; if finely pollinose and striped, then stripes not coalescent in anterior and posterior views. f_3 abruptly narrowed towards tip; if in doubt (*H. hybrida* ♀ and *H. diversipes* ♀), then *acr* and *dc* less numerous, the former 3- to 4-serial, the latter almost 1-serial, and prothoracic spiracle dark blackish-brown (whitish in *H. maura*) 8
- 8(7) Generally large species, body 3.5 – 5.0 mm long. Scutum finely pollinose, with 3 indistinct dark stripes in anterodorsal view, and microscopically silvery pilose in frontal view. Palpi mostly with pale hairs beneath, only a few longer bristly hairs brownish. *acr* irregularly 4-serial, minute. ♀: t_3 dilated 9
- Generally smaller species, body about 2.5 – 4 mm long. Scutum almost polished black, at least subshining from all points of view, unstriped. Palpi with dark to blackish hairs beneath. f_3 strongly dilated and abruptly narrowed before tip in both sexes. ♀: t_3 slender 10
- 9(8) ♂: lateral genital lamella with a cluster of pale golden-yellow hairs at tip (as in *H. maura*). *dc* almost 1-serial anteriorly. ♀: f_3 rather slender, practically not dilated; t_3 more evenly dilated towards tip; sternum 8 elongate, polished above, dusted below 105. *H. diversipes* Strobl
- ♂: lateral genital lamella with small dark brownish hairs. *dc* narrowly 2-serial anteriorly. Wings clear (brownish in the morphologically similar *H. nitidula*). ♀: f_3 dilated and abruptly narrowed at tip; t_3 slender in basal third, then conspicuously dilated apically; sternum 8 small, largely polished black 106. *H. hybrida* Collin
- 10(8) *acr* irregularly 4-serial, anteriorly often 3-serial, very small and inconspicuous; also ocellar and frontal bristles generally smaller 11
- *acr* irregularly 2-serial, anteriorly often 3-serial, then more distinct and hair-like, although small; if in doubt, and *acr* exceptionally almost 4-serial (*H. femorella*), then strong ocellar and frontal bristles in combination with brown clouded wings 12
- 11(10) *acr* irregularly 3- to 4-serial, *dc* 2-serial at middle, at least 3-serial anteriorly and posteriorly, all very minute. Antennal style about one-half length of 3rd segment, and palpi with one bristly hair in addition to the short hairs, no bristles. Ocellar bristles fine, frontal bristles often not

- differentiated. f_3 below towards tip covered with soft yellowish hairs. ♂: bt_1 large, equal to about 3/4 length of tibia; dorsal process of lateral lamella flattened, blunt-tipped. Larger, almost 4.0 mm long. Spring species 107. *H. nitidula* Zetterstedt
- *acr* almost regularly 4-serial, *dc* mostly 1-serial, more hair-like. Antennal style longer, almost as long as 3rd segment, and palpi more densely bristled. Ocellar and frontal bristles well developed, bristle-like. f_3 with black bristly hairs ventrally towards tip. ♂: bt_1 smaller, about 2/3 length of tibia; dorsal process of lateral lamella narrowed and sharply pointed. Generally smaller, about 3 – 3.5 mm long. Summer species 108. *H. nitidorella* Chvála
- 12(10) Abdominal pubescence blackish-brown, wings brownish. Ocellar and frontal bristles strong; *acr* and *dc* hair-like, about as long as 2nd tarsomere of fore tarsi. ♂: bt_1 shorter than tibia; hypandrium small, not produced posteriorly 109. *H. femorella* Zetterstedt
- Abdominal pubescence whitish, wings clear. Ocellar bristles small and fine, shorter than antennal style, and frontal bristles at most half as long, often invisible; *acr* and *dc* minute. ♂: bt_1 conspicuously large, as long as tibia; hypandrium produced posteriorly, very flattened, subhyaline along hind margin 110. *H. sulcitaris* Strobl
- 13(6) Pronotum without a bristle on each side, covered with uniform minute hairs 14
- Pronotum with a distinct bristle on each side. Wings clear, *acr* 4-serial. ♂: bt_1 stout but short, scarcely of 2/3 length of tibia. Rather a small species, body about 3 – 3.5 mm long (see also couplet 103) . 115. *H. media* Collin
- 14(13) Legs uniformly blackish including “knees”. The sensory pit below prothoracic spiracle without hairs. Radial fork very acute, “oreogetonine-like”; *acr* narrowly 2-serial. ♀: t_3 simple and slender 15
- “Knees” yellowish. The sensory pit below prothoracic spiracle guarded by silvery hairs. Radial fork of the usual shape, not acute, “hilarine-like”. Medium-sized species, body about 2.5 – 3.5 mm long 16
- 15(14) Abdominal pubescence blackish. Wings faintly brownish, veins blackish. ♂: bt_1 very thickened. Larger species, body 3 – 3.5 mm long 111. *H. clypeata* Meigen
- Abdominal pubescence whitish. Wings milky-white, veins whitish. ♂: bt_1 slender, unmodified. Smaller species, body about 2.5 mm long (= *H. miriptera* Straka, syn. n.) 112. *H. tyrolensis* Strobl
- 16(14) Frons subshining, with a small, shining ovate patch above antennae; clypeus largely polished black. *acr* 2-serial, in two widely separated rows, sometimes more numerous in front, *dc* 1-serial. Legs translucent yellowish on cx_1 , and also more or less so on all trochanters and femora. ♀: t_3 slender, unmodified 113. *H. discalis* Chvála
- Frons dull velvety black; clypeus greyish dusted, narrowly polished on upper margin. *acr* almost regularly 4-serial, *dc* irregularly 2-serial. Legs black except for narrowly yellowish “knees”. ♀: t_3 strongly dilated towards tip, slender at base 114. *H. discoidalis* Lundbeck

- 17(5) Legs yellow, at least fore legs partly yellow on coxa and base of femur, or legs almost uniformly brownish-yellow to dark brown 18
- Legs uniformly black, at most "knees" partly yellowish; if the colour varies, the species will be found in both sections (care must be taken with immature specimens with paler legs) 48
- 18(17) Yellow species, ground colour of thorax yellow 19
- Black or greyish species, ground colour of thorax black, at most humeri may be translucent yellowish 20
- 19(18) Large species, body about 4 – 4.5 mm long. Eyes narrowly separated on frons in ♂, occiput blackish-grey. Scutum extensively yellow, with long, hair-like irregularly 2- to 3-serial *acr*, and longer 1-serial *dc*. ♂: *bt*₁ long cylindrical, indistinctly stouter than tibia; ♀: *t*₃ slightly flattened and curved 24. *H. thoracica* Macquart
(Here belongs also *Hilara flavitarsis* Straka, 1976, described from Albania/Macedonia; for details see remarks under *H. thoracica*)
- Small species, body about 3 mm long. Eyes, as usual, broadly separated on frons, occiput light greyish. Scutum finely, almost silvery-grey pollinose, *acr* irregularly 3- to 4-serial, small and numerous, *dc* 1-serial and less numerous, about 10 bristles in one row. ♂: *bt*₁ long oval, stouter than tibia; ♀: *t*₃ slender, and abdomen silvery dusted on dorsum 38. *H. tenella* (Fallén)
- 20(18) Haltere clear yellow (knob darker grey in *H. allogastra*), and occiput dull grey, not blackish from any point of view 21
- Haltere blackish, or at least knob greyish-black; if in doubt (for instance *H. cuneata* ♀ with yellow haltere), species with occiput black from some points of view belong here 28
- 21(20) *acr* 2-serial, *dc*-1-serial, long and bristle-like, less numerous, about 10 in one row and all about as long as antennal style 22
- *acr* irregularly 3- to 4-serial, at least 3-serial at middle; if almost 2-serial (*H. gallica*), then large species about 3.5 – 4.5 mm long 23
- 22(21) Larger species, 3 – 3.5 mm long. ♂: legs with the usual scattered hairing and bristling, hypopygium upturned with an unusually stout, shining black hypandrium. ♀: *t*₃ distinctly thickened and compressed, contrasting blackish including tarsus; all femora and anterior tibiae yellowish. Palpi clear yellow 13. *H. canescens* Zetterstedt
- Smaller species, 2.5 – 3 mm long. ♂: tibiae and basitarsi on anterior two pairs unusually dilated and very densely, long black bristled. ♀: *t*₃ only slightly dilated and curved, not contrasting black; legs extensively darkened on all tibiae and tarsi. Palpi dark brown to blackish 14. *H. nigratarsis* Zetterstedt
- 23(21) Small, about 3 – 3.5 mm long; *acr* and *dc* long and bristle-like, less numerous (about 10 in one row), almost as long as antennal style. Scutum dull brownish-grey except for lighter grey scutellum. Legs extensively yellow, tarsi darkened. Female: *t*₃ only slightly thickened and distinctly curved. Haltere often extensively darkened (see also couplet 35) 18. *H. eviana* Straka

- Large species, about 4 – 5 mm long (except for *H. discolor*); *acr* and *dc* small and numerous. Rather robust, light grey dusted species on occiput and thorax, female t_3 simple (group 2, *H. abdominalis*-group) 24
- 24(22) Frontal bristles absent, not differentiated from other small hairs on frons. Palpi and basal antennal segments vary in colour from dark brown to black. Shorter- and stouter-legged species, especially femora stout, legs very yellow, only tarsi darkened towards tip. Scutum light grey, with only an indication of 2 darker lines between rows of bristles 8. *H. gallica* (Meigen)
- Frontal bristles distinct, often not much shorter than ocellars. Palpi yellowish. Longer-legged species, legs usually more or less darkened on tibiae and tarsi, and more distinctly bristled 25
- 25(24) Scutum with 3 indefinite darker stripes along the lines of *acr* and *dc*. Pronotum with a single, usually light brown bristle on each side, prothoracic episterna with white hairs. Basal antennal segments and legs varying in colour from yellow to dark brown, tarsi always blackish. ♂: bt_1 cylindrical, dark in contrast to yellow tibia, about 2/3 as long as length of tibia. Generally smaller, about 3.5-4 mm long 9. *H. discolor* Strobl
- Scutum with 2 narrow, more or less distinct darker lines between rows of bristles. Prothoracic episterna with black hairs, and pronotum with several small black spines in addition to the large black bristle on each side. Larger sized species 26
- 26(25) ♂: bt_1 very enlarged, as long as, or longer than t_1 , also 2nd tarsomere on fore tarsi clearly stouter than following tarsomeres. All tibiae with dense, long black pubescence, the hairs longer than tibiae are deep. Legs yellow, with all tarsi and often also tibiae towards tip blackish. Basal antennal segments brownish. Pronotum usually with 4 small spines on each side in addition to the large bristle. ♀: Abdomen brown to yellowish-brown, more or less greyish dusted; bt_1 long and slender, about 2/3 as long as length of t_1 . Haltere uniformly yellow. Large, about 5 mm long 5. *H. abdominalis* Zetterstedt
- ♂: bt_1 shorter, about 3/4 as long as length of t_1 ; t_2 almost bare, covered with only minute hairs and a few short black bristles towards tip. Basal antennal segments yellowish 27
- 27(26) Generally smaller, about 4 – 4.5 mm long, haltere clear yellow. Pronotum usually with 4 small black spines on each side in addition to the large bristle. ♂: Fore tarsi with 2nd tarsomere swollen, nearly twice as deep as the following tarsomere. Dorsum of abdomen subshining black in posterior view, otherwise greyish dusted. ♀: bt_1 shorter compared with *H. abdominalis*, about half as long as t_1 7. *H. alpicola* Chvála
- Large species, about 5 – 6 mm long, haltere with knob more or less greyish. Pronotum with 6 to 8 small spines on each side in addition to the large bristle. ♂: 2nd tarsomere on fore tarsi scarcely stouter than following tarsomeres. Dorsum of abdomen silvery-grey dusted in ♂, glittering silvery-white in ♀ (see also couplet 30) 6. *H. allogastra* Chvála

- 28(20) Occiput and frons dull grey, occiput not dull black from any point of view . 29
 - Occiput dull black, at least from some points of view, frons usually blackish. Abdominal pubescence black; if pale (*H. pseudosartrix*) then legs extensively brownish and male genitalia with an unusual, long, slender hypandrium 36
- 29(28) Large species, body about 4 – 6 mm long 30
 - Smaller species, body 3 – 3.5 mm long 31
- 30(29) *acr* minute, closely 2-serial, almost 1-serial anteriorly. ♂: Fore tibia and tarsus with conspicuously long black bristles. ♀: Abdomen dull greyish-black, tergum 2 at sides with a tuft of long light brownish hairs (group 3, *H. clavipes*-group, part) 11. *H. clavipes* (Harris)
 - *acr* 4-serial. ♂: Fore legs with only short pubescence, without distinct bristles except for a cirlet of preapical tibial bristly hairs. ♀: Abdomen silvery-white glittering on dorsum, tergum 2 with short hairs at sides (group 2, *H. abdominalis*-group, part) (see couplet 27) . 6. *H. allogastra* Chvála
- 31(29) *acr* 4-serial 32
 - *acr* 2-serial, long and bristle-like, palpi blackish. ♂: *bt*₁ very dilated, about 2/3 as long as *t*₁, and with long bristly hairs towards tip; a pair of long bristles also at tip of first two tarsomeres. ♀: *t*₃ slender, but slightly curved 16. *H. setosa* Collin
- 32(31) Abdominal pubescence pale, at least at base of abdomen; *acr* and *dc* numerous, fine and small, equally long. Legs extensively darkened. Late summer and autumn species 33
 - Abdominal pubescence black; *acr* long and bristle-like, *dc* even longer . . . 34
- 33(32) ♂: *bt*₁ long and cylindrical, rather slender, clearly shorter and only slightly stouter than *t*₁. Scutum light grey with and indefinite brownish central stripe, abdomen with pale hairs on basal segments only. ♀: very light grey dusted, abdomen silvery-grey, scutum with 2 narrow darker lines between rows of bristles; *t*₃ slightly compressed and curved 32. *H. litorea* (Fallén)
 - ♂: *bt*₁ conspicuously large and swollen, as long as tibia. Abdomen uniformly covered with white hairs, also hind-marginal bristles whitish. ♀: rather greyish species, abdomen not silvery; *t*₃ simple and slender (Alps) (see also couplet 74) 34. *H. sartor* Becker
- 34(32) ♂: *bt*₁ and *t*₁ dorsally with long black bristles, *bt*₁ with 5-7 strong dorsal bristles longer than basitarsus is deep; wings faintly brownish-grey clouded. ♀: *t*₁ and *t*₃ dorsally with black bristles at least as long as tibiae are deep, *t*₃ long and slender, very indistinctly curved at middle. Palpi yellow to brownish-yellow, covered with black bristly hairs, 3 *ntpl* bristles 17. *H. lasiopa* Strobl
 - ♂: *bt*₁ with only short fine hairs, no distinct bristles. ♀: *t*₁ bare except for a small hair-like bristle in basal third above and a preapical bristle, *t*₃ with fine bristles dorsally, slightly compressed and distinctly curved. 1 strong *ntpl* bristle (in addition with 2-3 smaller bristly hairs) 35
- 35(34) Palpi yellowish to light brownish, covered with fine pale hairs; haltere with blackish-grey knob, stalk paler. Abdomen subshining black, almost

- shining brown on dorsum in female. ♂: sternum 8 with a fan of unusual long black bristles posteriorly (as in *H. manicata*) 19. *H. hyposeta* Straka
- Palpi dark grey to greyish-brown, covered with black hairs; haltere almost uniformly brown or yellowish (see also couplet 23). Abdomen greyish dusted, rather light greyish pollinose in female. ♂: sternum 8 with short bristly hairs along hind margin, without distinct bristles 18. *H. eviana* Straka
- 36(28) *acr* irregularly 3- to 4-serial or more 37
- *acr* regularly 2-serial; if almost 3-serial posteriorly (*H. pseudosartrix*), then abdominal pubescence pale 41
- 37(36) Scutum shining black, or at least subshining; *acr* irregularly 3- to 4-serial. *bt*₃ in both sexes (less distinct in ♀) with 2 anterodorsal bristles at tip. Generally smaller species, body about 3 mm long 38
- Scutum dusted, dull grey to blackish-grey, not at all shining; if in doubt (*H. campinosensis*), then frons and face narrowed, legs extensively dark, and generally larger species, body 3 – 4 mm; *acr* 4-serial or more 39
- 38(37) Legs extensively yellow with dark tarsi; haltere with yellow stem and blackish knob; palpi yellowish-brown. Wings slightly smoky in male, almost clear in female; *acr* short and fine, diverging. ♂: *t*₁ dorsally with fine hairs, *bt*₁ slender, half as long as length of tibia, and only slightly wider; genitalia with an unusually long, slender hypandrium bowed above lamellae (like in *H. pseudosartrix*). ♀: *t*₃ simple and slender. Larger species, body 2.5 – 3 mm long 36. *H. morata* Collin
- Legs extensively blackish, at most *cx*₁, base of all femora and all “knees” yellowish; haltere entirely black; palpi blackish. Wings strongly darkened in both sexes; *acr* very long, bristle-like, and widely spaced. ♂: *t*₁ long bristled before tip, *bt*₁ short ovate, blunt-tipped, not much longer than half-length of tibia. ♀: *t*₃ slightly compressed and bent. Smaller species, body up to 2.5 mm long (see also couplet 102) 23. *H. merula* Collin
- 39(37) Large species, body 4 – 5.5 mm long, abdomen often yellowish at base. Palpi yellow, *acr* 4- to 6-serial. ♂: *bt*₁ only slightly thickened, not much stouter than tibia at tip; ♀: *t*₃ simple and slender 68. *H. lurida* (Fallén)
- Smaller species, body 2.5 – 4 mm long, abdomen uniformly blackish. *acr* almost regularly 4-serial; ♂ *bt*₁ clearly thickened, stouter than tibia at tip 40
- 40(39) Generally smaller, body about 2.5 – 3 mm long. Palpi yellowish at tip, wings brownish. Legs extensively blackish, only *cx*₁ and base of *f*₁ yellowish, *bt*₃ in both sexes with several distinct anteroventral bristles much longer than tarsomere is deep. Frons deep black above antennae, and contrasting with light grey face, very narrow, as wide as anterior ocellus. ♂: *bt*₁ short ovate, half as long as tibia. ♀: *t*₃ slender but distinctly curved (see also couplets 94, 102) 37. *H. splendida* Straka
- Larger species, body about 3 – 4 mm long. Palpi blackish, wings very faintly brownish infuscated. Legs varying in colour from almost

- uniformly blackish to extensively yellowish on fore coxae, base of femora, and "knees"; bt_3 covered with short hairs. Frons black, widening into a triangle above, with a shining patch above antennae, face as wide as 2nd antennal segment is deep. ♂: bt_1 not much stouter than tibia and about two-thirds as long. ♀: t_3 unmodified, slender as in male (see also couplet 105) 63. *H. campinosensis* Niesiolowski
- 41(36) Large species, body about 4 – 5.5 mm long. ♂: fore tibia and tarsus ciliated dorsally with long black bristles; ♀: abdomen with a tuft of long brownish bristly hairs on each side of tergum 8 (group 3, *H. clavipes*-group, part) 42
- Smaller species, body at most 3.5 mm long. ♂: fore leg with short bristling; ♀: abdomen without a tuft of long hairs at sides of tergum 8 43
- 42(41) Prothoracic spiracle pale, yellowish-brown. Legs extensively yellowish to brownish-yellow; haltere yellowish, with knob at most brownish, and wings almost clear. ♂: t_1 and bt_1 long bristled dorsally, following tarsomeres with short hairs only 10. *H. cilipes* Meigen
- Prothoracic spiracle blackish. Legs extensively blackish, except for yellowish cx_1 and base of f_1 ; knob of haltere dark brown to blackish ♂: in addition to t_1 and bt_1 , also following 2 tarsomeres on fore leg long black bristled 12. *H. curtisi* Collin
- 43(41) Palpi black; scutum subshining black, thoracic pleura dull grey, wings deep brown clouded. Legs extensively blackish, only cx_1 and base of f_1 yellowish. Small species of the *H. chorica*-group with short tarsi. ♂: bt_1 very thickened, short ovate; ♀: t_3 rather slender and distinctly curved. Small, body about 2.5 – 3 mm long (see also couplet 136) 98. *H. aartseni* Chvála
(To this couplet comes also *Hilara flavocoxa* Straka, a species known so far only from highlands of central Slovakia. A small-sized species of the *H. canescens*-group, body about 2 – 3 mm long, closely allied to *H. merula*. It differs by long, bristle-like 2-serial *acr* (short in *H. aartseni*), and by the unusually enlarged male bt_1 , which is about as long as corresponding tibia (much shorter in *H. aartseni*, at most 1.5 times as long as wide); bt_3 in both sexes with 2 distinct anterodorsal setae before tip. For redescription with illustration see "Additional species".)
- Palpi yellowish (brownish in *H. cuneata* and *H. cinereomicans*), dorsum of thorax dulled by greyish dust, not shining. Fore tarsi fairly long, tarsomeres 2-4 clearly longer than deep 44
- 44(43) Abdominal pubescence and hairs on cx_1 pale. Small, body about 2.5 – 3.3 mm long, light grey dusted species, scutum with velvety brown patches posteriorly in ♂, and with 2 darker narrow lines between rows of bristles in ♀. Legs extensively dark, rather uniformly dark brown to brownish-yellow, very slender; *acr* with a tendency to be 3- to 4-serial posteriorly. ♂: bt_1 very large and stout, almost as long as tibia; genitalia with an unusual long, slender hypandrium bowed above lateral lamellae (as in *H. morata*). ♀: legs extensively blackish, t_3 simple and slender (see also couplets 89, 125) 33. *H. pseudosaratrix* Strobl

- Abdominal pubescence and hairs on cx_1 black; *acr* regularly 2-serial, long and bristle-like, male bt_1 clearly shorter than tibia (except for *H. cuneata*) 45
- 45(44) Legs extensively blackish, often only cx_1 and base of f_1 yellowish. Scutum dark grey, slightly dark brownish pollinose, subshining, pleura lighter grey; *acr* in two close rows. ♂: bt_2 with a distinct thickening at base beneath. ♀: t_3 slightly compressed, as deep as femur 46
- Legs yellow on coxae and femora, but tibiae and tarsi more or less darkened. Thorax uniformly finely dark grey dusted on scutum. ♂: bt_2 simple, without the basal swelling 47
- 46(45) *acr* distinctly diverging; antennal style slightly longer than 3rd segment. ♂: sternum 8 with unusual long bristles posteriorly forming a fan of black bristles on each side of genitalia and overlapping the lamellae posteriorly (as in *H. hyposeta*). ♀: wings clear; t_3 slightly curved at middle 20. *H. manicata* Meigen
- *acr* only slightly diverging; antennal style very long, 1.5 times as long as 3rd segment. ♂ sternum 8 with short bristles, not forming a fan of bristles at sides of hypopygium. ♀: wings brownish; t_3 slightly laterally compressed, almost straight 21. *H. ponti* Chvála
- 47(45) *acr* narrowly biserial and very conspicuously diverging. ♂: Frons above antennae and face very narrowed, not as deep as 2nd antennal segment. Tibiae and basitarsi on anterior two pairs very densely, long black pubescent dorsally; bt_1 not much shorter than t_1 and almost equally deep. ♀: t_3 long and slender (and haltere whitish) 15. *H. cuneata* Loew
- *acr* in 2 widely separated rows, not clearly diverging. ♂: Frons and face of usual width, and anterior four tibiae and basitarsi with usual short bristling. Thorax uniformly finely dark grey dusted on scutum and pleura, the latter somewhat translucent brownish, and humeri (post-pronotum) yellowish. Genitalia large, especially hypandrium laterally flattened, keel-like (as in more northern distributed *H. apta* Collin). ♀ unknown 22. *H. cinereomicans* Strobl
- 48(17) Haltere pale, clear yellow, or at least uniformly yellowish-brown; if in doubt (for instance in *H. platyura*), the species will be found in both sections 49
- Haltere black, at least knob blackish-grey, the stem may be paler 72
- 49(48) Scutum unstriped, uniformly coloured, or longitudinal stripes very indistinct (if in doubts, e. g., *H. lacteipennis*), species with milky-white wings, and dark median stripe, belong here) 50
- Scutum with 2 to 4 distinct dark stripes on the grey background, or scutum velvety black in some lights, with stripes that change from different points of view (group 6, *H. intermedia*-group, part) 60
- 50(49) *acr* 4-serial 51
- *acr* 2-serial 54

- 51(50) Frons and occiput dull grey, occiput not black from any point of view. Smaller species, body about 2.5 – 3.5 mm long, scutum uniformly light grey dusted 52
- Occiput dull black, at least in some lights; large species, body 4 – 6 mm long (if wings milky-white, and a smaller species, 2.5 – 3.5 mm long, see section 55) 53
- 52(51) Larger species, body 3 – 3.5 mm long, haltere brownish. Palpi brownish-yellow; wings very clear with indistinct veins, stigma invisible, radial fork acute. Scutum light grey dusted, unstriped. Abdomen rather subshining blackish-brown, covered with dense dark pubescence, and long, thin black hind-marginal bristles. ♂: bt_1 long ovate, not much stouter than tibia, clearly longer than rest of tarsus, and tarsomeres 2-4 long, twice as long as deep; genitalia unusually large, hypandrium very convex; ♀: t_3 slightly dilated and indistinctly curved 39. *H. platyura* Loew
- Small species, body about 2.5 mm long, haltere clear yellow. Palpi black, greyish dusted; wings clear with distinct blackish veins, stigma faintly brownish, and radial fork of usual "hilarine" shape. Scutum slate-grey dusted, with 2 indistinct darker lines between small, numerous widely spaced *acr* and *dc* bristles. Abdominal pubescence rather long and fine, pale, hind-marginal bristles not differentiated. ♂: bt_1 stout and not much shorter than tibia, clearly longer than rest of tarsus, and tarsomeres 2-4 only slightly longer than deep; genitalia, especially hypandrium, small. ♀: t_3 slender and unmodified 40. *H. leukensis* sp. n.
- 53(51) Larger species, body 5 – 6 mm long. Frons dull black, narrow in ♂, as deep as 2nd antennal segment, face greyish. Scutum dark grey, with a broad, darker brownish median stripe on the widely spaced 4- to 6-serial *acr*; *dc* 1-serial. Palpi brownish at tip, frontal bristles reduced. ♂: bt_1 long cylindrical, longer than rest of tarsus; ♀: t_3 simple and slender (in the morphologically similar *H. aeronetha dc* more than 1-serial, and haltere blackish, see couplet 90) 79. *H. angustifrons* Strobl
- Smaller, body about 4 – 5 mm long. Frons and face grey, of usual width in both sexes. Lighter grey dusted species with whitish pubescence, *dc* 2- to 3-serial, and legs silvery pilose. Haltere often darkened (*H. borealis*-group, part) (see also couplet 85) 93. *H. pruinosa* Wiedemann in Meigen
- 54(50) Wings milky-white, veins whitish, indistinct. Scutum light grey to silvery-grey with 2 indistinct narrow darker lines between rows of bristles, *acr* and *dc* very small, hair-like. Very light grey dusted species, abdominal pubescence whitish 55
- Wings clear or clouded, veins always more or less darkened and distinct. Small to medium-sized species, body about 2.5 – 3.5 mm long 57
- 55(54) Vein Sc incomplete, not reaching costa. Scutum silvery-grey, *acr* 2-serial anteriorly, more numerous behind. Legs blackish, with "knees" and bt_3 pale, all femora whitish pilose beneath, f_3 slightly thickened and with dark ventral bristly hairs. Palpi dark greyish, body 2.5 – 3.5 mm long. (see also couplets 57, 86, 124) 116. *H. albitarsis* von Roser ♀

- Wings whitish with vein Sc complete, reaching costa. Combination of characters different. f_3 not thickened and spined below, *acr* regularly 2-serial 56
- 56(55) Scutum light bluish-grey dusted, with 2 indistinct narrow darker lines between rows of bristles. Legs quite slender, more uniformly brownish, "knees" narrowly paler; femora not silvery pilose beneath. Palpi yellowish. ♀: t_3 simple and slender (body 2 – 2.5 mm) (*H. litorea*-group) 43. *H. albipennis* von Roser
- Scutum very light grey dusted, *acr* 2-serial, on a broad brown median stripe; *dc* 1-serial, on very narrow dark lines. Haltere extensively darkened, palpi greyish-brown. ♀ t_3 evenly thickened and curved (body 2.7 – 4 mm) (♂ unknown, *H. borealis*-group) 92. *H. lacteipennis* Strobl ♀
- 57(54) Occiput dull black in some lights, frons and vertex light grey. Vein Sc incomplete. All femora silvery pilose beneath, f_3 distinctly thickened and with long, black, spine-like bristles beneath, hind tarsi often pale. Scutum light grey dusted, with 3 indefinite blackish stripes visible in some lights; *acr* 2-serial anteriorly, often 3- to 4-serial posteriorly. Abdominal pubescence whitish (see also couplets 55, 86, 124) 116. *H. albitarsis* von Roser ♂
- Frons and occiput dull grey, occiput not dull black from any point of view. Vein Sc complete, reaching costa. Legs blackish, all femora and tibiae long and slender, almost bare, and femora not silvery pilose beneath. Scutum dark grey dusted, more brownish-grey in anterior view; 2-serial *acr* widely spaced, *dc* 1-serial, all bristle-like and few in number, about 8 to 9 setae in one row, and all as long as antennal style. Uniformly rather light grey dusted species (*H. griseola*-complex) 58
- 58(57) Abdominal pubescence, and hairs on lower part of occiput black. Scutum with 2 very narrow, fine, darker blackish-grey lines between *acr* and *dc*. Wings clear. ♀: t_3 slightly dilated and curved 59
- Abdominal pubescence and hairs on lower part of occiput whitish. Scutum in anterodorsal view with a faint, indistinct, darker grey median stripe on *acr*. Wings brownish clouded. ♀: t_3 simple and slender, unmodified 29. *H. crossleyi* sp. n.
- 59(58) Palpi black; legs uniformly black in ground colour, finely greyish pollinose. Rather a medium-sized species, body length varies from 2.5 to 3.5 mm 27. *H. griseola* Zetterstedt
- Palpi yellow; legs black in ground colour, but cx_1 towards tip and all femora at least at base translucent brownish. Generally smaller species, body about 2.5 – 2.9 mm long 28. *H. planti* sp. n.
- 60(49) Occiput dull velvety black, at most with a contrasting whitish-grey triangle behind ocelli (*H. fuscipes*) 61
- Occiput dull grey, at most with an indefinite darker blackish-grey shadow above neck; if in doubt, (i.e. *H. luteihalterata*, a small species with short stout antennal style) the species is in both sections. Abdominal pubescence always pale, at least on basal segments 67

- 61(60) Occiput with a contrasting whitish-grey triangle behind ocelli. Body varying in length from 3 to 5 mm, f_1 with 1 or 2 small dark bristles anteriorly at middle. ♂: hypandrium narrowed posteriorly, well separated from lateral lamellae; ♀: t_3 evenly thickened and slightly curved 49. *H. fuscipes* (Fabricius)
- Vertex and occiput without the contrasting light grey triangular patch above 62
- 62(61) *acr* 4-serial, abdominal pubescence light brownish. Scutum brownish-grey in anterior view, light grey between 2 narrow blackish median stripes, broad lateral stripes visible in dorsal view; all stripes coalescent at sides when viewed from above and behind, leaving a light grey central stripe, sides of scutum then broadly black. ♂: legs covered with only short fine hairs and bristles, bt_1 not much stouter than tibia; ♀: t_3 rather slender but strongly curved. Species varying in length from 2.5 to 5.5 mm 48. *H. beckeri* Strobl
- *acr* 2-serial, and scutum with a different black pattern. Legs in ♂, including tibiae, covered with long bristly hairs (except for *H. embartaki*), and bt_1 very thickened 63
- 63(62) Abdominal pubescence whitish, at least on basal three segments 64
- Abdominal pubescence as well as all hairs and setae on legs black 66
- 64(63) Legs covered mostly with whitish hairs and setae; anterior four tibiae densely long pubescent posteriorly. Antennae with a short, stout style which is half as long as segment 3. Scutum with distinct black stripes, the 2 median stripes between lines of *acr* and *dc* coalescent in posterior view, forming a single central stripe lying on *acr*. Early spring species; smaller, body about 2.3 – 3 mm long (see also couplet 68)
- 54. *H. luteihalterata* sp. n.
- Legs covered with black hairs and setae. Antennal style longer and slender, about two-thirds length of segment 3. Scutum with 2 or 4 distinct black stripes clearly visible as well when viewed from behind. Generally larger species, body about 2.8 – 3.3 mm long 65
- 65(64) Scutum with 2 distinct black stripes between *acr* and *dc*; about 16 *acr* setae in one row. ♂: anterior four tibiae with only short sparse pubescence posteriorly; t_1 dorsally with 3 to 4 long, fine single bristles. Apical circular process on lateral genital lamella spinose along margin only. Wings short, 2.9 – 3.3 mm long. A summer species in mountains (French Massif Central) 55. *H. embartaki* Chvála
- Scutum with 4 distinct black stripes, the lateral 2 shorter and wider when viewed from behind; *acr* less numerous, about 10 setae in one row. ♂: anterior four tibiae with a dense pubescence posteriorly at least as long as tibiae are deep; t_1 dorsally with about 6 pairs of long bristles. Apical circular process of left lamella distinctly spinose also ventrally. Wings larger, 4.2 – 4.5 mm long. Early spring species (Bulgarian Rhodope Mts) 56. *H. polleti* sp. n.

- 66(63) A medium-sized species, body about 3 – 4 mm long. Thoracic stripes not well visible, scutum light brownish-grey in anterior view, almost uniformly velvety black from other angles, with a trace of golden-brown stripes between lines of bristles, leaving central stripe on narrowly 2-serial *acr* bristles black. Labrum short, half as long as head is high. ♂: anterior four femora and tibiae dorsally with very long woolly pubescence, no distinct bristles; bt_1 strongly swollen, also t_2 and bt_2 thickened. Genitalia with hypandrium not narrowed or produced distally. ♀: tibiae short pubescent, no distinct bristles, t_3 slightly compressed and curved, narrower than femur 52. *H. pilipes* Zetterstedt
- Small species, body about 2 – 2.8 mm long. The four subshining black stripes on scutum almost invisible when viewed from in front, in posterior view scutum extensively blackish. Labrum long, as long as head is high. ♂: all tibiae rather long pubescent, also t_3 dorsally, t_1 with 4 distinct dorsal bristles, and t_2 and bt_2 slender. Genitalia with a long, slender curved hypandrium. ♀: t_3 simple and slender . . . 53. *H. tanychira* Strobl
- 67(60) Dark stripes on scutum almost invisible in anterior view, when viewed from above with 4 distinct blackish stripes, the 2 median stripes between *acr* and *dc* turning to golden-yellow in posterior view and *acr* then lying on a velvety black middle stripe. Scutum chestnut-brown in dorsal view, with margins, prescutellar depression and scutellum contrasting light grey; *acr* almost uniformly 2-serial. ♂: lateral genital lamella with a long pointed apical projection; ♀: t_3 slender and simple. Later summer and autumn species 46. *H. hirta* Strobl
- Scutum uniformly light grey to brownish-grey dusted, with 4 dark stripes clearly visible from all points of view. ♀: t_3 more or less compressed and curved. Spring and rather early summer species 68
- 68(67) *acr* regularly 4-serial, at least at middle, almost 2-serial only in *H. quadrifasciata*. Large species, generally about 3 – 5 mm long 69
- *acr* regularly 2-serial. Small species, body about 2.3 – 3 mm long, with anterior four tibiae in ♂ densely long pubescent (t_1 posteriorly, like f_1); antennal style short and stout, frons mostly black, and occiput nearly dull grey when viewed from behind (see also couplet 64) 54. *H. luteihalterata* sp. n.
- 69(68) Uniformly light grey to almost whitish-grey dusted species, the bristle on each side of pronotum pale, rarely darkened; cx_2 and cx_3 with uniformly yellowish hairs and bristles. Frons entirely whitish-grey dusted, not darkened along ocular margins. Ocellar and frontal bristles very fine, much thinner than postvertical (upper postocular) bristles, and usually as long as antennal style, although they vary in length in some extent. Abdominal terga 1-4 with whitish hairs, without dark hind-marginal bristles 70
- Darker grey dusted species, scutum more or less darker or brownish-grey pollinose, the bristle on each side of pronotum black; cx_2 and cx_3 with additional blackish bristles. Frons grey, ocular margins with a

- velvety brown line touching above hind ocelli. Ocellar and frontal bristles as thick as those in upper postocular row, and much longer than antennal style. Abdominal terga 1-4 with dark hind-marginal bristles, only fine in female 71
- 70(69) Labrum short, about half as long as head is high. Thoracic stripes blackish, the 2 central stripes between *acr* and *dc* narrow and sharply contrasting with the bluish-grey scutum. t_1 and t_3 dorsally with several dark bristly hairs clearly longer than the other pubescence; f_2 with a row of long dark anterior bristles. Occiput rather uniformly light grey dusted. ♂: t_2 densely long pubescent anteriorly, the hairs at least as long as tibia is deep; lateral genital lamella with a very narrow, simple, slender, apical projection; ♀: t_3 compressed and very curved 44. *H. intermedia* (Fallén)
- Labrum long, as long as head is high. Thoracic stripes broader, brownish and less contrasting; when viewed from in front the distance between the 2 central stripes as wide as the width of one stripe. Legs covered with uniform short pale pubescence, no distinct bristles, except for 1 or 2 short preapical bristles on tibiae, and f_2 anteriorly with only short pale bristly hairs. Occiput when viewed from above with two large brownish patches above neck, leaving only a triangular light grey patch behind vertex. ♂: t_2 covered with only short hairs, lateral genital lamella with an ovate, spinose, apical projection; ♀: t_3 compressed, but only slightly bent, almost straight 45. *H. tetragramma* Loew
- 71(69) Scutum clearly grey dusted, *acr* irregularly 4-serial; cx_1 with fine yellowish-brown hairs at tip. Occiput very grey, with two darker, well separated patches above neck. ♂: t_2 with a few short black spine-like anteroventral bristles in apical third, otherwise short pubescent; bt_2 slender, as deep as following tarsomeres, and less than half length of tibia; t_3 dorsally with about 4 bristles slightly longer than tibia is deep. ♀: t_3 distinctly dilated, almost as deep as femur at middle, dorsally with 5-6 bristles longer than other pubescence 50. *H. quadrula* Chvála
- Scutum more brownish in colour, especially between the dark central stripes, *acr* with a tendency to be 2-serial; cx_1 with stouter blackish bristles at tip. Occiput more uniformly darker grey dusted. ♂: t_2 in addition to the anteroventral spine-like bristles with long bristly hairs anteriorly and posteriorly along the whole length, those in posterior row more numerous, longer and finer; bt_2 stouter and longer, at least half length of tibia; t_3 with about 8 bristles dorsally clearly longer than tibia is deep. ♀: t_3 less compressed, clearly narrower than femur, and dorsally with a row of less differentiated, almost equally long hairs and bristles 51. *H. quadrifasciata* Chvála
- 72(48) Occiput dull grey from all points of view, not at all black, also frons and vertex dull grey. Wings clear. abdominal pubescence black (brownish in *H. nigrocincta*) 73
- Occiput dull black, at least when viewed from above, usually frons and vertex also mostly black 78

- 73(72) *acr* 2-serial (at least anteriorly in *H. sartor*) 74
 - *acr* 4-serial; abdominal pubescence always black 75
- 74(73) *acr* fairly long, bristle-like, and less numerous. Small species, body 2 – 2.5 mm long, scutum uniformly dull bluish-grey dusted with a brownish pattern, unstriped, abdomen and male genitalia subshining brownish. Abdominal pubescence black. ♂: t_1 short and thick, bt_1 unusually large and swollen, clearly longer than tibia; ♀: t_3 slightly dilated (species of the *H. canescens*-group) 30. *H. tiefii* Strobl
- *acr* small and numerous, more than 10 setae in one row, and posteriorly often 3-serial. Larger, body 2.5 – 3.5 mm long, thorax and abdomen uniformly nearly light grey dusted. Abdominal pubescence whitish. ♂: bt_1 very long and swollen, as long as the very slender t_1 ; ♀: t_3 simple and slender (species of the *H. litorea*-group) (see also couplet 33) 34. *H. sartor* Becker
- 75(73) Large, body about 4 – 4.5 mm long, Scutum dull, dark bluish-grey dusted and densely black bristled, with 3 broad reddish-brown stripes, 6-8 *sc* bristles; abdomen dull light grey. Antennal style short, half as long as 3rd segment. ♂: bt_1 long ovate, but not much stouter than tibia; f_3 with about 4 strong black anteroventral bristles before tip, t_3 with 3-4 dorsal bristles longer than tibia is deep, and with 3 strong spine-like bristles anteroventrally. ♀: t_3 simple, slender, and the dark stripes on scutum more greyish-black (species of the *H. interstincta*-group) 80. *H. caerulescens* Oldenberg
- Smaller species, body at most 3.5 mm long, combination of characters different 76
- 76(75) Smaller, body about 2.5 mm long. Scutum uniformly brownish-grey dusted, sides narrowly and scutellum contrasting grey. ♂: bt_1 rather short and stout, about 2/3 as long as length of tibia, the latter short pubescent, dorsally with 3-4 short fine bristles; t_3 with small hairs, except for 3-4 dorsal bristles which are about as long as tibia is deep, and similar smaller anteroventral bristles. ♀: t_3 evenly dilated and compressed, slightly curved (syn. *H. griseifrons* Collin) 42. *H. ternovensis* Strobl
- Generally larger species, about 3 – 3.5 mm long (rarely 2.6 mm), with a different combination of characters. ♂: bt_1 longer and rather cylindrical, about 3 times as long as deep 77
- 77(76) Slender, long-legged species, cx_1 and femora at base often translucent yellowish; vein *Sc* usually abbreviated. Scutum brownish-grey, with a darker, almost blackish median stripe. ♂: t_1 with a pair of long preapical setae and a few dorsal setae; t_3 with 3-4 black dorsal and anteroventral setae at least as long as tibia is deep, other hairs minute. Terga uniformly blackish. Lateral genital lamella deeply cleft, upper process long, finger-like. ♀: t_3 simple and slender (August – October) (species of the *H. cornicula*-group) 65. *H. nigrohirta* Collin
- Rather robust, stouter-legged species, legs uniformly black; vein *Sc* complete. Scutum uniformly slate-grey, with widely spread *acr* on a

- broad lighter grey median stripe, separated by narrow darker grey lines from *dc*, sides somewhat brownish-grey; prescutellar depression and scutellum almost silvery-grey. Palpi brownish at tip, abdominal pubescence brownish, somewhat paler; abdomen when viewed from behind with contrasting black hind tergal margins. ♂: t_1 with numerous bristly hairs dorsally; t_3 anteriorly and anteroventrally with dense, rather adpressed long bristly hairs much longer than tibia is deep. ♀: t_3 slender at base, strongly dilated and curved on apical two-third (May – July) (species of the *H. litorea*-group) 41. *H. nigrocincta* de Meijere
- 78(72) *acr* 4-serial or more; if irregularly 2- to 3-serial, then large species about 5-7 mm long (*H. lugubris*), or abdominal pubescence pale (*H. pseudosaratrix*, *H. longicornis*) 79
- *acr* regularly 2-serial; if more than 2-serial (*H. biseta* of the *H. choric*-group), then small species about 2 mm long, with short tarsi and subshining scutum 106
- 79(78) Wings milky-white, with indistinct pale venation. Scutum and abdomen bluish-grey; *acr* small, hair-like and numerous, black; abdominal pubescence blackish. Frontal bristles absent, palpi blackish to yellowish-brown. ♂: bt_1 long cylindrical, short pubescent and longer than rest of tarsus; lateral genital lamella with an unusually long, slender, pointed terminal process. ♀: t_3 simple and slender 35. *H. galactoptera* Strobl
- Wings more or less clouded, or clear, but then with distinct blackish venation; wings not at all whitish 80
- 80(79) Scutum dull grey to greyish-black or greyish-brown, not at all subshining, often with more or less distinct darker stripes, or velvety black in some lights 81
- Scutum more or less shining black, or subshining blackish-grey, not dull; if thinly greyish or brownish dusted in anterior view (*H. anglodanica*, *H. pseudocornicula*), the species will be found in both sections 97
- 81(80) f_2 spinose beneath, with a double row of spine-like bristles towards tip. Large, strongly black bristled species about 5-7 mm long of the *H. interstincta*-group 82
- f_2 without black ventral spine-like bristles, at most anteroventrally with fine, bristly hairs 83
- 82(81) Smaller, body about 5 mm long, wings faintly greyish-brown infuscated, almost clear in ♂. Scutum darker grey dusted, the 3 stripes rather brownish and less distinct, abdomen subshining greyish-black. Antennal style shorter, 3/4 length of 3rd segment. Labrum slightly shorter than head is high. Legs extensively blackish including “knees”. ♂: f_3 pubescent beneath, with 2-3 anteroventral preapical bristles only; ♀: t_3 slightly compressed and bent 72. *H. interstincta* (Fallén)
- Larger species, body 6-7 mm long, wings strongly darkened. Scutum with blackish stripes on a grey ground-colour, abdomen dull black. Antennal style long, as long as, or longer than 3rd segment. Labrum at least as long as head is high. Legs black, “knees” yellowish. ♂: f_3

- strongly black bristled beneath; ♀: t_3 slender and simple 73. *H. lugubris* (Zetterstedt)
- 83(81) Femora more or less microscopically silvery pilose beneath 84
- No silver pile or whitish microscopic pubescence on femora beneath; if in doubt, the species will be found in both sections 89
- 84(83) Coxae with pale hairs, and abdominal pubescence mostly pale, at least at base of abdomen 85
- Coxae with black hairs, abdominal pubescence black. Scutum dull bronze brown with 3 black stripes visible from in front, but in posterior view scutum uniformly velvety black. Legs, palpus and haltere quite black. Frontal bristles indistinct or absent; antennal style short, often only of half-length of 3rd segment. ♂: bt_1 short cylindrical, scarcely wider than tibia at tip, f_3 spindle-shaped and strongly black bristled beneath; ♀: t_3 simple and slender. Medium-sized species, body about 3–4 mm long 60. *H. coracina* Oldenberg
- 85(84) Larger, about 4–5 mm long, densely light silvery-grey dusted species. Scutum light grey in frontal view; when viewed from above with a narrow darker median line, and sides broadly blackish; *acr* narrowly 4-serial, very small and diverging, *dc* 2- to 3-serial. Antennal style short, half as long as 3rd segment. Frons and face light grey, humeral and frontal bristles absent, palpi greyish-black. Fore tibia and tarsus densely, almost golden-yellow to silvery microscopically pubescent; wings brownish clouded. ♀: t_3 simple and slender (see also couplet 53) 93. *H. pruinosa* Wiedemann in Meigen
- Smaller, generally about 3 mm long (2.5–4 mm), darker grey species (except for *H. albitarsis* ♀), with *acr* not diverging and *dc* 1-serial. Antennal style longer, at least 2/3 length of 3rd segment; if shorter (*H. albitarsis*), then wings clear and vein Sc abbreviated 86
- 86(85) Wings clear with vein Sc abbreviated, *acr* with a tendency to be 2-serial, minute. Haltere sometimes yellowish and occiput often greyish, very variable species in many respects. ♂: bt_1 short elliptical, slender, scarcely wider than tibia at tip; f_3 spindle-shaped, thickened, with long black spine-like bristles beneath. Legs with broadly yellow “knees” and base of tarsi (see also couplets 55, 57, 124). ♀: thorax and abdomen very light grey dusted, legs simple and darker 116. *H. albitarsis* von Roser
- Wings with vein Sc complete, reaching costa (sometimes abbreviated in *H. bohémica*, but then wings brownish). ♂: f_3 not dilated; if slightly thickened (*H. bohémica*), then ventral bristles very short. ♀: body dark, dull brown or subshining black; if abdomen light grey (*H. bohémica*), then scutum with contrasting brown stripes. If f_3 dilated and black bristled ventrally (*H. coracina*), then all hairs and bristles black, and scutum velvety black when viewed from behind 87
- 87(86) *acr* narrowly 2- to 3-serial. Scutum silvery-grey pollinose in anterior view, with narrow reddish-brown stripes on lines of bristles, but when viewed from above subshining black; *h* bristle small and fine, or absent.

- Frons dull black in some lights. Antennal style about 2/3 length of 3rd segment; wings faintly brownish. ♂: f_3 distinctly spindle-shaped, ventrally with short black bristles (much shorter than in *H. albitarsis* and finer than in *H. coracina*); bt_1 only slightly swollen, scarcely wider than tibia at tip; abdomen almost shining black. ♀: dorsum of abdomen subshining black, but silvery dusted in some lights; t_3 simple and slender (see also couplet 124) 117. *H. bohémica* Straka
- *acr* widely 4-serial, at least anteriorly, Wings very clear, iridescent, veins blackish. ♂: f_3 not dilated and armed with only fine bristly hairs beneath, bt_1 distinctly swollen, much wider than tibia towards tip 88
- 88(87) Scutum brownish dusted in anterior view, when viewed from above broadly very light bluish-grey at middle (with a narrow median line), in prescutellar depression, and on scutellum. Antennal style long, as long as 3rd segment; frons and face light grey. A distinct, although fine *h* bristle. Abdomen dull black when viewed from above in male, dull brownish in female. ♀: t_3 simple, but fairly stout . 90. *H. medeteriformis* Collin
- Scutum light grey in all lights, with a brown or reddish-brown median stripe (mainly males), or with 3 stripes on lines of bristles (often females). Antennal style shorter, nearly half as long as 3rd segment; frons velvety blackish-brown, face light grey. Both *h* and *ih* bristles minute, practically absent. Wings with a tendency to be whitish. ♀: t_3 simple and very slender 91. *H. calinota* Collin
- 89(83) cx_1 with pale hairs. Palpi yellow. Small species about 2.5 - 3 mm long, rather light grey dusted on thorax and abdomen, *acr* irregular, almost 2-serial anteriorly. Frontal bristles, and *h* bristle fine, small. Scutum dull light grey, in frontal view with 2 indistinct darker lines between *acr* and *dc*, in dorsal view postalar calli and sides of scutellum broadly deep velvety brown or almost dull black. Legs often uniformly brownish (see also couplets 44, 125) 33. *H. pseudosartrix* Strobl
- cx_1 with black bristly hairs, palpi blackish; and with a different combination of characters 90
- 90(89) Large species, about 6 mm long; *acr* irregularly 6-serial, *dc* irregularly 1- to 2-serial. Frontal bristles very small, fine. Antennal style nearly as long as 3rd segment, frons and face in ♂ narrowed (the similar species *H. angustifrons* has yellow haltere and *dc* 1-serial, see couplet 53) 78. *H. aeronetha* Mik
- Generally smaller species, body at most 5 mm long; *acr* irregularly 4-serial, *dc* 1-serial. Frontal bristles strong, about as long as ocellar bristles (finer and smaller in *H. splendida*, absent in *H. coracina*) 91
- 91(90) Labrum long, as long as head is high. Wings clear, at most greyish hyaline . 92
- Labrum short, clearly shorter than head is high 93
- 92(91) Smaller species, about 2.5 - 3.5 mm long, finely bristled, thorax unstriped. Scutum brownish-black dusted, though subshining in some lights. Legs with a tendency to be uniformly dark brownish. Labrum long, slender, abdomen subshining black to blackish-brown. ♂: f_3 with

- 4-5 long anteroventral bristly hairs on apical half much longer than femur is deep; lateral genital lamella deeply cleft apically, and the terminal process broad, hypandrium short bifurcated. ♀: t_3 unusually dilated on apical third and strongly curved (syn. *H. subpollinosa* Collin) (see also couplet 97) 66. *H. pseudocornicula* Strobl
- Generally larger species, body length varies from 3 to 5 mm, robust, and strongly bristled. Scutum dull brownish-grey, in dorsal and posterior views with 3 velvety black shifting stripes. Labrum unusually strong, abdomen dull grey. ♂: f_3 with the usual anteroventral preapical bristles; lateral genital lamella without any process at the blunt apex, hypandrium apically long bifurcated. ♀: t_3 evenly distinctly dilated and compressed, only slightly curved 75. *H. scrobiculata* Loew
- 93(91) Generally smaller, body about 2.5 – 3.5 mm long; *acr* and *dc* rather long and bristle-like, *acr* regularly 4-serial and widely spaced 94
(Here belongs also *H. longicornis* Strobl, a species known so far from the Hungarian lowlands of the Danube region. A very small species, body about 2 – 2.8 mm long, with unusually long antennae, and simple unmodified legs in both sexes, even male bt_1 long and slender; *acr* setae are 4-serial at middle only, 2-serial anteriorly and posteriorly, small and numerous. A species of the *H. litorea*-group, for redescription with illustration see "Additional species".)
- Generally larger species, body about 3.5 – 5 mm long 95
- 94(93) Frons above antennae and face very narrow, as wide as anterior ocellus; face light grey, contrasting with the blackish frons. Legs with a tendency to be yellow on cx_1 and base of f_1 (see also couplets 40, 102), bt_3 with long black anterodorsal bristles longer than tarsomere is deep. Palpi yellowish, at least at tip; antennal style longer than 3rd segment. Wings brownish, haltere with yellowish stem. Scutum dark brownish-grey dusted, almost black in posterior view. ♂: bt_1 long ovate but small, not much longer than half-length of tibia; ♀: t_3 slender and clearly bent 37. *H. splendida* Straka
- Frons and face wide as usual, uniformly velvety black to greyish-black. Legs uniformly blackish, bt_3 with short hairs. Palpi black; antennal style slightly shorter than 3rd segment. Wings clear (almost whitish in some lights), haltere black. Scutum dull brownish-grey in anterior and dorsal views, when viewed from behind with 3 wide blackish stripes leaving space between bristles grey; *acr* and *dc* sparse, long and bristle-like. ♂: bt_1 long ovate, not much shorter than tibia is long; f_2 and f_3 before tip with very long anteroventral bristly hairs much longer than femora are deep; f_2 ventrally at base and t_3 dorsally at tip with an unusual long bristle; t_1 with a pair of long preapical bristles, a small bristle dorsally in basal quarter, and posteriorly with longer pubescence which is present also on f_1 . ♀: t_3 evenly dilated and laterally compressed, strongly curved; *acr* long and regularly 4-serial 67. *H. quadrifaria* Strobl
- 95(93) Abdomen shining or subshining black from most points of view. Wings clear, squama with pale fringes; haltere with yellowish stem. Frons

- uniformly dull, with a light grey patch above antennae; t_2 with 2-3 short antero- and posteroventral bristles on apical half, and with apical circllet of similar bristles; no anterior basal bristle. ♂: bt_1 slender, only slightly wider than tibia at tip, everywhere with minute hairs, no distinct bristles. Palpi strongly bristled, pronotum with additional small spines in addition to the long lateral bristle. ♀: t_3 slender on basal half, then very dilated towards tip (resembling *H. nigrocincta* or the lowland *H. nigrina*) 74. *H. dimidiata* Strobl
- Abdomen dulled by greyish dust, squama with black fringes (pale in *H. scrobiculata* and *H. dimidiata*); haltere with dark stem. Pronotum with a single bristle on each side 96
- 96(95) Abdomen rather silvery-grey pollinose when viewed from in front, dull blackish from other angles, scarcely subshining, with distinct hind-marginal bristles. Wings brownish. Frons with a rhomboid subshining patch above antennae; t_2 with a species-specific long anterior bristle at base, another in apical third anteroventrally, and a circllet of similar long preapical bristles. ♂: bt_1 long cylindrical, nearly twice as wide as tibia at tip, dorsally with 1 or 2 distinct black bristles and a smaller preapical pair; tarsi long and slender, tarsomeres clearly longer than deep. Palpi often brownish or nearly yellowish at tip. Hypandrium dorsally before tip with a pair of small flattened spines which is an unique character. ♀: t_3 simple and slender (see also couplet 98) 77. *H. anglodanica* Lundbeck
- Abdomen dull grey to greyish-brown, no hind-marginal bristles. Wings almost clear. Frons dull velvety black. ♂: bt_1 very stout, long black bristled dorsally, similar long dorsal bristles also on the stout t_1 ; tarsi short and stout, tarsomeres 2-4 on fore leg as long as deep. Palpi blackish. ♀ unknown 76. *H. sirbitzmatrona* sp. n.
- 97(80) Labrum long, as long as head is high. Rather a slender, long-legged species about 2.5 – 3 mm long. Wings clear, scutum finely brownish-black dusted, unstriped, subshining in some lights. ♂: bt_1 cylindrical, not much stouter than tibia; ♀: t_3 unusually dilated on apical third and distinctly curved (syn. *H. subpollinosa* Collin) (see also couplet 92) 66. *H. pseudocornicula* Strobl
- Labrum short, clearly shorter than head is high 98
- 98(97) Thorax and abdomen greyish dusted when viewed from in front, scutum in posterior view with 3 indefinite blackish stripes. Face and a patch on frons above antennae grey. Palpi yellowish; antennal style as long as 3rd antennal segment. ♂: bt_1 long cylindrical, 4 times as long as deep and not much wider than tibia; t_3 with strong dorsal and anteroventral bristles in both sexes. ♀: t_3 slender and simple. Larger species, body about 3.5 – 4.5 mm long (see also couplet 96) 77. *H. anglodanica* Lundbeck
- Dorsum of thorax black, more or less shining, or covered with a faint greyish dusting. Frons dull black, without a grey patch below, or uniformly grey (in *H. pygialis*); other combination of characters different 99

- 99(98) Abdominal pubescence whitish. Frons and face densely light grey dusted, occiput black, behind vertex with a more or less visible light grey triangular patch. Scutum metallic, finely brownish-grey dusted, subshining, wings brownish. ♂: genitalia unusually large, hypandrium laterally flattened, largely circular, much higher than end of abdomen. ♀: t_3 thickened, as deep as femur, and curved (Spain, France) (species of the *H. cornicula*-group) 64. *H. pygialis* Chvála
- Abdominal pubescence black. Frons dull black; with a different combination of characters 100
- 100(99) *acr* long, as long as *dc*, bristle-like, regularly 4-serial and widely spaced, not clearly separated from *dc*; the distance between *acr* rows as wide as the distance between *acr* and *dc*. Antennal style long and slender, longer than 3rd segment, or at least as long. Abdomen dull. Wings strongly darkened (lighter brownish in *H. splendida*) 101
- *acr* short and closer together, well separated from *dc*, and often 2-serial anteriorly. Abdomen shining. Species generally about 3 – 4 mm long 103
- 101(100) Legs and haltere uniformly black; a rather small species, body about 2.5 mm long. Scutum uniformly subshining black, palpi strongly black bristled, including 1 very long bristle. t_2 with an anterodorsal bristle in basal quarter, bt_3 with a long black anterior bristle before tip, clearly longer than tarsomere is deep in male, shorter in female. ♂: bt_1 short ovate, about twice as long as deep, and nearly of half-length of tibia; ♀: t_3 simple and slender 25. *H. nigrita* Chvála
(The lowland European *H. nigrina* (Fallén) is a larger species, body about 3 – 4 mm long, with bt_1 in ♂ long cylindrical, not much shorter than tibia, and t_3 in ♀ is unusually dilated and curved on apical two-thirds, very slender at base, very much like as in *H. nigrocincta*. A new record for *H. nigrina* is listed here: France: Gard, Dourbies (855 m) 21.vii.2009, 1 ♂, leg. *Haenni*.)
- Legs paler, cx_1 , base of f_1 and “knees” more or less yellowish (see also couplets 17ff) 102
- 102(101) Frons (above antennae) and face very narrow, about as wide as anterior ocellus, face contrasting light grey. Palpi yellowish, at least at tip; haltere with base of stem yellow. bt_3 with several long anteroventral bristles clearly longer than tarsomere is deep. Larger species, body about 3 mm long (see also couplets 40, 94) 37. *H. splendida* Straka
- Frons and face blackish, and as wide as usual. Palpi and haltere blackish. bt_3 with 2 fine anteroventral bristles before tip. Generally smaller, body about 2.5 mm long (see also couplet 38) 23. *H. merula* Collin
- 103(100) *h*, *ih* and *ph* bristles absent, abdominal terga without hind-marginal bristles, pronotum with a distinct bristle on each side. Legs often with cx_1 , base of f_1 and “knees” more or less yellowish; cx_1 with pale hairs. *acr* 4-serial, *dc* 1-serial, all minute. Medium-sized, body about 3 – 3.5 mm long (species of the *H. maura*-group) (see also couplet 13)
. 115. *H. media* Collin

- *h*, *ih* and *ph* bristles distinct, although sometimes fine; abdomen with well developed hind-marginal bristles. Legs uniformly black, but if fore leg translucent yellowish at base, then *cx*₁ with black hairs 104
- 104(103) Wings strongly darkened, dark brown, legs entirely black; *acr* anteriorly 2- to 3-serial, *dc* slightly longer. ♂: genitalia with a distinctly produced, very convex, keel-like hypandrium. ♀: *t*₁ with 1 or 2 bristles dorsally, *t*₃ with rather long anteroventral bristles clearly longer than tibia is deep 61. *H. cornicula* Loew
- Wings almost clear or only faintly brownish clouded, legs with a tendency to be paler at least on *cx*₁; *acr* almost regularly 4-serial and as long as *dc*. ♂: genitalia with hypandrium not enlarged and not conspicuously produced distally 105
- 105(104) Generally smaller, body about 2.5 – 3.5 mm long. Haltere black with brownish stem. ♂: wings clear; genitalia: lateral lamella simple, apical process short and blunt, dorsally with uniform rather short hairs pointing backwards (syn. *H. monedula* Collin) 62. *H. longifurca* Strobl
- Generally larger, body about 3 – 4 mm long. Haltere with a black knob and contrasting light yellow stem. ♂: wings slightly brownish infuscated, not clear; genitalia: lateral lamella with a long pointed terminal process, at base with a tubercle with a tuft of long, forwardly directed long black bristles (about 6), and dorsal bristling pointing backwards, clearly longer and stouter (see also couplet 40) 63. *H. campinosensis* Niesiolowski
- 106(78) Scutum distinctly black striped, or the velvety black stripes change in position from different points of view, or dorsum of thorax entirely dull velvety black in some lights. Male fore tarsi often long, tarsomeres 2-4 clearly longer than deep (except for *H. brevivittata* and some species of the *H. andermattensis*-group). Abdominal pubescence blackish, legs, haltere and palpi black 107
- Scutum more or less shining black, or only very finely pollinose, not striped; if in doubt, the species with legs not quite black, with shortened tarsi (fore tarsomeres 2-4 as long as deep), abdominal pubescence pale, and/or with femora microscopically pilose beneath (*H. bohémica*, *H. albitarsis*, *H. borealis*) are included here 119
- 107(106) Scutum in anterodorsal view with 2 distinct black stripes between *acr* and *dc*; when viewed from above with 4 black stripes; if median stripes indistinct or partly fused in posterior view (in *H. brevivittata* and *H. brevistriata*), then lateral stripes very widened and more or less coalesce, whereas in anterior view scutum almost unstriped. ♀: *t*₃ more or less compressed and bent; slender in *H. brevistriata* (species of the *H. intermedia*-group) 108
- Scutum with 3 wide velvety black stripes that change in position in different points of view, but most often scutum extensively dull black, with 2 narrow light brownish stripes between *acr* and *dc* when viewed from above and behind. ♀: *t*₃ unmodified, simple and slender (except for

- H. zermattensis* and *H. parvimaior*) (high mountain species of group 10, *H. andermattensis*-group) 111
- 108(107) Scutum distinctly striped also in anterodorsal view; in dorsal and posterior view with 4 clearly separated well visible stripes. Antennal style short, almost half-length of 3rd segment. Abdomen rather brownish (in *H. bistrinata* greyish pollinose in dorsal view). Tarsomeres on all pairs of legs in male longer than deep. A small, fine *h* bristle 109
- Scutum brownish and almost unstriped when viewed from in front, but with distinct 4 black stripes in anterodorsal and dorsal views, in posterior view the lateral black stripes very broadened, and the 2 median stripes coalescing into a median stripe on *acr* setae. Antennal style longer, 3/4 length of 3rd segment. A distinct *h* bristle 110
- 109(108) f_2 with the usual black bristles anteriorly. ♂: anterior four tibiae and basitarsi densely long pubescent, bt_2 slightly swollen and clothed with long hairs; t_1 with several dorsal bristles much longer than tibia is deep. ♀: t_3 only slightly compressed and curved, clearly narrower than femur is deep 57. *H. hirtipes* Collin
- f_2 without the usual row of anterior bristles. ♂: t_2 and mid tarsus simple, not stouter or compressed, and covered with short hairs only; t_1 finely short pubescent, only about 4 fine dorsal bristly hairs longer than tibia is deep; f_1 densely long pubescent posteriorly, the hairs at least as long as femur is deep. ♀: t_3 very compressed and distinctly curved, at least as deep as femur 58. *H. bistrinata* Zetterstedt
- 110(108) Generally larger, body about 2.5 – 3.5 mm. Abdomen deep black when viewed from above, more blackish-brown in ♀. ♂: t_1 with 4 pairs of very long dorsal bristly hairs becoming longer towards tip, apical pair more than twice as long as tibia is deep; bt_1 very stout, twice as deep as corresponding tibia is wide, and tarsomeres 2-4 short, as long as deep; t_2 with long anterior bristly hairs longer than tibia is deep (as in *H. intermedia*). Lateral genital lamella with a circular, ventrally spinose apical process (*H. brevivittata* complex). ♀: t_3 compressed, almost as deep as femur, slightly curved 59. *H. brevivittata* Macquart
- Smaller species, body generally about 2.3 – 2.6 mm. Abdomen dull grey in both sexes. Legs long, all tarsomeres distinctly longer than deep in both sexes. ♂: t_1 with short hairs only, no distinct setae; bt_1 long and slender, about as deep as corresponding tibia is wide; t_2 with short hairs. Lateral genital lamella with a simple, bare, slender apical process (*H. intermedia* complex). ♀: t_3 slender, slightly undulating 47. *H. brevistriata* sp. n.
- 111(107) Labrum long, almost as long as or at least not much shorter than head is high 112
- Labrum short, clearly shorter than head is high, often of half-length; if in doubt (*H. andermattensis*), the species is included in both sections 116
- 112(111) f_1 with short hairs posteriorly, without longer bristly hairs. ♂: fore tarsus short, at least tarsomeres 3-4 as long as deep 113

- f_1 in both sexes, and also t_1 in ♂, densely long pubescent posteriorly, the hairs at least as long as corresponding femora or tibiae are deep. ♂: fore tarsi vary in length 115
- 113(112) Frontal bristles as long as ocellars. ♂: bt_1 very swollen, much wider than tibia at tip; at least tergum 6 with distinct hind-marginal bristles 114
- Frontal bristles absent or very small and fine. ♂: bt_1 only slightly swollen, nearly as wide as tibia at tip; abdomen practically bare on segments 3-6. Medium-sized, body about 3.5 mm long (see also couplet 118) 87. *H. andermattensis* Strobl
- 114(113) Large species, body about 3.5 – 4 mm long. Scutum dull velvety black when viewed from above, only scutellum paler, brownish. ♂: t_1 and bt_1 covered with short hairs dorsally; genitalia small (= *H. tatra* Niesiolowski, syn. n.) 82. *H. maior* Strobl
- Smaller, body about 3 mm long. Scutum dull black, but in posterodorsal view light cupreous-brown dusted between *acr* and *dc* and in prescutellar depression. ♂: t_1 and bt_1 densely long pubescent dorsally, t_1 also posteriorly, posteroventrally with 3-4 long bristly hairs more than twice as long as tibia is deep; genitalia very large, half as long as rest of abdomen 81. *H. helvetica* Chvála
- 115(112) Larger species, body about 3 – 3.5 mm long. Scutum uniformly brownish in anterior view, when viewed from above cupreous-brown in prescutellar depression and on 2 stripes between *acr* and *dc*. ♂: tarsi short, bt_1 very swollen, and tarsomeres 2-4 as long as deep. ♀: squama ash-coloured, with pale fringes; bt_3 clearly longer than bt_1 , t_3 with several long bristly hairs much longer than tibia is deep . 84. *H. styriaca* Strobl
- Smaller, body about 2.5 – 3 mm long. Scutum with black stripes on lines of bristles in anterior view, viewed from above uniformly dull velvety black, only scutellum paler. ♂: tarsi rather long, bt_1 long cylindrical, 3 times as long as deep and scarcely wider than tibia at tip, tarsomeres 2-3 longer than deep. ♀: squama blackish, with black fringes; bt_1 and bt_3 equally long, and t_3 dorsally with a row of almost equal bristles shorter than tibia is deep 85. *H. merzi* Chvála
- 116(111) Tarsi short, tarsomeres 2-4 on fore leg in both sexes as long as deep. Face, and a small patch on frons above antennae, light grey; *acr* and *dc* small and fine. ♂: bt_1 very swollen, much wider than corresponding tibia. ♀: t_3 thickened, nearly as wide as corresponding femur, and distinctly curved 117
- Tarsi longer, tarsomeres 2-4 on all pairs clearly longer than deep. Frons and face dull black; *acr* and *dc* longer and bristle-like. ♂: bt_1 slender, scarcely stouter than corresponding tibia at tip. ♀: t_3 simple and slender . . 118
- 117(116) Thoracic pleura light bluish-grey dusted, contrastingly paler than scutum; wings almost clear. Scutum in posterodorsal view with 2 wide, light grey stripes between *acr* and *dc*. Larger species, body 3.2 – 3.6 mm long 86. *H. zermattensis* Chvála
- Thorax uniformly dull black, pleura with a greyish tomentum; wings brownish. Scutum uniformly dull velvety black when viewed from

- above and behind, only scutellum brownish. Smaller species, body 2.3 – 2.8 mm long 83. *H. parvimaior* sp. n.
- 118(116) Smaller, body about 2 – 2.5 mm long. Scutum almost uniformly velvety blackish-brown, light pattern very indistinct. Frontal bristles long, as long as ocellars. Fore tarsi including basitarsus slender, unmodified; *acr* and *dc* very long, longer than antennal style; palpi long bristled beneath, also abdominal hind-marginal bristles prominent 88. *H. simplicipes* Strobl
- Larger, body about 3.5 mm long. Scutum with 3 velvety black stripes on lines of bristles visible from all points of view. Frontal bristles not developed, or only minute. ♂: *bt*₁ scarcely stouter than tibia at tip; *acr* and *dc* shorter than antennal style, though rather coarse; palpi with a single long preapical bristle in addition to short bristly hairs, and abdominal segments 3-6 almost bare, without hind-marginal bristles (see also couplet 113) 87. *H. andermattensis* Strobl
- 119(106) *f*₁ very thickened, posterior four femora slender; legs entirely black, only the fore “bent knees” yellowish. Wings brownish, long and narrow, axillary lobe little developed. Scutum shining black, *dc* very long, bristle-like, as long as antennal style and few in number, about 8 bristles in one row; *acr* small, in 2 close rows and of half length of *dc* bristles 31. *H. perversa* Oldenberg
- *f*₁ not conspicuously thickened, all femora almost equally stout. Wings with well developed axillary lobe, and axillary excision distinct 120
- 120(119) Tarsi long and slender, tarsomeres 2-4 on fore leg clearly longer than deep 121
- Tarsi short, tarsomeres 2-4 on fore leg very short in ♂, at most as long as deep, scarcely longer in ♀; if slightly longer (*H. biseta* of the *H. chorica*-group), then small species up to 3 mm long, *bt*₁ in ♂ with 2-4 strong black bristles dorsally, and dorsum of thorax polished black. Generally small, shining black species, body about 2 – 3 mm long; if larger (*H. borealis*), then scutum more brownish-grey with 3 indefinite blackish stripes, *acr* and *dc* very inconspicuous, and pubescence on *cx*₁ and base of abdomen pale to rusty-brown 128
- 121(120) Small, body about 2 – 2.5 mm long; black species with haltere, legs and all setae and hairs black; ♂: *bt*₁ very swollen, twice as long as deep . . 122
- Larger species, body generally about 2.5 – 4 mm long, combination of characters different 123
- 122(121) ♂: *bt*₁ covered with short hairs, without strong bristles; ♀: *t*₃ evenly thickened and distinctly curved. Antennal style slender; wings almost clear, only indistinctly brownish clouded; scutum silvery-grey pollinose when viewed from in front 26. *H. goetzei* Chvála
- ♂: *bt*₁ dorsally with 3 strong bristles (occasionally with 2 or 4); ♀: *t*₃ simple and slender. Antennal style unusually thickened; wings brownish, almost dark brown on costal half; when viewed from in front scutum finely dark cupreous-brownish pollinose, with 2 narrow black stripes between lines of bristles 100. *triseta* Chvála

- 123(121) All femora densely microscopically silvery pilose beneath f_3 more or less thickened, especially in ♂; *acr* often more than 2-serial (species of the *H. albitarsis*-group, see also couplets 86 and 87) 124
- Femora without microscopic silver pilosity beneath 125
- 124(123) Legs uniformly black. Abdomen subshining black, with a silvery lustre in female. ♂: f_3 slightly dilated and ventrally with very short, black, spine-like bristles. Vein Sc usually complete, reaching costa (see also couplet 87) 117. *H. bohémica* Straka
- Legs with yellowish "knees", often also posterior tibiae and tarsi somewhat paler. Abdomen densely light grey dusted, especially in female. ♂: f_3 distinctly thickened, ventrally with a row of strong black bristles nearly half as long as femur is deep. Vein Sc always incomplete, not reaching costa (see also couplets 55, 57, 86) 116. *H. albitarsis* von Roser
- 125(123) cx_1 with pale hairs. Scutum and abdomen when seen from above rather light grey dusted; palpi yellowish. Long-legged species, "knees" yellowish, wings clear. ♀: *acr* usually nearly 4-serial, wings whitish, (see also couplets 44, 89) 33. *H. pseudosaratrix* Strobl
- cx_1 with black hairs. Scutum somewhat metallic, finely dark brownish-grey pollinose; *acr* and *dc* long and bristle-like, and only about 10 setae in one row; palpi blackish. Legs entirely black (species of the *H. lasiochira*-group) 126
- 126(125) Wings almost clear, very faintly brownish; antennal style very thickened, nearly one-half length of 3rd segment. Thoracic pleura dull grey below on katepisternum and meron (sterno- and hypopleurum) upper half on anepisternum and anepimeron (meso- and pteropleurum) contrasting darker, subshining black. ♂: t_3 dorsally with unusually long bristly hairs at least 3 times as long as tibia is deep, some long, bristly hairs also on t_1 towards tip; hind-marginal abdominal bristles very long, sternum 8 with a fan of long bristles overlapping genitalia as in *H. hyposeta* and *H. manicata* (*H. canescens*-group). Genitalia small, especially hypandrium, as wide as abdomen at tip. ♀: t_3 compressed and narrower than femur, slightly bent, dorsally with a row of 5-6 bristly hairs nearly as long as tibia is deep. Small species, body about 2.5 mm long (syn. *H. longesetosa* Strobl) 69. *H. pilosopectinata* Strobl
- Wings brownish clouded; antennal style slender. Thoracic pleura uniformly grey dusted including upper half of anepisternum and meron. ♂: t_3 with usual hairing and bristling, dorsal and anteroventral setae at most slightly longer than tibia is deep. Abdomen with hind-marginal bristles of the usual length, and no fan-like long setae on sternum 8 posteriorly. Genitalia very large, larger than the 6th abdominal segment, at least hypandrium strongly flattened. ♀: t_3 evenly dilated, laterally compressed, narrower than femur, and only very slightly bent at middle. Generally larger species, body about 2.5 – 3.5 mm long 127
- 127(126) Antennal segment 3 long, style two-thirds as long; *acr* and *dc* very long, bristle-like, about as long as antennal style, and few in number

- (about 8 pairs of *dc* and 5 pairs of *acr*), *acr* in 2 widely separated rows, the distance between the two rows and between *acr* and *dc* almost equal. Wings brownish. ♂: f_1 with a row of about 5 long fine bristly hairs posteriorly longer than femur is deep, bt_1 densely long pubescent dorsally, t_3 with dorsal and anteroventral bristles slightly longer than tibia is deep (temperate Europe, Southern France, Northern Italy) 70. *H. lasiochira* Strobl
- Antennal segment 3 smaller, style slightly longer; *acr* and *dc* bristle-like, but shorter than antennal style, *acr* in 2 closer rows, the distance between *acr* and *dc* is clearly larger. Wings more strongly brown infuscated. ♂: f_1 posteriorly with hairs not longer than femur is deep, t_1 and bt_1 mostly short pubescent, t_3 with small, thin dorsal and anteroventral bristles shorter than tibia is deep (Spain, east to Switzerland) 71. *H. strakai* Chvála
- 128(120) Larger species, body about 3 – 3.5 mm long. Scutum brownish dusted in anterior view, but prescutellar depression contrasting grey; when viewed from behind blackish-grey, with 3 broad indefinite black stripes along lines of bristles. Abdomen dull brownish dusted. Wings clear; palpi, legs and haltere quite black. All hairs and bristles fine, short, *h* and *ih* bristles fine; legs without distinct bristles, femora beneath with silvery pile. Abdominal pubescence and hairs on legs pale to rusty-brown. ♂: bt_1 egg-shaped, twice as long as deep and much wider than tibia at tip, short pubescent. ♀: t_3 slender at extreme base, otherwise very dilated, as deep as femur, and distinctly curved 89. *H. borealis* Oldenberg
- Smaller species, about 2 – 3 mm long, mostly shining black, or scutum only thinly pollinose when viewed from in front. Abdomen dull black also when viewed from behind. Small, short legged species (group 12, *H. chorica*-group) 129
- 129(128) ♂: t_1 with a row of about 8 strong black dorsal bristles at least 3 times as long as tibia is deep. ♀: t_3 spindle-shaped, strongly dilated about middle, tips narrower (also in *H. pseudochorica*) 130
- ♂: t_1 with short hairs dorsally, at most with a few longer bristly hairs before tip, at most twice as long as tibia is deep at tip. ♀: t_3 slender or evenly compressed and curved, not spindle-shaped and broader than femur; if spindle-shaped and broader than femur (*H. pseudochorica*), then bt_3 with 2-4 distinct anterodorsal bristles 132
- 130(129) Scutum, when viewed from in front, uniformly finely brownish-grey dusted. ♂: only t_1 with long dorsal bristles, bt_1 with 2 small, fine pre-apical bristly hairs 101. *H. pectinipes* Strobl
- Scutum shining black from all points of view, and without the combination of other characters 131
- 131(130) Ocellar and frontal bristles equally long and strong. ♂: bt_1 and the following 3 tarsomeres long bristled dorsally; t_2 simple, not swollen, and covered with short hairs 102. *H. barbipes* Frey

- Frontal bristles very small and fine, at most half as long as ocellar bristles. ♂: entire fore tarsus with short hairs, without distinct bristles; t_2 strongly dilated towards tip and dorsally densely covered with long bristles 103. *H. hystrix* Strobl
- 132(129) Scutum, when viewed from in front, finely brownish or brownish-grey dusted. ♂: bt_1 rather longer ovate, about twice as long as deep, covered with short hairs 133
- Scutum shining black from all points of view. ♂: bt_1 broader and shorter; if almost twice as long as deep, then with 2-5 long bristly hairs dorsally. Antennal style always long, about as long as 3rd segment, and wings more or less brownish 135
- 133(132) Antennal style very short, about 1/3 length of 3rd segment. Ocellar and frontal bristles equally long and fine. Scutum when viewed from in front uniformly finely dusted also anteriorly. ♀: t_3 simple and slender. Early spring species 94. *H. brevistyla* Collin
- Antennal style longer, at least 2/3 length of 3rd segment. ♀: t_3 more or less thickened, compressed and curved. Late spring and summer species . . 134
- 134(133) Scutum subshining black; when viewed from in front finely brownish pollinose posteriorly, the brownish dusting clearly visible as two wide stripes also anteriorly between lines of bristles. Frontal bristles fine and very small, or completely absent. Palpi with a tendency to be light brownish at tip. ♂: t_1 (except for preapical bristly hairs) and tarsus finely short pubescent, tarsomeres 2-4 simple, not produced dorsally; bt_3 with short hairs; hypandrium small. ♀: t_3 slightly and evenly dilated, not deeper than femur, but distinctly curved 95. *H. longivittata* Zetterstedt
- Scutum in anterodorsal view with more or less darker, rather subshining black stripes between lines of bristles. Ocellar and frontal bristles almost equally long and strong. Palpi uniformly black. ♂: t_1 with long bristly hairs dorsally, bt_1 rather densely long pubescent above and 2nd tarsomere produced dorsally; bt_3 with 4-5 long bristly hairs anteriorly; hypandrium very convex and produced distally. ♀: t_3 strongly dilated at middle, spindle-shaped, much wider than femur . . . 96. *H. pseudochorica* Strobl
- 135(132) ♂: bt_1 very stout and short, at most 1.5 times as long as deep, dorsally with short hairs, at most with 1 or 2 fine bristly hairs dorsally before tip. ♀: tarsi shortened, tarsomeres 2-4 on fore leg as long as deep 136
- ♂: bt_1 longer, egg-shaped, about twice as long as deep, dorsally with 2 (occasionally up to 4) long black bristles; if two are present, then the upper one inserted at middle of basitarsus. ♀: tarsi longer, all tarsomeres on fore leg longer than deep; t_3 spindle-shaped, as wide as femur at middle. *acr* shorter than *dc*, and with a tendency to be 3- to 4-serial posteriorly; generally smaller species, body about 2 mm long . . 99. *H. biseta* Collin (The morphologically similar lowland species *H. quadriseta* Collin is larger-sized, up to 3 mm long, with *acr* regularly 2-serial, bristle-like, as long as *dc*; bt_3 in both sexes with 2 small anterodorsal bristles before tip, bt_1 in ♂ with 4-5 strong dorsal bristles, and t_3 in ♀ evenly dilated towards tip, but in apical third scarcely as wide as femur.)

- 136(135) Legs quite black. Wings faintly brownish; *acr* in two uniform rows.
 ♂: tarsomeres 2-4 on fore leg dorsally produced; hind trochanter simple.
 ♀: t_1 dorsally at tip with a long bristle which is as long as bt_1 is long
 97. *H. chorica* (Fallén)
- Legs translucent yellowish at least on cx_1 and base of f_1 (see couplet 43).
 Wings darker brown; *acr* strongly diverging on posterior half of scutum.
 ♂: only tarsomere 2 on fore leg produced dorsally; hind trochanter with
 a spur-like projection anteriorly. ♀: dorsal bristle at tip of t_1 much
 shorter 98. *H. aartseni* Chvála

LIST OF GROUPS AND SPECIES

1. *Hilara flavipes* group
 1. *H. flavipes* Meigen, 1822
 2. *H. flavidipes* Chvála, 1998
 3. *H. morenae* Strobl, 1899
 - 3a *H. sturmi* Wiedemann in Meigen, 1822
 4. *H. albiventris* von Roser, 1840
2. *Hilara abdominalis* group
 5. *H. abdominalis* Zetterstedt, 1838
 6. *H. allogastra* Chvála, 2001
 7. *H. alpicola* Chvála, 2001
 8. *H. gallica* (Meigen, 1804)
 9. *H. discolor* Strobl, 1892
3. *Hilara clavipes* group
 10. *H. cilipes* Meigen, 1822
 11. *H. clavipes* (Harris, 1776)
 12. *H. curtisi* Collin, 1927
4. *Hilara canescens* group
 13. *H. canescens* Zetterstedt, 1849
 14. *H. nigritarsis* Zetterstedt, 1838
 15. *H. cuneata* Loew, 1873
 16. *H. setosa* Collin, 1927
 17. *H. lasiopa* Strobl, 1892
 18. *H. eviana* Straka, 1976
 19. *H. hyposeta* Straka, 1976
 20. *H. manicata* Meigen, 1822
 21. *H. ponti* Chvála, 1981
 22. *H. cinereomicans* Strobl, 1892
 23. *H. merula* Collin, 1927
 24. *H. thoracica* Macquart, 1827
 25. *H. nigrita* Chvála, 2005
 26. *H. goetzei* Chvála, 2005
 27. *H. griseola* Zetterstedt, 1838
 28. ***H. planti* sp. n.**
 29. ***H. crossleyi* sp. n.**
 30. *H. tiefi* Strobl, 1892
 31. *H. perversa* Oldenberg, 1916
5. *Hilara litorea* group
 32. *H. litorea* (Fallén, 1816)
 33. *H. pseudosartrix* Strobl, 1892
34. *H. sartor* Becker, 1888
35. *H. galactoptera* Strobl, 1910
36. *H. morata* Collin, 1927
37. *H. splendida* Straka, 1976
38. *H. tenella* (Fallén, 1816)
39. *H. platyura* Loew, 1873
40. ***H. leukensis* sp. n.**
41. *H. nigrocincta* de Meijere, 1935
42. *H. ternovens* Strobl, 1898
(= *H. griseifrons* Collin, 1927)
43. *H. albipennis* von Roser, 1840
6. *Hilara intermedia* group
 44. *H. intermedia* (Fallén, 1816)
 45. *H. tetragramma* Loew, 1873
 46. *H. hirta* Strobl, 1892
 47. ***H. brevistriata* sp. n.**
 48. *H. beckeri* Strobl, 1892
 49. *H. fuscipes* (Fabricius, 1794)
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 54. ***H. luteihalterata* sp. n.**
 55. *H. embartaki* Chvála, 2008
 56. ***H. polleti* sp. n.**
 57. *H. hirtipes* Collin, 1927
 58. *H. bistriata* Zetterstedt, 1842
 59. *H. brevittata* Macquart, 1827
 60. *H. coracina* Oldenberg, 1916
7. *Hilara cornicula* group
 61. *H. cornicula* Loew, 1873
 62. *H. longifurca* Strobl, 1892
(= *H. monedula* Collin, 1927)
 63. *H. campinosensis* Niesiolowski, 1986
 64. *H. pygialis* Chvála, 2008
 65. *H. nigrohirta* Collin, 1927
 66. *H. pseudocornicula* Strobl, 1909
(= *H. subpollinosa* Collin, 1927)
 67. *H. quadrifaria* Strobl, 1892
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8. *Hilara lasiochira* group
 69. *H. pilospectinata* Strobl, 1892
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 70. *H. lasiochira* Strobl, 1892
 71. *H. strakai* Chvála, 1981
9. *Hilara interstincta* group
 72. *H. interstincta* (Fallén, 1816)
 73. *H. lugubris* (Zetterstedt, 1819)
 74. *H. dimidiata* Strobl, 1892
 75. *H. scrobiculata* Loew, 1873
 76. ***H. sirbitzmatrona* sp. n.**
 77. *H. anglodanica* Lundbeck, 1913
 78. *H. aeronetha* Mik, 1892
 79. *H. angustifrons* Strobl, 1892
 80. *H. caerulescens* Oldenberg, 1916
10. *Hilara andermattensis* group
 81. *H. helvetica* Chvála, 1999
 82. *H. maior* Strobl, 1910
 (= *H. tatra* Niesiolowski, 1991,
 syn. n.)
 83. ***H. parvimaior* sp. n.**
 84. *H. styriaca* Strobl, 1893
 85. *H. merzi* Chvála, 1999
 86. *H. zermattensis* Chvála, 1999
 87. *H. andermattensis* Strobl, 1892
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11. *Hilara borealis* group
 89. *H. borealis* Oldenberg, 1916
 90. *H. medeteriformis* Collin, 1961
 91. *H. calinota* Collin, 1969
 92. *H. lacteipennis* Strobl, 1892
 93. *H. pruinosa* Wiedemann in Meigen,
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12. *Hilara chorica* group
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 95. *H. longivittata* Zetterstedt, 1842
 96. *H. pseudochorica* Strobl, 1892
 97. *H. chorica* (Fallén, 1816)
 98. *H. aartseni* Chvála, 1997
 99. *H. biseta* Collin, 1927
 100. *H. triseta* Chvála, 2005
 101. *H. pectinipes* Strobl, 1892
 102. *H. barbipes* Frey, 1908
 103. *H. hystrix* Strobl, 1892
13. *Hilara maura* group
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 106. *H. hybrida* Collin, 1961
 107. *H. nitidula* Zetterstedt, 1838
 108. *H. nitidorella* Chvála, 1997
 109. *H. femorella* Zetterstedt, 1842
 110. *H. sulcitaris* Strobl, 1892
 111. *H. clypeata* Meigen, 1822
 112. *H. tyrolensis* Strobl, 1892
 (= *H. miriptera*, Straka, 1976, syn. n.)
 113. *H. discalis* Chvála, 1997
 114. *H. discoidalis* Lundbeck, 1910
 115. *H. media* Collin, 1927
14. *Hilara albitarsis* group
 116. *H. albitarsis* von Roser, 1840
 117. *H. bohemica* Straka, 1976
- ADDITIONAL SPECIES
Hilara longicornis Strobl, 1894
Hilara flavocoxa Straka, 1976

Group 1 – *H. flavipes*-group

For a characterization of this group, containing the original types of the genus, and for a revision of all known European species, see Chvála (1998).

1. *Hilara flavipes* Meigen, 1822

REFERENCES: Strobl (1892a: 160), Collin (1961: 679), Chvála (2005a: 46) – description and illustration of male fore leg, hind femur, and postabdomen with genitalia, Chvála (1998: 468) – synonymy.

DISTRIBUTION: A species of cold and temperate Europe, widely distributed from southern Scandinavia and the British Isles along the Atlantic coast south to France and Spain, in central parts of Europe south to Austria and Hungary only. In temperate and warmer parts of Europe preferring higher altitudes. It is a fairly common species for instance in the Czech Šumava Mts (Böhmerwald), found at many sites from 800 to 1100m (see Chvála, 1998), also in the Moravian Beskydy Mts, but there are only scarce records from the Alps. A late summer and autumn species, in mountain biotopes mainly from August to October.

MATERIAL EXAMINED: **Czech Republic:** Šumava Mts: Antygl (1100 m) 2.viii.1975 1 ♀; Prášily, River Křemelná (800 m) 29.viii.1994 1 ♀; Spálenec (800 m) 15.viii.1994 1 ♂ 2 ♀; Starý Brunst (960 m) 21.viii.1989 1 ♂; Šmauzy (960 m) 20.viii.1989 1 ♀ (all *Barták*); Jezerní slat' (1050 m) 4.-6.x.2005 1 ♂ (*Spitzer*). Beskydy Mts: Košařiska (550 m) 24.viii.1987 1 ♂; Horní Lomná (520 m) 10.viii.1986 1 ♂ (both *Barták*). **Austria:** Carinthia: Villach 1 ♂ (*Tief*).

2. *Hilara flavidipes* Chvála, 1998

REFERENCES: Chvála (1998: 466) – description and illustration of male postabdomen.

DISTRIBUTION: *Hilara flavidipes*, a species closely related to the preceding *H. flavipes*, was described only recently from the Romanian Transylvanian Alps, and from western slopes of the Moravian Beskydy Mts (Tinec). Its occurrence in other mountain ranges in central parts of Europe including the Alps is possible and, therefore, it is included here as well.

MATERIAL EXAMINED: **Romania:** Transylvanian Alps, Voineasa, 23.vii.1987 1 ♂ (*Barták*).

3. *Hilara morenae* Strobl, 1899

REFERENCES: Chvála (1971: 334, 2008a: 32) – description, and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: This species, closely related to *Hilara sturmii* Wiedemann in Meigen, was described from the Spanish Cardenas, but now it is known also from Germany, Switzerland and Corsica. Recently, it was discovered among specimens collected by V. Straka in Slovakia on the River Danube at Pribence near Šamorín, 1 ♂ 14.vii.1970 (UMO). Mainly a spring species, in May and June, in Switzerland at low altitudes at about 200 m only.

MATERIAL EXAMINED: **Switzerland:** TI: Gordola, Bolle (220 m) 16.-19.vi.1995 9 ♂ 8 ♀ (*Merz & Bächli*), Gordola, Verzasca (205 m) 15.-19.v.2006 2 ♂ 6 ♀, Gordola, Bolle di Magadino (200 m) 19.v.2006 2 ♂ 2 ♀; Tenero, Lido 205 m, 15.v.2006 19 ♂ 12 ♀ (all *Merz*), Bolle di Magadino, marais (196 m) 30.iv.1996 2 ♂ 2 ♀ (*Pollini*).

3a. *Hilara sturmii* Wiedemann in Meigen, 1822

REFERENCES: Chvála (2005a: 50) – description and illustration of male postabdomen.

DISTRIBUTION: Widely distributed in Europe from the British Isles and southern parts of Fennoscandia to the Mediterranean. Uncommon in central temperate Europe east to Romania; in southern Europe only in the western parts. A long flight period from May to September, but mainly in spring and early summer.

MATERIAL EXAMINED: **Switzerland.** TI: Gordola, Bolle di Magadino (205 m) 6.vii.2001 3 ♂ (*Merz*).

4. *Hilara albiventris* von Roser, 1840

REFERENCES: Collin (1961: 674), Chvála (2005a: 51) – description and illustration of male postabdomen and genitalia.

DISTRIBUTION: A species of temperate Europe, very rare in the south of Scandinavia (Norway), and from the British Isles (including Scotland) south to France

(Pyrenees), northern Italy and Romania. In central parts of Europe a typical summer species, occurring both in lowlands and at higher altitudes.

MATERIAL EXAMINED: **Czech Republic:** Šumava Mts: Kašperské hory, Losenice (600 m) 1.vii.1995 1♂ (*Barták*). **Switzerland:** GE: Chancy, La Laire (350 m) 25.vii.2004 1♀. ZH: Embrach, Haumüli (400 m) 10.vii.1997 1♂ (all *Merz*). **France:** Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 1♂ (*Barták*); Alpes-de-Haute-Provence, Montagne d. Lure (500 m) 1♂ (*Schacht*). **Romania:** Transylvanian Alps, Voineasa 23.vii.1987 4♂ (*Barták*).

Group 2 – *H. abdominalis*-group

For a characterization of this group, and a revision of all known Palaearctic species, see Chvála (2001).

5. *Hilara abdominalis* Zetterstedt, 1838

REFERENCES: Collin (1961: 618), Chvála (2001: 205, 2005a: 55) – description, with illustration of male and female fore leg, and of male genitalia.

DISTRIBUTION: Throughout Fennoscandia, but much commoner in the north, especially in Lapland, also in Russian Karelia, and on the British Isles, especially in Scotland. Very probably a boreoalpine species, in temperate Europe known only at high altitudes of the Czech Krkonoše Mts (Riesengebirge, or Giant Mts) and Šumava Mts (Böhmerwald). Unknown south of the Czech mountains, all other records from the Alps refer to other related species. The record from Switzerland of Schiegg *et al.* (1999) refers to *Hilara alpicola* (re-examination of A. Stark in 2009), and this species is therefore deleted from the list of Swiss Diptera.

MATERIAL EXAMINED: **Czech Republic:** Krkonoše Mts: Lysečiny (1000 m) vii.1965 1♂ (*Macek*). Šumava Mts: Trojmezňá (1200 m) 12.-24.vi.2003 MT 1♂; Boubín (1250-1350 m) vi.2004 PT 1♀, MT 1♀ (all *Farkač*).

6. *Hilara algoastra* Chvála, 2001

REFERENCES: Strobl (1892a: 172, as *H. heterogastra*), Chvála (2001: 208) – synonymy, homonymy, new name for *Hilara heterogastra* Nowicki, 1868, and description with illustration of male fore leg and genitalia.

DISTRIBUTION: A widely distributed species in mountains of central temperate Europe, south to Bulgaria (Pirin Mts), Romania (Transylvanian Alps) and east to the Caucasus (Georgia). Absent in northern Europe and the British Isles. The northern border of its distribution lies in the northern Czech mountains (Krkonoše, Orlické hory, Jeseníky, Beskydy) and the Slovak West Carpathians (Velká Fatra, Vysoké Tatry, and the Bukovecké hory Mts on the Ukrainian border). For a long period from 19 May to 17 August, for detailed distributional data with the exception of the Alps, see Chvála (2001). The species is often misidentified in the literature as *H. abdominalis*. Strobl (1893: 91; 1898: 206; 1910: 71) recorded it as *H. heterogastra* from many localities in the Styrian Alps, from the Ennstaler Alpen, and from the Rottenmanner and Schladminger Tauern.

MATERIAL EXAMINED: **Austria:** Lower Austria (Schneeberg), Oberösterreich (Hinterstoder), Styria (Ennstaler Alpen, Gesäuse, Rottenmanner Tauern, Schladminger Tauern, Salzbürgland (Sulzgau), Tyrol (St Ulrich, Grödnerthal, Bad Ratzes); common from 12 June to

10 August, at altitudes from 700 to 1300 m. **Switzerland:** GR (St Moritz, Zerne, Valbella, Poschiavo), TI (Piora, Bedretto), VS (Längtal, Oberwald, Aletsch); common from 2 July to 17. August, at altitudes up to 1935 m. **Italy:** Landro, Trafoi, Monte Rosa, Macugnaga, S. Martino; common from 8 July to 15 August, at altitudes up to 1900 m. **Slovenia:** Julian Alps, Triglav, Aljažev dom (1100 m) 3.vii.1973 4♂ (*Chvála*).

7. *Hilara alpicola* Chvála, 2001

REFERENCES: Chvála (2001: 212) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: Exclusively an Alpine species, known so far from the Austrian, Swiss and French Alps, mostly at high altitudes above 1000 m. A typical summer species, mainly in July and August, on dates ranging from 2 June to 14 August.

MATERIAL EXAMINED: **Austria:** Styria: Ennstaler Alpen, Oberlaussa Polzanbach (850 m) 18.vi.2000 1♂ (*Chvála*). **Switzerland:** VS: Visperterminen, Giw (1900 m) 16.vii.1997 1♂ (holotype) (*Merz*); Riederalp 31.vii.-8.viii.1976 3♂ 6♀ (*Bächli*); Leuk, Pfynwald (600 m) 25.viii.2001 1♂ (*Merz & Landry*). GR: Ftan 12.-14.viii.1978 2♂ 2♀; Alp Flix 4.-8.viii.1975 2♂ 4♀ (all *Bächli*); Samedan Wald (1770 m) 16.vii.1985 1♂, 18.vii.1989 4♂, (1840 m) 21.vii.1988 1♀ (all *Sauter*); S. Vittore, Rebberg (290 m) 2.vi.1997 1♂ (*Merz*); Zerne, Crastatscha (1450 m) 16.vii.1980 1♀ (*Haenni*). **France:** Gard (Aigoual), Arphy, Cascade d'Orgon (1253 m) 17.viii.2002 1♂ (*Haenni*); Alpes Maritimes, Isola (2000 m) 30.vii.1993 1♂ (*Stark*).

8. *Hilara gallica* (Meigen, 1804)

REFERENCES: Collin (1961: 620), Chvála (2005a: 53) – description, and illustration of male fore leg and genitalia.

DISTRIBUTION: Widely distributed in northern Europe as far north as the central parts of Fennoscandia, rare on the British Isles, where it occurs as in the Netherlands mostly on sandy heathlands; in temperate central parts of Europe south to France, Switzerland, northern Italy, Croatia and Hungary, preferring mainly dry steppe biotopes. A spring and early summer species. In Alpine regions already from the end of April to mid of July.

MATERIAL EXAMINED: **Switzerland:** GR: S.Vittore, Rebberg (290 m) 2.vi.1997 1♂; Valbella, Casoja (1530 m) 14.vii.1998 1♀ (all *Merz*); Strada (1070 m) 13.vi.1986 1♂; Ardez (1360-1380 m) 13.vi.1986 1♂ 1♀; Sent, Tuffarolas (1540-1580 m) 13.vi.1986 1♂ 1♀ (all *Haenni*). VS: Zermatt, Haveten (1760 m) 29.vi.1959 1♂ (*Keiser*); Leuk, Platten (630 m) 22.iv.1998 1♂ (*Merz & Botta*); Leuk, Brentjong (920 m) 15.v.2000 1♂ (*Merz & Ulrich*). **France:** Hautes-Alpes, Montgenevre (1800 m) 12.vii.1990 2♀ (*Barták*). **Italy:** AO: Aosta, St Vincent Salirod (mosaique steppe) 14.v.2006 5♂ 2♀ (*Haenni*).

9. *Hilara discolor* Strobl, 1892

REFERENCES: Chvála (2001: 220) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: A species of temperate continental Europe, in the north from Germany and Poland south to the Mediterranean (Spain, Corsica, Greece). In the Alps rather a submountain late summer species, mainly in August and September. Strobl (1892a: 165) described it as “*Hilara discolor* Kowarz i.litt.” from specimens collected by Prof. Tief in the Jeseníky Mts (Czech Republic), and by T. Becker in German and

Polish Silesia; for details and lectotype designation, see Chvála (2004: 131). In the south, in Spain and in the Mediterranean, high in mountains above 1000 m; not yet found in Austria.

MATERIAL EXAMINED: **Switzerland:** SZ: Gersau-Oberholz 14.viii.1980 1♂ (*Rezbanyai*). TI: Piotta 19.-22.viii.1981 1♂ 1♀ (*Bächli*). VS: Leuk, Rotafen (620 m) 10.viii.1997 1♂ 1♀ (*Merz*); Leuk, Finges (550 m) 9.viii.1997 1♂ (*Haenni*); Leuk (635 m) 10.viii.1997 1♀ (*Haenni & Merz*); Zermatt 5.viii. 1♀ (*Becker*, coll. Strobl); Sierre 9.x.1890 1♀ (*Huguenin*). GR: Laax and Sasa vii.-viii.1892 1♂ 3♀ (*Escher-Kündig*); Ftan 12.-14.viii.1978 1♂ (*Bächli*). **France:** Vosges, Queleux 30.vii.1990 1♂ (*Pont*); Gard, Dourbies, 1.6 km SW Rouviere (840-880 m) 11.viii.1995 1♂ 3♀; Gard (Aigoual), Arphy, Cascade d'Orgon (1253 m) 7.viii.2002 3♀ (all *Haenni*).

Group 3 – *H. clavipes*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 57 and 2008a: 39).

10. *Hilara cilipes* Meigen, 1822

REFERENCES: Strobl (1892a: 171), Chvála (2005a: 60) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: Not found in Fennoscandia and in the British Isles, in continental temperate Europe often misidentified as *H. clavipes*. From the Netherlands and central parts of Europe south to France, Switzerland, northern Italy and Romania. A spring and early summer species, everywhere rare. In the Alps also at altitudes about 1100 m.

MATERIAL EXAMINED: **Austria:** Carinthia: Villach, Tschinowitsch, 23.v. 1♂ (*Tief*). Styria: Gesäuse, Kaiserau (1100 m) 11.vi.1997 1♂ (*Chvála*). **Switzerland:** GE: Cartigny, Vers Vaux (335 m) 1.vi.2002 1♂; Bernex, Chante-Merle (415 m) 16.v.1999 2♀. SG: Wattwil (610 m) 11.vii.1997 1♂. ZH: Zürich Katzenssee (450 m) 23.v.1995 1♂, (440 m) 25.v.1996 1♂ (all *Merz*). **Slovenia:** Spodnja Bilpa, River Kolpa (300 m) 15.vi.2006 2♂ 4♀ (*Plant*).

11. *Hilara clavipes* (Harris, 1776)

REFERENCES: Strobl (1892a: 169, as *H. spinimana* var. *spinigera*), Collin (1961: 655, as *H. matrona*), Chvála (2005a: 58) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: A widely distributed species in Europe, including northern parts of Fennoscandia, but especially common in temperate Europe, often in large swarms both in lowlands and in mountains. For a long period from June to September. A common species in mountains of central Europe, as for instance in the Krkonoše Mts (Giant Mts) and Jeseníky Mts, in swarms above streams at altitudes above 1300 m. Strobl (1893: 91) recorded this species from the Austrian Alps (as a new variety *spinigera*, his “*H. matrona*” was in fact *Hilara lasiopa*) from the Styrian Haller Mauern (Natterriegel), the Rottenmanner Tauern (Bösenstein), at about 1300-1700 m, also from Stelzing (1410 m) in Carinthia, and from Gastein in Salzburgland. In the French Alps also above 2000 m.

MATERIAL EXAMINED: **Austria:** Styria: Haller Mauern, Natterriegel (about 1800 m) 22.viii. 1♀; Scheiplsee (= Scheibelsee) 30.vii.1891 1♂ (all *Strobl*), Rottenmanner Tauern,

Scheibelsee (1750 m) 6.vii.2002 1♂, 15.ix.2005 3♀; Schladminger Tauern, Innere Grosssölkertal (1200 m) 24.viii.2001 swarms (all *Chvála*). Salzburgland: Gastein 5.ix. 1♀ (*Becker*). **Switzerland**: GR: Sur, Alp Flix (1965 m) 4.-8.viii.1975 1♂, 1.viii.2004 2♂ 1♀ (*Bächli*); Ausserferrera (1320 m) 4.viii.1999 1♂; Valbella See (1500 m) 17.vii.1996 10♂, Valbella Casoja (1490-1500 m) 11.-24.vii.1997-1998 11♂ 8♀ (all *Merz*); Zernez, Gondas (1480 m) 4.viii.1996 1♂ 1♀ (*Merz & Bächli*). **France**: Haute-Savoie, Pormenaz (1700-2200 m) 8.vii.-15.vii.2003 (MT) 2♀ (*Castella & Speight*). **Italy**: S. Martino 31.vii.1914 1♂ 2♀ (*Oldenberg*).

12. *Hilara curtisi* Collin, 1927

REFERENCES: Collin (1961: 657), Chvála (2005a: 62) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: West and central European species, described from England, where it is a common especially coastal species, and from the Netherlands and western Germany along the Atlantic coast to France, inlands as far as Switzerland and northern Italy. Artmann-Graf *et al.* (2003) published the first record from Switzerland where it occurs at lower altitudes. A typical spring species, mainly in May and June.

MATERIAL EXAMINED: **Switzerland**: SO: Kappel, Baumhecke Höchi Matten (426 m) 15.v.2001 1♂ (*Artmann-Graf*). TG: Ermatingen, Waldwiese (577 m) 15.v.2006 1♂ (*Grimm*).

Group 4 – *H. canescens*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 64 and 2008a: 39).

13. *Hilara canescens* Zetterstedt, 1849

REFERENCES: Strobl (1892a: 164), Collin (1961: 670), Chvála 2005a: 64) – description and illustration of male fore leg, female hind tibia, and male genitalia.

DISTRIBUTION: Widely distributed species in Europe, from central parts of Fennoscandia, where it is fairly common, south to the Mediterranean countries, although in temperate and warm Europe only locally common, and preferring higher altitudes. From mid May, but mainly in June and July. In the Alps only rarely above 1000 m. Strobl (1893: 91) recorded it from Styria only from the vicinity of Admont and from the Ennstaler Alpen (several sites: (Gesäuse, Kaiserau, Mühlauerbach) in July and August.

MATERIAL EXAMINED: **Austria**: Salzburgland: Untertauern 17.vi.2000 1♂; Obertauern, Tweng (1200 m) 17.vi.2000 1♀. Styria: Haller Mauern, Unterlaussa (700 m) 18.vi.2000 2♂ 3♀; Admont, River Enns (640 m) 16.v.2003 1♂, 13.vi.2000 1♀, 2.vii.2002 2♀ (all *Chvála*). **Switzerland**: TI: Biasca Loderio (350 m) 2.vi.1997 1♀; Cadenazzo (270 m) 3.vi.1992 1♂; Tenero-Lido (205 m) 15.v.2006 4♂ 6♀; Gordola, Verzasca-Ufer (205 m) 15.v.2006 1♂ 1♀ (all *Merz*). VS: Mörel SW (730 m) 1.vii.1996 1♀ (*Haenni*). GR: St Moritz 15.vii. 1♂ (*Becker*); S. Vittore, Monticello (280 m) 2.vi.1997 1♂ 1♀. GE: Chancy, Vers Vaux (335 m) 9.vii.2002 1♂; Veyrier, Pont Sierne (400 m) 1.vii.1999 1♀ (all *Merz*). **Slovenia**: Spodnja Bilpa, River Kolpa (300 m) 15.vi.2006 1♂ 1♀ (*Plant*).

14. *Hilara nigritarsis* Zetterstedt, 1838

REFERENCES: Chvála (2005a: 66) – description and illustration of male fore and mid leg, female hind leg, and male genitalia.

DISTRIBUTION: Northern species, throughout Fennoscandia including Russian Karelia and Kola Peninsula, but unknown on the British Isles. In temperate continental Europe only in mountains (Krkonosé Mts, Slovak West Carpathians and Šumava Mts on the Czech-German border). A species of a similar apparently boreoalpine distribution in Europe like *H. abdominalis*, and also not yet found in the Alps. In June and July, mainly on peat bogs.

MATERIAL EXAMINED: **Czech Republic:** Krkonosé Mts (Giant Mts or Riesengebirge): Labský důl (1040 m) 28.vi.-13.vii.2006 (MT) 3♂ 3♀ (*Vaněk*). Jizerské hory Mts: Jizera peat bog (840 m) 24.vi.1999 2♂; River Jizerka near Bukovec (780 m) 26.vi.1999 (all *Preisler*). Šumava Mts (Böhmerwald): Nová Hůrka (800 m) 24.vi.-28.vii.2000 (MT) 1♂ 3♀; Prášíly, River Křemelná (810 m) 8.vii.1994 7♂ 2♀; Popelná (880 m) 3.-4.vii.1988 2♀ (all *Barták*); Pěkná env. (750 m) 9.vii.1992 2♂ (*Roháček*); Velká Niva, peat bog (780 m) 10.-12.vi.2003 1♂ (*Spitzer*).

15. *Hilara cuneata* Loew, 1873

REFERENCES: Chvála (1997c: 301) - description, synonymy, and illustration of male fore leg and genitalia; Chvála (2008a: 46) - diagnosis and illustration of male mid leg.

DISTRIBUTION: South European species widely distributed in the Mediterranean from Spain and the Balearic Islands east to Lebanon; in warm central parts of Europe from the Czech Republic south to French Alpes Maritimes, only at scattered sites in lowlands. Only one new record from Switzerland, not yet recorded in Austria. Mainly in June, in the Mediterranean already in mid May.

MATERIAL EXAMINED: **Switzerland:** BS: Basel 28.vi.1955 2♂ (Keiser). GE: Corsier-Port, vitre véranda 1.-31.vii.2004 1♀ (*Besuchet*).

16. *Hilara setosa* Collin, 1927

REFERENCES: Collin (1961: 659), Chvála (2005a: 68) - description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: Described from Scotland, but later found also in England and along the North Sea coast in Schleswig-Holstein (Rief, 1996). It has not been found in Scandinavia until now, but its occurrence in the Czech Šumava Mts (Böhmerwald) seems to indicate that *H. setosa* is a boreomontane species; its occurrence also in other mountains in central temperate Europe, including the Alps, is very probable. A late summer species, in August and September.

MATERIAL EXAMINED: **Czech Republic:** Šumava Mts: Prášíly, River Křemelná (780-810 m) 29.viii.1994 1♂, 27.viii.2000 1♀ (all *Barták*), 23.viii.2003 1♀, 3.ix.2001 2♀ (all *Chvála*).

17. *Hilara lasiopa* Strobl, 1892

REFERENCES: Strobl (1892a: 168 as *H. matrona* auct.), Chvála (1997c: 308; 2005a: 69) - synonymy, description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: A continental central European species, distributed towards south to France, northern Italy and Romania, absent from Scandinavia and the British Isles. A typical mountain species, rarely in lowlands, preferring colder highlands. A

species of summer occurrence, from mid June to mid August. In the north of its area of distribution for instance in the Czech Orlické hory Mts, the Polish Beskydy Mts, or the West Carpathians, or the Slovak Velká Fatra Mts; for detailed data on distribution, see Chvála (1997c). Strobl (1893: 91) recorded it as *H. matrona* Haliday from Styrian Ennstaler Alpen in the vicinity of Admont, and later (Strobl 1898: 206) also from the Slovenian Alps, from the vicinity of Ojstrica. Common especially in Austrian Alps, from June to August, sometimes above 1000 m.

MATERIAL EXAMINED: **Austria:** Oberösterreich: St. Pankraz, River Steyer (490 m) 2.vii.2001 1♂ 1♀; Totes Gebirge, Hinterstoder (700 m) 8.vii.2001 1♂ 1♀. Styria: Admont env. (Saugraben, Kematengraben) (700-1000 m) 12.vi.-12.viii. 1997-2002 14♂ 6♀; Haller Mauern (Mühlau, Hengstpass, Grabneralm) (750-1300 m) 19.vi.-11.viii.1998-2007 common; Gesäuse, Kaiserau (1100 m) 26.vii.1997 2♂; Weissenbach bei Liezen (700 m) 8.vii.2002 1♂ (all *Chvála*). **Switzerland:** ZH: Embrach, Haumüli (400 m) 19.vi.1998 1♂ (*Merz*). GR: Poschivao, Li Curt (1000 m) 2.vii.2004 2♂ (*Haenni*). **Italy:** BZ: Bozen (Bolzano) 9.vii.1911 1♂ 1♀ (*Oldenberg*). **France:** Hautes-Alpes, Montgenevre (1800 m) 12.vii.1990 2♀ (*Barták*). **Slovenia:** Julian Alps, Triglav, Aljažev dom (1100 m) 3.vii.1973 1♂ (holotype of *H. matronella* Straka) 3♀ (*Chvála*); Vrsnik, Trib. of River Soča (485 m) 19.vi.2006 1♀; Bistrica, Slap Peričnik (775 m) 19.vi.2006 1♂; River Čabrance (330 m) 15.vi.2006 2♂ 1♀; Planinska Jama (800 m) 20.vi.2006 2♂ (all *Plant*).

18. *Hilara eviana* Straka, 1976

REFERENCES: Chvála (2005a: 71) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: A typical boreomontane species, widely distributed in central parts of Fennoscandia, but it remains unknown in the British Isles and the Benelux countries. In temperate central parts of Europe only in mountains, known so far besides the Alps only from the Czech Šumava Mts, the Slovak Carpathians (Velká Fatra Mts), and the Bulgarian Rila Planina. A late summer and autumn species, from August to the beginning of October. In the Alps mostly at altitudes above 1000 m.

MATERIAL EXAMINED: **Czech Republic:** Šumava Mts: Prášíly, River Křemelná (810 m) 29.viii.1994 1♀; Nová Hůrka (850 m) 28.viii.1994 1♂ 1♀; Horní Vltavice (800 m) 30.ix.1988 1♀ (all *Barták*); Prášíly (780 m) 3.ix.2001 3♂ 2♀ (*Chvála*). **Slovakia:** Velká Fatra: Belianská dolina 9.ix.1970 2♂ (holotype + paratype); Nepalská dolina 25.ix.1971 5♂ 1♀; Gaderská dolina 27.viii.1970 9♂ 23♀; Oravská Polhora 20.viii.1971 4♂ 7♀ (all paratypes, *Straka*). **Austria:** Styria: Rottenmanner Tauern, Wirthsgraben bei Hohentauern 28.viii. 3♂ 2♀ (*Strobl*, as *H. manicata*). Schladminger Tauern, Sölkpass, Inner Grosssölk (1200 m) 24.viii.2001 1♂; Haller Mauern, Mühlau (900 m) 16.ix.2005 1♂; Pyhrnpass, Kalkofen (1100 m) 24.ix.2006 1♀; Gesäuse, Kaiserau (1100 m) 17.ix.2006 1♂ (all *Chvála*). **Switzerland:** GR: Ausserferrera (1300 m) 28.viii.2006 1♀ (*Merz*).

REMARK: This species is here recorded for the first time from Switzerland.

19. *Hilara hyposeta* Straka, 1976

REFERENCES: Chvála (2005a: 73) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: A species closely related to the preceding *H. eviana*, and with a similar type of distribution. A continental species, known so far in the north only from southern Finland, but it has a wider distribution in temperate central Europe even in

lowlands, although preferring higher altitudes. In central Europe known so far from mountains of the Slovak West Carpathians; its more southern occurrence also in the Alpine region cannot be excluded. The lowland localities are not presented here.

MATERIAL EXAMINED: **Slovakia:** Velká Fatra Mts: Gaderská dolina 27.viii.1970 13♂ 2♀ (holotype and paratypes), 1.-19.viii.1971 24♂ 17♀ (all paratypes *Straka*).

20. *Hilara manicata* Meigen, 1822

REFERENCES: Collin (1961: 647), Chvála (2005a: 75) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: British Isles and southern Scandinavia (Denmark and Norway) in the north, south along the Atlantic coast to the Pyrenees and northern Italy, and the south-eastern border of its distribution lies in Slovakia. Both in lowlands and highlands, absent high in mountains. A typical summer species, from July to the mid of September.

MATERIAL EXAMINED: **Czech Republic:** Beskydy Mts: Horní Lomná (550 m) 26.-28.vii.1996 3♂ (*Barták*). Železné hory Mts: Spačice valley (400 m) 21.vii.1995 1♂ (*Mocek*). **Switzerland:** ZH: Embrach Haumüli (400 m) 10.vii.1997 1♂ (*Merz*). SH: Rüdlingen (350 m) 2.-3.vii.1994 1♀ (*Merz & Eggenberger*). **France:** Vosges, Moyenmoutier ravines 7.viii.1990 1♂ (*Pont*). Gard, Dourbies, La Rouvière, Crouzoulous (970 m) 15.vii.2005 1♂, (959 m) 23.vii.2005 1♀, (835 - 855 m) 21.vii.2009 8♂ 4♀, (960 m) 15.vii.2009 6♀ (all *Haenni*). Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 1♀ (*Barták*).

21. *Hilara ponti* Chvála, 1981

REFERENCES: Chvála (2008a: 51) – systematic position, description and illustration of male fore leg and genitalia.

DISTRIBUTION: This species was described from high mountains of central Spain (Sierra Guadarrama) and later recorded from Switzerland (*Merz et al.*, 2002). Because of its morphological similarity with *H. manicata*, it may be overlooked and may occur also elsewhere in central Europe, or at least in mountains east of the Pyrenees. A late summer species, all data are from August.

DIFFERENTIAL DIAGNOSIS: A species of five morphologically similar species of the *H. canescens*-group (*H. eviana*, *H. hyposeta*, *H. manicata*, *H. ponti* and *H. rejecta*), all with more or less yellowish legs, long 2-serial *acr* setae, and black haltere. *H. eviana* and *H. hyposeta* have occiput dull grey, but in the other three species it is dull black.

MATERIAL EXAMINED: **Spain:** Castilia: Sierra de Guadarrama (1400 m) 18.viii.1963 10♂ 5♀ (holotype and paratypes); San Rafael (1260-1500 m) 19.viii.1963 1♂ 3♀ (all *Pont*). **Switzerland:** SO: Limpachtal 13.viii.1987 1♂ (*Duelli*).

Additional, morphologically similar species

H. rejecta Collin, 1927 is not included in the key. It is a lowland species of temperate Europe not yet found in the Alpine region but recently discovered in the south of France (see below). It resembles *H. manicata* but has extensively yellow legs with tibiae and tarsi contrasting black, male *bt*₁ is armed with long hairs and setae dorsally, and *acr* are in two widely separated rows. *H. ponti* is undoubtedly closer

allied to *H. manicata*, the legs in both species are extensively darkened, usually only cx_1 and base of all femora are yellowish-brown, and *acr* are in two close rows; they are very diverging in *H. manicata*. *H. ponti* has the 2-serial *acr* less diverging and a stronger, longer antennal style, about 1.5 times as long as antennal segment 3, and the scutum is dull blackish-grey; the decisive differential feature is the absence of the setae on sternum 8 in male. They form a curious open fan of long black setae around the hypopygium present in *H. manicata* and *H. hyposeta*.

MATERIAL EXAMINED: **France:** Gard, Dourbies, 1.9 km SSE, rive du Crouzoulous (978 m) 17.vii.2009 1 ♂; Dourbies, 2km SSE, rive du Crouzoulous (855 m) 21.vii.2009 1 ♀ (all *Haenni*).

H. veletica Chvála, 1981 is another closely related high mountain species not included in the key. Also a late summer species, still known only in southern Spain from high mountains of the Sierra Nevada, at altitudes from 1100 to 2550 m. It differs from *H. ponti* and its allies by extensively yellow legs and yellow haltere.

22. *Hilara cinereomicans* Strobl, 1892

Figs 1-2

DIAGNOSIS: Medium-sized, body about 3.5 mm long, yellow-legged species with dull black occiput, long, bristle-like 2-serial *acr*, and male with large flattened genitalia, resembling in this way *H. apta* Collin, 1927 (see Chvála, 2005a: 79, for a description and illustrations).

REDESCRIPTION:

Male. The holotype is unfortunately headless, but in the original description it is described as “Kopf klein, der mässig breite Oberkopf sammt Hinterkopf mat schwarz, schwarz beborstet. Rüssel viel kürzer, Fühler fast länger als der Kopf, beide schwarz. Taster klein, sehr dunkel mit einer auffallend langen Borste“.

Thorax greyish dusted, translucently reddish-brown, especially on pleura; *acr* and *dc* black, long, as long as the longest black bristles on coxae; *acr* 2-serial, *dc* 1-serial, last prescutellar pair the longest. Large thoracic bristles black, very long, 1 *h*, 1 *ih*, 2 *ntpl* (? 1 *ph*) with 2 smaller hairs at sides of lower hind *ntpl*, 1 *sa*, 1 *pa*, 2 pairs of *sc* (outer pair shorter) and a distinct bristle on each side of pronotum.

Wings very faintly brownish, stigma large but not very distinct, a long black costal bristle, and anal vein fine, abbreviated before tip. Squama light brown with brownish fringes, haltere blackish-brown with yellow base of stem.

Legs long and slender, black bristled and pubescent, coxae and femora yellow to yellowish-brown, tibiae darker brown, and tarsi nearly blackish; f_1 with longer dark hairs posteriorly, f_2 with 4 distinct black bristles in anterior row, the bristles are slightly longer than femur is deep, ventrally with a double row of longer dark hairs (not as long as femur is deep); f_3 the longest, anterodorsally fringed with shorter dark hairs, antero-ventrally with a row of bristly hairs becoming longer towards tip; t_1 (Fig. 1) slender, only very slightly dilated towards tip, covered with short hairs and, besides three weak preapical bristles, with a row of distinct bristles dorsally; bt_1 very thickened, long ovate, clearly shorter than tibia but as long as rest of tarsus, covered with short hairs except for 3 long black bristly hairs dorsally before tip, and all following tarsomeres slender, much longer than deep; t_2 slender, covered with short hairs and, in addition to

the usual preapical bristles, with a single long bristle in basal third ventrally; t_3 simple, very indistinctly dilated towards tip, some longer bristles anteroventrally and anterodorsally.

Abdomen thinly greyish-brown dusted, slightly shining from some views, blackish, but translucently reddish-brown at base. All segments covered with fine black hairs and with long black hind-marginal bristles. Genitalia (Fig. 2) conspicuously large, rounded when viewed from the side, laterally very flattened, and the large hypandrium slightly brownish and clothed with only fine dark hairs.

Length: holotype body without head 2.9 mm, wing 3.5 mm.

Female unknown.

Holotype identification: Described from a single male collected by Prof. Tief in St. Anna near Villach, Carinthia. A single male in the Strobl Collection in Admont is undoubtedly the holotype and it was labelled by the first author in 1970. It bears 3 labels, a white label "St. Anna 10/7", a green label written by Strobl "*cinereomicans* ♂", and a red type label "Typen-Exemplar rev. G. Morge 1961" – for details see Chvála (2004: 117).

DISTRIBUTION: This species is actually still known only from Austrian Carinthia.

MATERIAL EXAMINED: **Austria**: Carinthia: St. Anna near Villach 10.vii.1♂ (holotype, Tief).

23. *Hilara merula* Collin, 1927

REFERENCES: Collin (1961: 632), Chvála (2005a: 81) – description and illustration of male fore leg and hind basitarsus, female hind leg, and male genitalia.

DISTRIBUTION: England and temperate central Europe south to France, Switzerland, Hungary and Romania. For a long period from June to the middle of August. Everywhere rare, mostly in lowlands and hilly countries, absent in mountains. Not yet found in Austria.

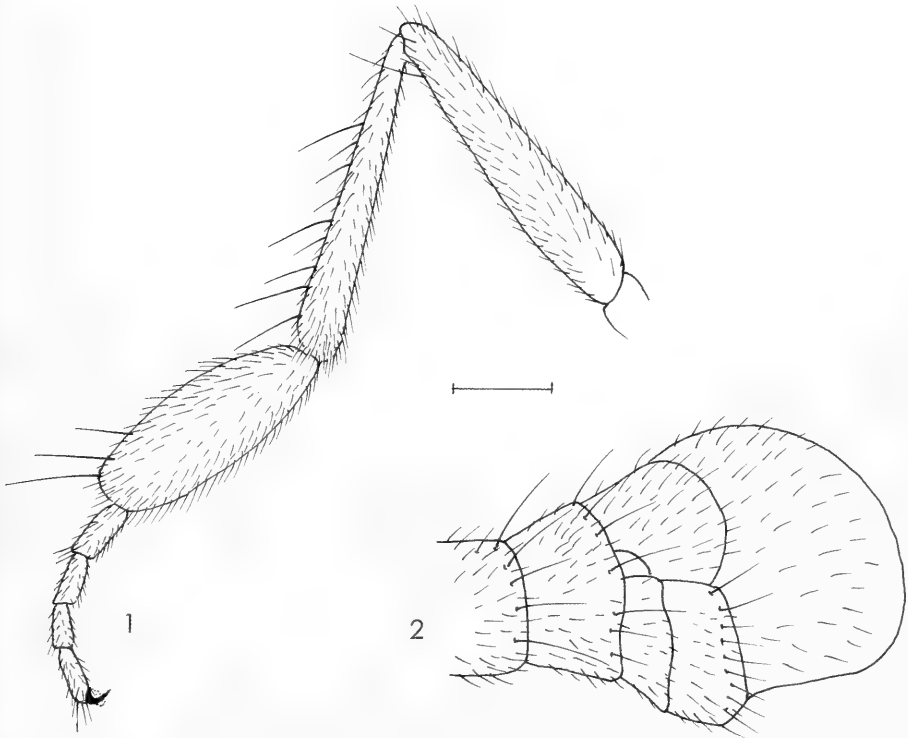
MATERIAL EXAMINED: **Switzerland**: ZH: Embrach, Haumüli (400 m) 10.vii.1997 1♀ (Merz), 29.vi.1998 1♀ (Wolf); Zürich. Ziegelhütte (460 m) 13.vii.1997 1♂ (Merz). **Slovenia**: Gasparci, River Kolpa (310 m) 15.vi.2006 1♂ (Plant). **Romania**: Transylvanian Alps, Rimnicu Vilcea 2.vii.1983 1♂ (*Rozkošný*).

REMARK: For the very closely related species *Hilara flavocoxa* Straka, known so far from the hilly region of western Carpathians only, see couplet 43 in the key and the section "additional species".

24. *Hilara thoracica* Macquart, 1827

REFERENCES: Strobl (1892a: 174 as *H. flava* Schiner), Collin (1961: 672), Chvála (2005a: 85) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: Widely distributed in Europe, from southern parts of Scandinavia (Sweden, Denmark) south to the Mediterranean (Spain, Albania). For a long period from May to the beginning of August. A common species preferring shady places in lowlands, absent high in mountains. Locally common, but because of its early morning and late evening activity, swarming around sunrise and sunset, it is not frequently



FIGS 1-2

Hilara cinereomicans Strobl ♂ (A, Carinthia, holotype). (1) Fore leg in posterior view. (2) Postabdomen with a large, semicircular hypandrium at tip. Scale: 0.2 mm.

collected. Strobl (1893: 206) recorded it from Austria as *H. flava* from Scheibleggerhochalpe in the vicinity of Admont (Kematen 1 pair in mid of July).

MATERIAL EXAMINED: **Austria:** Styria: Admont, Saugraben (830 m) 3.vii.2001 ♂ swarm; Kematen (800 m) 9.vii.2001 1 ♀ (all *Chvála*). **Switzerland:** NE: Hauterive, Champréveyres-Dessous (435 m) 19.vi.2004 2 ♂, Neuchâtel, Gorges du Seyon (495 m) 21.vi.2006 1 ♀ (all *Haenni*). ZH: Embrach, Haumüli (400 m) 11.vi.1997 3 ♂ (*Merz*), 8.-24.vi.1995-1998 common (*Wolf & Merz*); Zürich Katzensee (440 m) 31.v.1997 3 ♂ 3 ♀; Zürich Hönggerberg (530-550 m) 10.-22.vi.1995-1998 4 ♂ 2 ♀; Zürich Zürichberg (600-650 m) 15.vi.1997 1 ♂; Zürich Ziegelhütte (460 m) 13.vii.1997 1 ♂ 1 ♀ (all *Merz*); ZH/ZG: Maschwanden, Rüss-Spitz (388 m) 20.vi.1987 1 ♂ (*Rezbanayi-Reser*). TI: Mte. S.Giorgio (600-1100 m) 18.vi.1995 1 ♂ (*Merz & Bächli*). GE: Ecogia, Source captée (420 m) 21.vi.2006 1 ♂; Dardagny, source (420 m) 21.vi.2006 2 ♂ (all *Stucki*); Corsier-Port, vitre véranda 1.-30.vi.2006 1 ♀ (*Besuchet*). **France:** Pyrenees, Can Baills, 5km SW Thuir (610 m) 11.vi.2007 4 ♂ (*Merz*).

REMARKS: *Hilara flavitarsis* Straka, 1976, described and still known from a single pair collected on 12.vi.1942 by Blachanov at the Macedonian/Albanian Ochrid Lake, is a closely related species. The holotype ♂ and paratype ♀ (mounted on one pin) are clearly immature specimens, differing from *H. thoracica* by a smaller size (body about 3.5 mm), the uniformly pale yellowish to almost whitish-yellow colouration, with head and antennae uniformly yellow like the other parts of body and legs.

Furthermore, male bt_1 (figured by Straka, 1976: 31, Fig. 33) is as long as corresponding tibia, and clearly uniformly stouter, with following tarsomeres rather short, not much longer than deep (very long and slender in *H. thoracica*). The type pair is in the collection of the senior author, now in UMO.

25. *Hilara nigrita* Chvála, 2005

REFERENCES: Chvála (2005b: 107) – description and illustration of male fore leg, hind basitarsus, postabdomen and genitalia.

DISTRIBUTION: An exclusively mountain species of temperate Europe, known up to now only from mountains of the Czech Republic (Šumava Mts), Slovakia (Malá and Velká Fatra Mts), the Alps, the Bulgarian Stara planina, and Romanian Transylvanian Alps. A summer species, in July and August, rarely already in June. In the Alps only at lower altitudes between 400 and 900 m.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Totes Gebirge, Rossleithen, River Piessling (650 m) 8.vii.2001 1♀. Styria: Weissenbach near Liezen (700 m) 8.vii.2002 3♀; Frauenberg, Ennstal (680 m) 4.vii.2001 1♀; Haller Mauern, Mühlau (750 m) 3.vii.2002 2♀, (900 m) 25.viii.1999 1♀; Oberlaussa, Polzanbach (850 m) 18.vi.2000 1♂ (all *Chvála*). **Switzerland:** VS: Leuk, Platten (623 m) 1.viii.1998 8♂ 7♀, 3.viii.1998 2♂ 1♀ (all *Merz & Bächli*); Leuk, Rotafen (625 m) 10.viii.1997 1♂ (*Haenni & Merz*). ZH: Embrach, Haumüli (400 m) 10.vii.1997 1♂ (*Merz*).

26. *Hilara goetzei* Chvála, 2005

REFERENCES: Chvála (2005b: 100) – description and illustration of male fore leg, female hind tibia, and male postabdomen with genitalia.

DISTRIBUTION: Like the preceding *H. nigrita* a mountain species of temperate Europe, known so far only from the Slovak Carpathians (Malá Fatra Mts), the Austrian Alps and Swiss lowlands. Early summer species, from June to the middle of August, in the Alps mainly at lower altitudes between 350 and 650 m.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Totes Gebirge, St.Pankraz, River Steyer (600 m) 12.vi.2000 3♂ (holotype and paratypes), 24.vii.1997 2♂ 1♀, 6.viii.1998 9♂ 2♀, 2.vii.2001 1♂ (all paratypes), 27.vii.2005 common, swarms; Rossleithen, River Piessling (650 m) 8.vii.2001 1♂ (all *Chvála*). **Switzerland:** ZH: Embrach, Haumüli (400 m) 19.vi.1998 1♂, 10.vii.1997 1♂ (all *Merz*), 23.-29.vi.1998 2♂ (*Wolf*); Zürich, Ziegelhütte (460 m) 13.vii.1997 1♂ (*Merz*). GE: Dardagny, Rivière de Roulave (390–430 m) 11.viii.2000 1♀ (*Merz & Bächli*), 30.vi.2001 1♂; Dardagny, Le Moulin (360 m) 30.vi.2001 1♂ 1♀; Chancy, bord du Rhône, 28.vii.2002 1♂; Chancy, La Laire (350 m) 1.vii.2001 1♀ (all *Merz*).

27. *Hilara griseola* Zetterstedt, 1838

REFERENCES: Chvála (2005a: 87) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: A common and widely distributed species in northern Europe including Lapland, for a long period from May to September. A mainly northern species with a boreomontane type of distribution; absent on the British Isles, very rare in the Netherlands, and in temperate Europe only at higher altitudes and in mountains. An early spring species in temperate Europe, including the Alps, already in April. The species was very often misidentified in central parts in Europe.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Steyer River N of Hinterstoder (500 m) 24.v.2009 1♂ (*Chvála*). Styria: Admont (640 m) 2.-7.v.2008 8♂ 2♀; River Enns near Admont (620-640 m) 16.-22.v.2003 3♂ 5♀, 1.-16.vi.2000 1♂ 1♀; Hall near Admont 5.vi.1996 1♀; Haller Mauern, Oberlaussa (700 m) 24.v.2003 1♀; Gesäuse, Kaiserau (1100 m) 11.vi.1997 1♂ (all *Chvála*); Gesäuse 28.v.1890 6♂, Admont 25.vi 1♂ 1♀ (all *Strobl*). Carinthia: Villach 25.iv. 1♂ 1♀ (*Strobl*). **Switzerland:** GL: Linthal 9.vi.1913 1♂ 1♀ (*Oldenberg*). TI: Biasca, Loderio (350 m) 2.vi.1997 1♂ 2♀, 16.v.2006 1♂; Magadino, Quartino (205 m) 2.iv.2007 4♂ 6♀ (all *Merz*). VS: Leuk, Pfynwald (630 m) 25.v.1997 1♂. GE: Cartigny, Moulin de Vert (350 m) 22.iv.1999 1♀ (all *Merz*).

28. *Hilara planti* sp. n.

Figs 3-5

DIAGNOSIS: Rather a small to medium-sized (body 2.5 – 3.0 mm long) dull grey species closely resembling *H. griseola*. Frons and occiput dull grey, all hairs and bristles on body and legs black, haltere and palpus yellow; *acr* 2-serial, long, and few in number. Legs black, long and slender, without distinct setae, ♂ bt_1 long and rather slender, also t_3 in ♀ long, slender and unmodified.

DESCRIPTION:

Male. Head black, frons and face wide, face nearly square-shaped and almost silvery-grey dusted, the equally wide frons dull grey, similarly like vertex and occiput. All hairs and setae on head black, upper vertical and postocular setae long and fine, about as long as antennal style, the 2 pairs of ocellar and frontal setae clearly longer. Antennae black, style long and slender, as long as segment 3. Palpi uniformly yellowish-brown, very pale, covered ventrally with a few dark hairs, and a very long black preapical seta, which is as long as the short labrum, half length of head height.

Thorax dull dark grey, with all hairs and setae black; scutum viewed from in front uniformly grey, in anterodorsal view with two narrow dark lines between *acr* and *dc*, in dorsal and posterodorsal views sides almost dull blackish, the median line disappear, and the central area between *dc* setae almost brownish, similarly like scutellum. Large marginal setae including *h* and *ph* setae long and fine, 2 setae of the 4 *ntpl*, last 2 pairs of prescutellar *dc*, a *pa* seta, and the inner pair of 4 *sc* the longest, clearly longer than the 2 pairs of ocellar and frontal bristles on head; *acr* rather widely 2-serial (although the distance between the 2 rows is smaller than the distance between *acr* and *dc*), *dc* 1-serial, all fine and as long as antennal style, few in number, only 8-9 setae in one row. Pronotum on each side with a distinct seta about as long as antennal style, otherwise prothorax almost bare.

Wings very indistinctly brownish clouded, almost clear, with distinct dark veins, dark brown costal stigma, a long radial fork, and a long costal bristle as long as *pa* seta. Squamae very pale yellowish-brown with dark fringes, in some lights fringes are nearly pale. Haltere uniformly yellow.

Legs long and slender, fore coxae towards tip, and often also especially fore femur at least at base, translucent dark brownish, clearly paler than other parts. All hairs on legs blackish, longer setae practically absent, with the exception of a long diverging pair at tip of t_1 (see Fig. 3), a row of usual anterior setae (about 5) on f_1 , 1 or 2 long fine anteroventral setae on f_3 before tip, and about 4 dorsal setae on t_3 about as long as tibia is deep. Fore leg as in Fig. 3, bt_1 long cylindrical, nearly as deep as tibia and scarcely longer than its half-length, and tarsi on all pairs long, slender, and covered with short hairs only.

Abdomen dulled by brownish-black colour, although terga in some lights almost shining black; pubescence uniformly black, short, hind-marginal bristles fairly long but thin. Genitalia (Figs 4-5) small, covered with fine dark setae, lateral lamella with a slender apical process like in *H. griseola*, and hypandrium apically pointed and heavily sclerotized.

Length: body 2.5 – 3.0 mm, wing 3.6 – 3.8 mm (holotype body 3.0 mm, wing 3.8 mm).

Female. Very much like male in all main differential features including the length of bristling on head and thorax, but wings more distinctly brownish clouded. Legs long, slender and similarly short pubescent and with the same few setae as in male, only bt_1 is simple; t_3 is almost slender, and very indistinctly undulating in posterior view, not clearly curved. Abdomen uniformly subshining brownish-black, with all black hairs and hind-marginal setae smaller and finer.

Length: body 2.6 mm, wing 3.3 mm.

DIFFERENTIAL DIAGNOSIS: A species closely resembling *H. griseola*, differing by its generally smaller size (body only up to 3 mm long), but especially by the yellow palpi, and by the translucent brownish fore coxae and base of all femora. The female of *H. griseola* is generally larger-sized, about 3 mm long, the scutum is more dull brownish, but t_3 is similarly shaped and bristled.

Holotype ♂: **Switzerland:** TI: Biasca-Loderio 350 m, 7180/1375, 16.v.2006, leg. B. Merz (MHNG).

Paratypes. 4♂ and 1♀ with the same data as holotype (MHNG, 1♂ UMO).

DERIVATIO NOMINIS: This species is named in honour of the British dipterist Dr Adrian Plant of Cardiff, who added very much in the studies of the British and Mediterranean *Hilara* species.

DISTRIBUTION: Low altitudes in southern Switzerland, a spring species.

29. *Hilara crossleyi* sp. n.

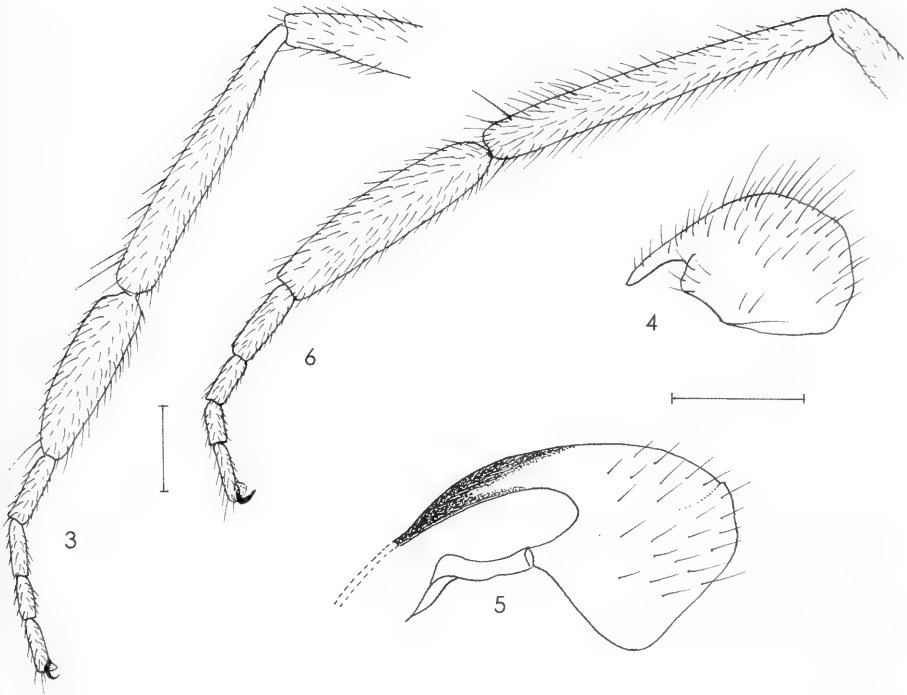
Fig. 6

DIAGNOSIS: A medium-sized (body 3 – 4 mm long), dull dark grey species with long, slender and uniformly black legs; frons and occiput dull grey, haltere yellow. Abdominal pubescence whitish, but all thoracic setae black, long and thin, *acr* 2-serial, and few in number.

DESCRIPTION:

Male. Head dull dark grey, uniformly dusted on both very wide frons and face, and on occiput. Long setae on head black and thin, but lower part of occiput below neck with whitish hairs; the two pairs of ocellar and frontal setae unusually long, much longer than antennal style, postvertical and upper postocular setae much shorter. Antennae black, style long and slender, two-thirds length of segment 3. Palpi black, light greyish pollinose, and ventrally covered with fine black hairs, preapical seta very long. Labrum long, not much shorter than head is high, porrect labium even slightly longer.

Thorax including pleura uniformly dull grey, scutum when viewed from above brownish-grey, leaving scutellum and notopleural depression greyish; scutum in frontal and anterodorsal views with a wide median darker line on *acr* setae, in dorsal view



FIGS 3-6

Hilara planti sp. n. ♂ (CH, TI: Biasca-Loderio, paratype). (3) Fore leg in posterior view. (4) Lateral genital lamella. (5) Hypandrium with postgonite. - *Hilara crossleyi* sp. n. ♂ (CH, TI: Biasca-Loderio, holotype). (6) Fore leg in posterior view. Scale: 0.2 mm.

the central stripe nearly disappears, but there are two broad lateral faint darkened stripes outside of *dc* setae. All thoracic setae thin, *h* and *ih* setae small, *ph* and 3 *npl* setae long and stouter, but the longest are the last pair of prescutellar *dc*, a *pa* seta, and the inner pair of 4 *sc*; *acr* in 2 widely separated rows, *dc* 1-serial, and as in *H. griseola* and *H. planti* all nearly as long as antennal style, thin and few in number. A very fine small black seta on each side of pronotum, otherwise prothorax practically bare.

Wings faintly brownish clouded, not at least clear, with blackish veins, a long acute radial fork, and a long costal bristle. Squamae yellowish-brown with whitish fringes, haltere yellow.

Legs long and slender, uniformly black coloured and finely greyish pollinose, subshining in some points of view. All hairs and a few setae black; *f*₁ posteriorly with dense black hairs about as long as femur is deep when viewed from above, similar but shorter dense pubescence also on *t*₁ posteroventrally; *f*₂ with the usual anterior setae, but *f*₃ covered mostly with short hairs; *t*₁ with tarsus as on Fig. 6, *bt*₁ not clearly stouter than tibia, long but only short pubescent, similarly like the following tarsomeres, which are clearly shorter than in the related *H. planti*, tarsus is at most as long as *bt*₁; posterior four tibiae and tarsi long, very slender, covered with only short hairs, *t*₃ dorsally with only 2 or 3 long setae still shorter than tibia is deep.

Abdomen uniformly dark grey dusted, basal segment covered with whitish hairs becoming brownish on mid segments, posterior terga almost dark pubescent; also hind-marginal bristles on terga light brownish on basal segments, blackish posteriorly. Genitalia small, covered with short dark hairs, not dissected on the single holotype male available, but lateral lamella clearly with the same long, rather slender apical process as in *H. planti*.

Length: (holotype) body 4.0 mm, wing 4.5 mm.

Female. Very much like male but smaller, head and thorax with the same long black setae, but wings still more brownish. Legs long and slender, f_1 posteriorly with shorter black pubescence scarcely as long as femur is deep when viewed from above, and t_1 with only short hairs posteriorly; tarsi simple, unmodified, and t_3 quite simple and slender, not curved, dorsally with only a few short setae slightly longer than other short hairs.

Length: body 3.0 – 3.2 mm, wing 3.3 – 4.2 mm.

DIFFERENTIAL DIAGNOSIS: A species of the *H. griseola*-complex, differing from other species of this complex by the whitish pubescent abdomen, brownish clouded wings, the ♂ by the densely longer pubescent f_1 and t_1 posteriorly, and ♀ by the quite simple, slender unmodified t_3 . This new species has been collected together with the preceding *H. planti* sp. n. on the same day and at the same site.

Holotype ♂: **Switzerland:** TI: Biasca-Loderio 350 m, 7180/1375, 16.v.2006, leg. B.Merz (MHNG).

Paratypes: 5 ♀ with the same data as holotype (MHNG, 2 ♀ UMO).

DERIVATIO NOMINIS: This species is named in honour of the British dipterist Dr Roy Crossley, who added very much in our knowledge of the Yorkshire empidid fauna.

DISTRIBUTION: Low altitudes in southern Switzerland, a spring species.

30. *Hilara tiefi* Strobl, 1892

Figs 7-8

REFERENCES: Chvála (2004: 131) – lectotype designation.

DIAGNOSIS: A small, body about 2 – 2.5 mm long, uniformly dull grey species even on occiput and scutum, and *acr* 2-serial, few in number; all hairs and setae on body and legs black. Legs short, black, ♂ bt_1 unusually large and stout, longer than t_1 , ♀ t_3 slightly thickened.

REDESCRIPTION:

Male. Head uniformly dull dark grey, also on occiput, only face lighter greyish dusted; frons very wide, as deep above antennae as antennal segment 3 at base, and still triangularly widening above. All hairs and setae on head black, a pair of ocellar and frontal bristles very long and stout, at least as long as antennal segment 3 without style, upper postocular bristles clearly shorter, of half-length. Antennae black, style fairly long, at least of three-quarters length of segment 3. Palpi dull grey, ventrally before tip with a strong black bristle at least as long as ocellar and frontal setae. Labrum very short, scarcely of half-length of head height.

Thorax uniformly dull bluish-grey, pleura slightly lighter grey, and scutum with an indistinct brownish colouration on the lines of *acr* setae. All hairs and bristles on

thorax black: *acr* in 2 distant rows, *dc* uniserial, all nearly as long as antennal style and few in number, less than 10 setae in one row; a *h* and *ih* bristle not much longer, one *pa* and usually 2 *npl* longer and stronger, as long as outer pair of 4 *sc*, of these the inner pair very long, nearly twice as long, last pair of prescutellar *dc* shorter; pronotum with a small black bristle on each side.

Wings almost clear with dark brown veins, radial fork long and of usual *Hilara*-like shape, anal vein invisible; squama brownish with pale fringes, as are the hairs along the base of wing below. Haltere uniformly blackish.

Legs uniformly subshining blackish-brown, only finely silvery pilose also on coxae; fore leg (Fig. 7) very short and stout, short pubescent, only femur and tibia with a row of fine, very short setae dorsally; t_1 unusually stout, widening towards tip, and bt_1 (Fig. 7) unusually long, as deep as tibia at tip, but clearly longer; posterior four femora and tibiae much more slender: f_2 with about 5 long anterior setae, otherwise legs only short pubescent, except for rows of fine black setae dorsally on f_3 and t_3 ; tarsi on posterior two pairs rather long and very slender, all tarsomeres clearly longer than deep, especially basitarsi are long, and all are covered with short hairs only.

Abdomen more subshining brownish in contrast to the dull grey thorax, only finely greyish pollinose, with all hairs and setae blackish; hind-marginal bristles on terga long. Genitalia (Fig. 8) rather large, especially the laterally flattened circular hypandrium large; genitalia were not dissected, but the long oblong lateral sclerite (Fig. 8, above in front of the circular hypandrium) looks like if the usual apical process is not clearly separated, or it is completely absent.

Length: body 2.0 – 2.5 mm, wing 2.5 – 3.0 mm.

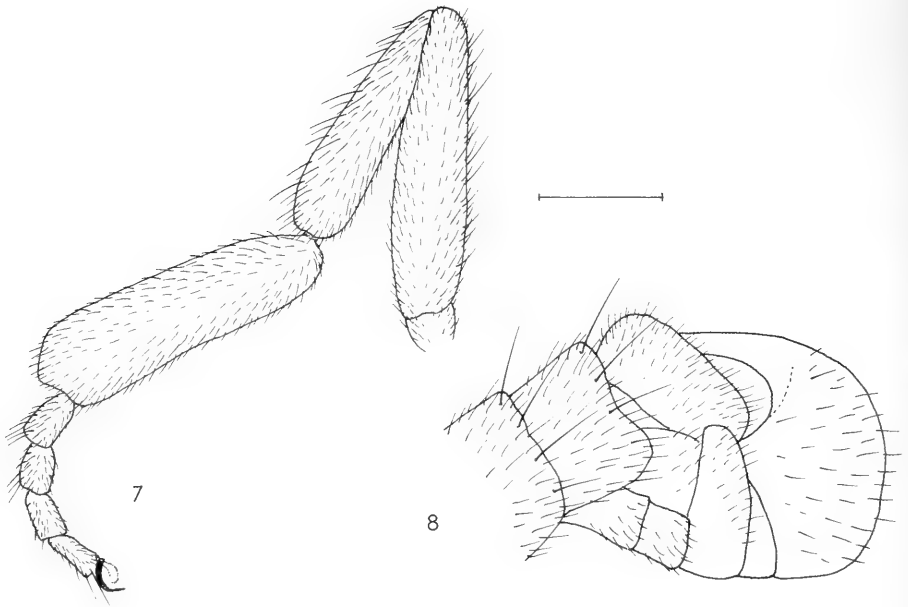
Female. Head, thorax and wings as in male, perhaps veins on wing slightly paler, less distinct. Legs uniformly slender, as well fore tarsi long and slender, with all tarsomeres at least slightly longer than deep; t_3 slightly dilated, as deep as the corresponding femur, viewed from behind slightly curved at middle, and dorsally, similarly like femur, covered with a row of slightly longer black bristly hairs. Abdomen subshining brownish, dissimilar in comparison with the dull grey thorax, and covered with only very fine, short, and rather paler hairs, hind-marginal bristles on terga missing.

Length: body 2.1 – 2.5 mm, wing 2.6 – 3.0 mm.

DIFFERENTIAL DIAGNOSIS: This Alpine species is very characteristic by its small size, the uniformly dull greyish head (including occiput) and thorax, the less numerous 2-serial *acr*, and the male by the extremely large and stout bt_1 , clearly the greatest enlargement within the European *Hilara* species. The unusually enlarged male bt_1 may be compared in the Alps only with the high Alpine *H. sartor*. This species, distributed in much lower Alpine biotopes, should be compared also with *H. goetzei*, but the latter is generally a darker species both on thorax and abdomen, with much smaller bt_1 in male, and clearly more slender t_3 in female.

DISTRIBUTION: An endemic Alpine species, locally very common in June above swift flowing streams at altitudes between 600 to 1000 m. Mainly in June, the only finding in the beginning of August in the Styrian Gesäuse may well be an exception, or a locality date error of Strobl in 1891.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Steyer River N of Hinterstoder (500 m) 24.v.2009 1♂ 1♀ (*Chvála*). Styria: Gesäuse, Ennsand 28.v.1890 1♂ (lectotype); Gesäuse



FIGS 7-8

Hilara tiefii Strobl ♂ (A, Styria, Gesäuse). (7) Fore leg is posterior view. (8) Postabdomen. Scale: 0.2 mm.

1.viii.1891 1♂ 2♀, 16.vi.1893 1♂ (all *Strobl*); Ennstal, Hall near Admont (640 m) 5.vi.1996 common, 16.vi.2000 2♂ 2♀; Zirnitz near Admont, Schwarzenbach (730 m) 9.vi.1996 common, 30.vi.2005 1♀; Ennstaler Alpen, Oberlaussa, Polzanbach (850 m) 18.vi.2000 1♀; Gesäuse, Johnsbach (900 m) 8.vi.1996 1♂ (all *Chvála*). **Switzerland**: GR: Andeer, Clugin (980 m) 17.vi.1994 3♂ (*Merz*). **Slovenia**: Julian Alps, River Bistrica, Slap Perinik (775 m) 19.vi.2006 2♂ (*Plant*).

31. *Hilara perversa* Oldenberg, 1916

REFERENCES: Chvála (2002a: 76) – description and illustration of antenna and male fore leg.

DISTRIBUTION: This species with unusually stout fore femora, is the only western Palaearctic species with “raptorial”-like fore legs. It was described from the Carpathians, the Slovak Vysoké Tatry Mts, later found by Niesiolowski & Krysiak (1996) also on the Polish side of Tatra Mts, and by Ceianu (1992) in the Romanian mountains. The species has not yet been found elsewhere, but its occurrence in the Alps is possible.

MATERIAL EXAMINED: **Slovakia**: Vysoké Tatry Mts: Starý Smokovec, 25.-30.vii.1901 2♂ 6♀ (holotype and paratypes); Studenovodská dolina 31.vii.1901 1♂ 1♀ (*Oldenberg*). Kremnické vrchy Mts: Turček 9.viii.1970 1♂ 1♀ (*Straka*). **Romania**: Munti Calimani, Lunca Bradului 15 km N (1000 m) 13.vii.1988 1♂ (*Mocek*).

Group 5 – *H. litorea*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 89 and 2008a: 58).

32. *Hilara litorea* (Fallén, 1816)

REFERENCES: Strobl (1892a: 161 as *litorea*), Collin (1961: 668) and Chvála (2005a: 89) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: A widely distributed and common species in Europe, known from central parts of Fennoscandia south to France, the Alpine regions, east to Bulgarian Pirin Mts (1760 m). In warm temperate Europe mainly at higher altitudes and in mountains, sometimes above 2000 m. A characteristic summer and late summer species, mainly in July, August and to the middle of September, although sometimes already in June. Very common in the Alps, correctly recognized by Strobl (1892a, 1893, 1910) in the Austrian Alps, in Ennstaler Alpen, Rottenmanner Tauern and the Seetaler Alpen.

MATERIAL EXAMINED: **Austria:** Styria (Haller Mauern, Gesäuse, Ennstal, Rottenmanner Tauern, Seetaler Alpen); Salzburgland (Gastein); common from 26.vii. to 19.ix. at altitudes about 600-1000 m. **Switzerland:** SG (Unterwasser), GR (Valbella, Zernez, Scuol, Lenzerheide, Grono), TI (Airolo, Angone), VS (Oberwald, Visperterminen), ZH (Sihlbrugg, Glattfelden, Zürich); common from 29.vi. to 10.ix., at altitudes from 350 to 2300 m. **France:** Haute-Savoie, Pormenaz (1700-2200 m) 8.-31.vii.2003 MT 1 ♂ (*Castella & Speight*).

33. *Hilara pseudosartrix* Strobl, 1892

REFERENCES: Chvála (1997c: 314) – synonymy and redescription, Chvála (2005a: 91) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: A widely distributed species, known from the end of April to the middle of May. In the north from the south of Norway (Chvála, 2005a) and Scotland (Plant, 1998) only, and at scattered localities from the Netherlands and Poland south to the Alpine region and Hungary. Described from the West Carpathians (Velká Fatra Mts) by Straka (1976) as *H. subcalinota*. In the collections often misidentified as *H. calinota* Collin; for instance, Strobl had in his collection under *H. pseudosartrix* a pair of *H. calinota*, collected by him in the Styrian Gesäuse on 16 June. In temperate Europe everywhere rather a rare species, distributed mainly in hilly countrysides, in the south in mountains. In contrast to many other species of the genus *H. pseudosartrix* may be found sometimes far away from water in forest clearings or along foodpaths in deciduous forests where males are swarming, often in large numbers. Apparently an overlooked species maybe because of its very early spring occurrence and its unusual behaviour.

MATERIAL EXAMINED: **Austria:** Styria: Trieben, Graben 28.v. 1 ♂ (lectotype); Gesäuse 2 ♂ (all Strobl); Admont, Saugraben (830 m) 27.v.2003 1 ♂ (*Chvála*). **Switzerland:** ZH: Sihlbrugg (670 m) 25.iv.1994 1 ♂, 2.v.1994 1 ♂ (*Rüegg*); Zürich, Katzenssee (440 m) 3.v.1997 3 ♂; Zürich, Ziegelhütte (460 m) 10.-11.v.1999 5 ♂; Zürich, Allmend (430 m) 6.v.1998 2 ♂; Zürich, Zürichberg (650 m) 15.-18.v.1997-98 2 ♂ 1 ♀; Zürich, Waldgarten (500 m) 5.-24.v.1996 2 ♂; Embrach, Haumüli (400 m) 30.iv. 2 ♂, 5.-25.v.1998 4 ♂ 3 ♀ (all *Merz*). VS: Raron, Heidnischbiel (700-770 m) 26.v.1999 1 ♀ (*Merz*). **Italy:** AO: Aosta, St. Vincent, Salirod (1080 m) 14.v.2006 1 ♀ (*Haenni*).

34. *Hilara sartor* Becker, 1888

Figs 9-11

SYNONYM: *Hilara sartrix* Becker: Handlirsch (1889), and authors (lapsus).

DIAGNOSIS: A medium-sized, body about 2.5 – 3.5 mm long, uniformly rather light dull grey dusted species, with dull grey occiput, irregularly 2- (anteriorly) to 4-serial (posteriorly) *acr*, clear wings and black haltere. Legs yellowish usually only at base of fore leg, though legs often extensively darkened; ♂ *bt*₁ unusually large and dilated, as long as *t*₁, ♀ *t*₃ simple and slender.

REDESCRIPTION:

Male. Head uniformly dull grey on face, frons and occiput, face not wider than frons below, frons slightly widening above and width as usual in the genus. All setae on head black and fine, the two pairs of ocellar and frontal bristles equally long as upper occipital, all about as long as antennal style. Occiput dull grey, not shining from any point of view, covered with whitish hairs below neck. Antennae black, style long, scarcely shorter than segment 3. Palpi black, silvery-grey pollinose, beneath with fine whitish hairs, but the preapical ventral seta black, about as long as the short labrum which is half-length of head height.

Thorax uniformly dull rather light grey including pleura, somewhat bluish-grey, and scutum practically unstriped. All setae black (including small anterior notopleural setae), *acr* and *dc* fine and small, shorter than antennal style, *acr* almost regularly 2-serial in front, becoming irregularly 3- to 4-serial posteriorly; *dc* 1-serial, scarcely longer, and all rather numerous, about 12 to 13 setae in one row; large marginal setae long and fine, in full number, inner pair of 4 *sc* the longest, but also the *h* and *ih* bristle fairly long.

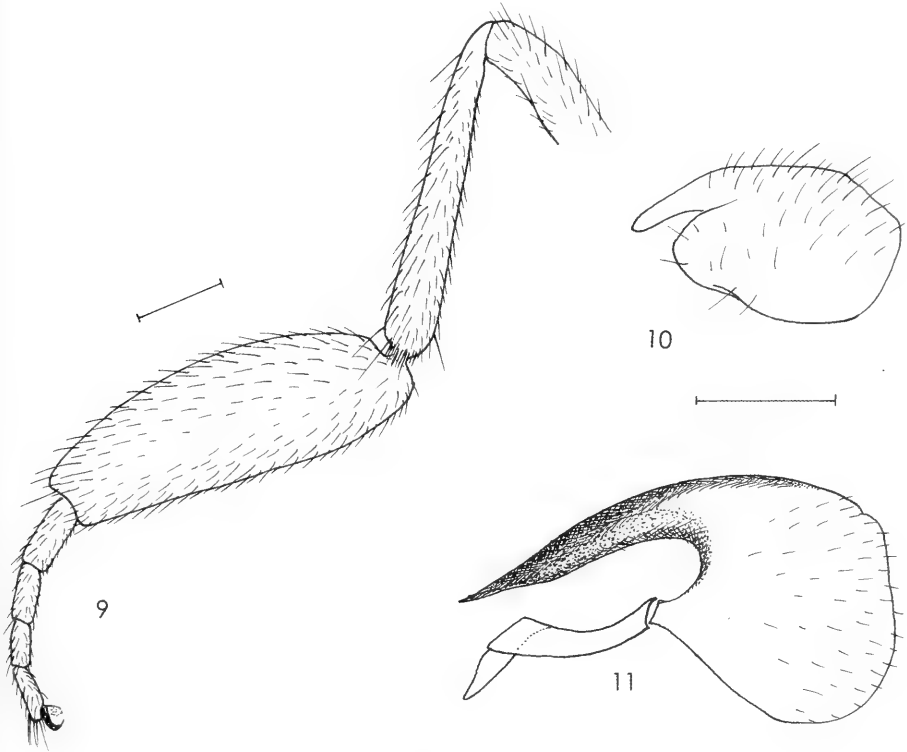
Wings almost clear, faintly brownish infuscated anteriorly towards base, veins brownish-black, a long narrow radial fork, and a distinct black costal bristle. Squamae very pale with white fringes; haltere black, but stalk clearly yellowish.

Legs long and slender, and covered with only sparse, fine long black setae. Legs in general very dark, blackish to blackish-brown, usually *cx*₁ towards tip and base of *f*₁ yellowish, also trochanters are clearly yellow, especially on fore leg, as well as all "knees". All femora very slender, short pubescent, but all with 1 or 2 longer antero-ventral preapical setae, *f*₂ with only 2 or 3 long anterior setae; also tibiae covered with short hairs, only apical setae are longer; *bt*₁ (Fig. 9) unusually large and thickened, as long as tibia, and covered with short hairs only, rest of tarsus much shorter; posterior four tarsi long and very slender, all tarsomeres much longer than deep.

Abdomen uniformly dull grey, concolorous with thorax, covered with rather long, dense, whitish to whitish-yellow hairs, and also fine hind-marginal bristles are very pale. Genitalia (Figs 10-11) small, subshining black and almost bare; hypandrium narrowed and pointed apically, though not as long and slender as in *H. pseudosartrix*, and lateral lamella bears a distinct long terminal process (without apical process in *H. pseudosartrix*).

Length: body 2.6 – 3.5 mm, wing 3.2 – 4.0 mm.

Female. Very much like male in all details, including the pubescence and bristling on head, thorax and legs. Also wings almost clear, with distinct dark veins, a long radial fork, and a faint brownish stigma. Legs often almost uniformly blackish, *cx*₁ scarcely yellow towards tip, and fore tarsus long and slender, two-thirds length of corresponding tibia. Abdomen as in male, similarly light greyish dusted and whitish pubescent, only hind-marginal bristles inconspicuous.



FIGS 9-11

Hilara sartor Becker ♂ (A, Styria, Rottenmanner Tauern, Bösenstein). (9) Fore leg in posterior view. (10) Lateral genital lamella. (11) Hypandrium with postgonite. Scale: 0.2 mm.

Length: body 2.5 – 3.0 mm, wing 3.5 – 3.8 mm.

DIFFERENTIAL DIAGNOSIS: Although *H. sartor* is the only so-called “balloon-fly” in the Palaearctic region, therefore frequently mentioned in the literature (often under the false name *Hilara sartrix* Becker), no redescription after the brief original description of Becker (1888) has been published until now. The species needs comparison especially with the closely related *H. pseudosartrix* Strobl, differing mainly by the dusted grey vertex and occiput (dull black in *H. pseudosartrix*), the blackish-grey palpi (yellow in *H. pseudosartrix*), the uniformly dull bluish-grey scutum and scutellum (with a dark brownish-black pattern in *H. pseudosartrix*), and by the ♂ genitalia, which are particular in *H. pseudosartrix* with their very long, apically narrowed sickle-shaped hypandrium. Both these species possess the unusually enlarged, swollen ♂ bt_1 , often even longer than the corresponding tibia, and t_3 in ♀ is in both species unmodified, simple and slender.

DISTRIBUTION: An endemic Alpine species. A late summer species occurring at suitable biotopes in large swarms of males at altitudes above 1000 m, only exceptionally (Leuk in Switzerland) collected at only 650 m. Although there exists an extensive

literature dealing with its unusual epigamic behaviour at high mountain altitudes, the species has not been fully redescribed and illustrated since its rather brief description of Becker (1888) from Gastein in Austria and the monograph of Engel (1941: 270). The species was often mistakenly named by subsequent authors as *Hilara sartrix* Becker due to the error of Handlirsch (1889).

MATERIAL EXAMINED: **Austria:** Styria: Rottenmanner Tauern, Bösenstein (1750 m) 10.-14.ix.2006 swarms, 23.ix.2006 1♂ 1♀, 1.viii.2007, 2.viii.2003, 18.ix.2004 swarms; Schladminger Tauern, Sölkpass (1900 m) 24.viii.2001 11♀ (all *Chvála*); Donnersbachwald (1600 m) viii-x.1999 MT 1♂ (*Barták*). Tyrol: Obergurgl Ötztal 3.-6.viii.1962 1♂ (*Lindner*); Gastein (No 14733) 1♂ (*Becker*). **Switzerland.** GR: Ausserferrera, Cresta (1300-1670 m) 28.viii.-1.ix.2006 17♂ 25♀; Lenzerheide (2000 m) viii.2000 MT 5♂ 3♀; Lenzerheide, Talstation Rothornbahn (1500 m) 8.ix.2000 1♂ (all *Merz*); St. Moritz 9.viii.1934 2♂ (*de Meijere*); Il Fuorn, W du labo[ratoire] (1780 m) 8.viii.1982 1♀ (*Haenni*). VS: Vispertermenin, Rothhorn (2250 m) 26.viii.2001 1♀ (*Merz & Landry*); Vercorin (1600 m) 26.viii.2007 6♂; Grimselpass, Totesee (2200 m) 8.viii.2006 1♂; Leuk, Finges (650 m) 9.viii.1997 4♂ (all *Haenni*). TI: Bodio, Bidrè (970-1050 m) 14.-26.viii.1988 3♂, (1100-1300 m) 24.viii.1988 1♂ (all *Haenni*). **France:** Haute-Savoie, Pormenaz (1700-2200 m) 8.-31.vii.2003 MT 2♂, 1.-15.viii.2003 MT 8♂ 9♀ (all *Castella & Speight*). **Italy:** Stelvio 7.viii.1909 1♂ (*Oldenberg*).

35. *Hilara galactoptera* Strobl, 1910

REFERENCES: Collin (1961: 666), Chvála (2005a: 99) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: From the British Isles including Scotland, the Netherlands, but not yet found in Scandinavia, south through mild temperate central Europe to France and the Alpine region, where it is a typical species in mountains up to 1000 m. A spring and early summer species, in the Alps mainly in May and June.

MATERIAL EXAMINED: **Austria:** Styria: Gesäuse 5.vi. 3♂ (lectotype and paralectotypes); Admont 2♂ 2♀ (all *Strobl*); Haller Mauern, Ziernitz (680 m) 9.vi.1996 2♂; Oberlaussa (700 m) 24.v.2003 1♂; Hieflau, Waggraben (600 m) 24.v.2003 2♂ 2♀; Admont, River Enns (620 m) 25.v.2003 1♂ 3♀; Admont, Saugraben (830 m) 19.vi.2000 1♂ 1♀ (all *Chvála*). **Switzerland:** BE: Ostermundigen, Rüti (640 m) 24.v.2003 1♂; Mt. Raimeux, Corcelles (650-950 m) 2.vi.2003 1♂ (all *Merz*). ZH: Sihlbrugg (670 m) 2.-14.vi.1994 2♂ 4♀ (*Rüegg*). VS: Branson, Follatères (800 m) 9.vi.2004 1♂ (*Haenni*). **France:** Drôme, Col de Tourniol (1050 m) 26.v.2006 17♂ 2♀ (*Barták*).

36. *Hilara morata* Collin, 1927

REFERENCES: Collin (1961: 652), Chvála (2005a: 100) – description and illustration of male fore leg, hind basitarsus, postabdomen and genitalia.

DISTRIBUTION: Very rare in southern Scandinavia, from the British Isles south to northern Spain (Catalonia), in central parts of Europe south to the Alpine region and eastwards to Romania; only exceptionally common or in large numbers. In temperate Europe for a long period in summer, from June to August, both in lowlands and at higher altitudes.

MATERIAL EXAMINED: **Austria:** Styria: Weissenbach bei Liezen (700 m) 8.vii.2002 1♀; Woerschbach Klamm (650 m) 8.vii.2002 2♂ (all *Chvála*). **Switzerland:** SZ: Gersau, Oberholz (550 m) 13.viii.1981 1♂ (*Rezbanayai*). GE: Cartigny, Moulin de Vert (350 m) 5.vi.2006 5♂ 7♀ (*Merz*). **Italy:** BZ: Bozen, 11.vii.1911 1♂ (*Oldenberg*). **Slovenia:** Julian Alps, Planinska Jama (800 m) 20.vi.2006 1♂ (*Plant*). **France:** Pyrenees, Can Baills, 10 km SW Thuir (610 m) 11.vi.2007 1♀ (*Merz*).

37. *Hilara splendida* Straka, 1976

REFERENCES: Chvála (1999c: 212) – description and illustration of male fore leg, hind basitarsus, postabdomen and genitalia.

DISTRIBUTION: Central European species, known from both lowlands and mountains, in the Alps also rarely above 1000 m. This species, very characteristic by its very narrow frons in male, and the long bristled hind basitarsus, has been known until now only from the Czech Republic, Slovakia, Hungary, the Alpine region, and eastwards to Romania. However, it was recently found also more southwards, in the Greek Peloponnesus at Lakonia, Taiyetos Oros, 8 km WSW Tripl (1100 m) 11.vi.1990 1♂ 1♀ (*Haenni & Dufour*, MHNN). In the Alps from the end of May to the middle of August, but mainly in June.

MATERIAL EXAMINED: **Austria:** Oberösterreich: St. Pankraz, River Steyer (490 m) 24.vi.2002 12♂, 26.vi.2005 1♂, 2.vii.2001 1♂; Rossleithen, River Piessling (650 m) 8.vii.2001 1♂ (all *Chvála*). Styria: Admont (640 m) 13.-15.vi.1997 6♂, 25.-28.vii.1997 21♂ 3♀, 17.vi.2007 1♂, 1.vii.2002 1♀, 11.vii.2008 1♀; Admont, Saugraben (700-780 m) 23.vi.2007 1♂, 28.vi.2005 2♂, 3.vii.2001 and 7.vii.2002 common, 22.vii.2007 2♂; Admont, Kematengraben (850 m) 12.viii.1998 2♂; Gesäuse Eingang, River Enns (620 m) 25.v.2003 1♂, 2.vii.2002 3♂ 2♀; Haller Mauern, Mühlauerbach (750-850 m) 3.vii.2002 1♂, 11.viii.1998 1♂ 1♀; Ennstaler Alpen, Pyhrn, Pyhrnbach (850 m) 30.vi.2002 1♂; Pyhrnpass, Kalkofen (1100 m) 24.vi.2007 1♂; Weissenbach bei Liezen (700 m) 8.vii.2002 7♂ 1♀ (all *Chvála*). **Fürstentum Liechtenstein:** FL: Schaan, Schwabbrünnen (440 m) 7.viii.1997 1♀ (*Merz*). **Switzerland:** ZH: Zürich, Höngerberg (400 m) 18.vi.1996 1♂, (530 m) 9.vi.1998 1♂; Zürich, Ziegelhütte (460 m) 29.vi.1997 3♂ 1♀; Zürich, Waldgarten (460 m) 7.vi.1997 1♂; Embrach, Haumüli (400 m) 11.vi.-10.vii.1997 3♂ 1♀ (all *Merz*). GE: Cartigny, Moulin de Vert (350 m) 5.vi.2006 1♂ (*Merz*). **Slovenia:** Julian Alps, Planinska Jama (800 m) 20.vi.2006 1♂; abor, River abranca (280 m) 15.vi.2006 1♂, (330 m) 3♂; Dsilnica, River Kolpa (240 m) 15.vi.2006 2♂ (all *Plant*). **France:** Pyrenees, Can Baills, 10 km SW Thuir (610 m) 11.vi.2007 4♂ 2♀ (*Merz*); Savoie, Brides 15.-20.vii.1927 1♂ (*Naville*).

38. *Hilara tenella* (Fallén, 1816)

REFERENCES: Chvála (2005a: 104) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: Very rare in the north of Europe, although described from Sweden; the province Skåne in southern Sweden is still the only Scandinavian locality known; rare in the Netherlands and on the British Isles, but abundant along large rivers in central parts of Europe from Germany south to the Mediterranean (Chvála, 2008a: 60). Only at lower altitudes in Switzerland, up to 650 m, for a long period from the end of May to the beginning of August, though mainly in June.

MATERIAL EXAMINED: **Switzerland:** BE: Gampelen (430 m) 22.vi.1972 1♂ (*Haenni*). TI: Gordola, Bolle (220 m) 17.-19.vi.1995 1♂ 1♀ (*Merz & Bächli*), (205 m) 6.vii.2001 1♂ 2♀ (*Merz*). VS: Baltschieder, Kumme (650 m) 24.vi.2000 2♂; Leuk, Rotafen (620 m) 10.viii.1997 1♂, Leuk, Platten (625 m) 30.v.2002 1♂ (all *Merz*), same locality 8.vi.2001 1♂ 1♀; Leuk, Pfynwald (600 m) 7.vi.2001 1♂ (all *Merz & Landry*). **France:** Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 1♂ 2♀ (*Barták*).

39. *Hilara platyura* Loew, 1873

Fig. 13

REFERENCES: Collin (1961: 660), Chvála (2005a: 93) – description and illustration of male fore leg, postabdomen, genitalia, and wing venation.

DISTRIBUTION: A widely distributed species in Europe, from England and southern Scandinavia south to France, and along the Mediterranean coast east as far as the Turkish Antalya Province (Chvála, 2008a: 64). A typical summer species, everywhere rare, in temperate Europe from June to August, absent in high mountains.

MATERIAL EXAMINED: **Switzerland:** SG: Betlis, Walensee (450-520 m) 24.-25.vi.1995 1 ♂ 3 ♀ (*Merz & Eggenberger*). GE: Bernex, Saule (440 m) 19.vi.2008 1 ♀ (*Merz*); Corsier-Port, vitre véranda, 24.vi.2003 1 ♀ (*Besuchet*).

40. *Hilara leukensis* sp. n.

Figs 12, 14-16

DIAGNOSIS: Small, body about 2.5 mm long, light greyish dusted species with dull grey frons and occiput, *acr* 4-serial, small and numerous, wings clear, abdominal pubescence and haltere pale. Very much like *H. ternovensis* Strobl, 1898 (= *H. griseifrons* Collin, 1927), but haltere clear yellow, and legs devoid of distinct bristles. Fore basitarsus in ♂ distinctly dilated, and hind tibia in ♀ unmodified, simple and slender.

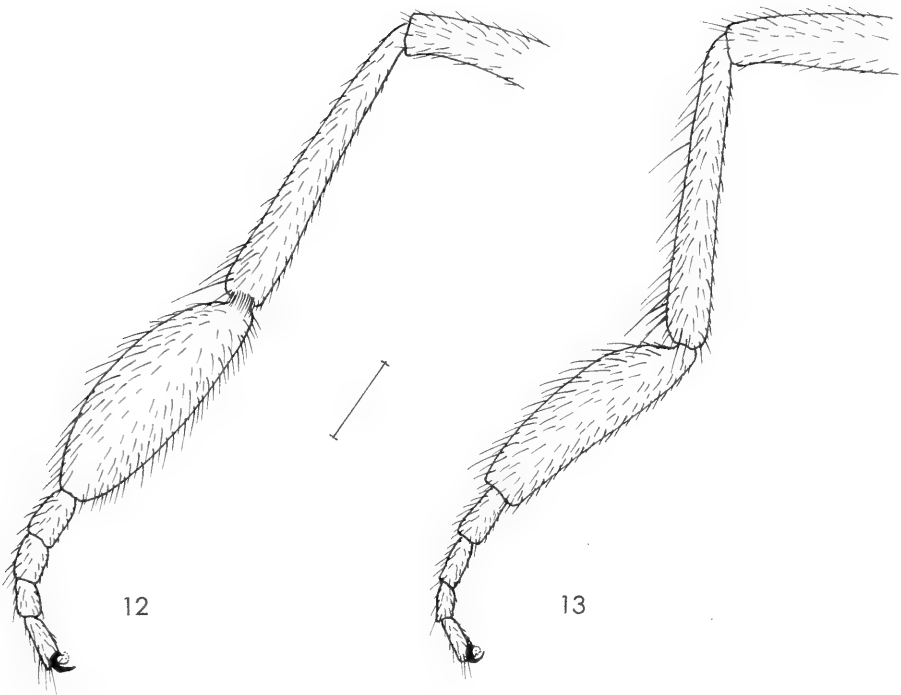
DESCRIPTION:

Male. Head uniformly dull, rather light grey dusted, occiput not black from any point of view. Frons and face wide, large bristles on head black, long and rather thin: a pair of ocellar and frontal bristles equally long, as long as a ventral preapical bristle on palpus, upper occipital postocular bristly hairs and vertical bristles nearly of half length. Hairs on lower part of occiput below neck shorter and paler, brownish. Antennae black, style long, of about 3/4 length of 3rd segment. Palpi black, densely light grey dusted, ventrally with small, fine dark hairs, a long thin preapical bristle, and another shorter one near base. Labrum short, scarcely half as long as head is high.

Thorax dull slate greyish, although scutum when viewed from in front distinctly brownish, when viewed from above greyish on a broad middle stripe and on scutum, and there are 2 very indistinct, narrow darker lines between rows of *acr* and *dc* bristles; former widely regularly 4-serial, latter 1-serial, all small and fine, numerous, *dc* ending in 2 longer prescutellar pairs. Other large thoracic setae black but very fine, *h* and *ih* setae small, as long and strong as a lateral pair on pronotum, *ph* seta longer and stronger, not much shorter than 2 *ntpl*, *sa* and *pa* smaller, and 2 pairs of *sc*, inner pair very long, at least twice as long as outer pair. Prothorax (sides of prosternum and episterna) practically bare, and only a fine bristle on each side of pronotum. Spiracles blackish.

Wings quite clear, iridescent, practically no stigma, and all veins dark; radial fork of usual shape, not at least acute as in *H. platyura*. Costal bristle black, as long and strong as a *pa* seta. Squama dirty grey with blackish posterior margin, fringes long, pale. Haltere uniformly pale yellow, only extreme base of stalk brownish.

Legs uniformly black, only "knees" narrowly contrasting whitish; coxae dull grey like thoracic pleura, covered with pale hairs, the sparse longer bristling darkened. Otherwise legs slightly subshining, with very indistinct greyish pollinosity, and all parts covered with short inconspicuous hairs, except for 3 to 4 anterior bristles on *f*₂; tibiae also without dorsal or preapical bristles. Tarsi with all tarsomeres at least slightly longer than deep, short pubescent, *bt*₁ (Fig.12) very enlarged, at least three-quarters length of tibia, and usually in dried pinned specimens flattened, and consequently more than twice as deep as tibia at tip.



FIGS 12-13

Hilara leukensis sp. n. ♂ (CH, VS: Leuk, Pfynwald, paratype). (12) Fore leg in anterior view. - *Hilara platyura* Loew ♂ (CZ, Moravia, Lednice). (13) Fore leg in posterior view. Scale: 0.2 mm.

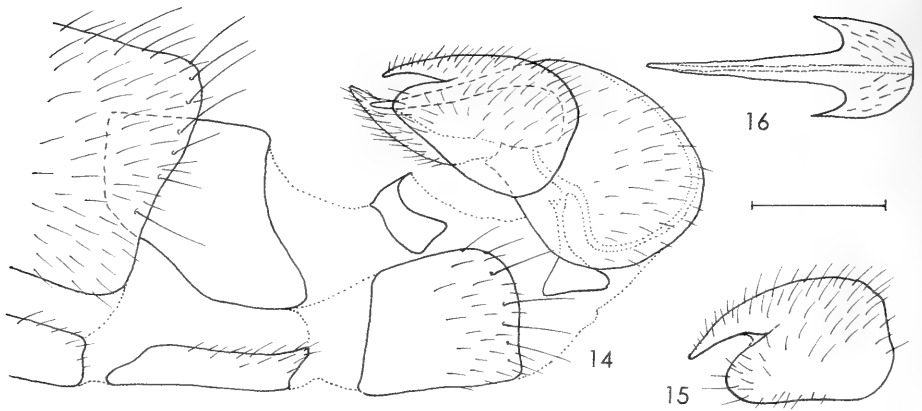
Abdomen when viewed from above darker than thorax, more brownish black coloured, dull, fine greyish dusting denser on sterna only; terga short but densely pale pubescent, darker brown on posterior segments, hind-marginal bristles black, well-developed on all terga, fine and fairly long, though not longer than following segment is wide. Genitalia (Figs 14-16) concolorous with abdomen, covered with dense, minute dark hairing; hypandrium small, somewhat subshining, apical part long and simple, very slender (Fig. 16).

Length: body 2.2. - 2.8 mm, wing 3.0 - 3.5 mm, holotype body 2.8, wing 3.3 mm.

Female. Head, thorax and wings as in male. Legs similarly subshining black except for paler "knees" and dull grey coxae, unmodified, and devoid of distinct bristles as in male; fore basitarsus very narrow, half as long as tibia, and hind tibia quite simple and slender. Abdomen similarly dull brownish black, though subshining in some lights, pubescence pale, dense and short, hind-marginal bristles absent; last sternum and cerci dull.

Length: body 2.3 - 2.6 mm, wing 3.0 - 3.3 mm.

DIFFERENTIAL DIAGNOSIS: Alpine species, resembling in many respects the habitually similar *H. ternovens* Strobl (= *H. griseifrons* Collin), both in the size, general



FIGS 14-16

Hilara leukensis sp. n. ♂ (CH, VS: Leuk, Pfywald, paratype). (14) Postabdomen (macerated). (15) Lateral genital lamella. (16) Tip of hypandrium in dorsal view. Scale: 0.2 mm.

shape, and colouration. However, the male of *H. ternovens* possesses long black bristles on t_1 dorsally, and both dorsally and anteroventrally on t_3 . The hypopygium differs in the broad tip of the hypandrium, and a blunt-tipped dorsal lamellar process; t_3 in female in *H. ternovens* is distinctly dilated and laterally compressed. However, the simplest key characters of *H. ternovens* are the black abdominal pubescence and black haltere.

Holotype ♂: **Switzerland**, VS: Leuk, Pfywald (614100/290070), 6.vi.2001 (600 m), leg. Merz & Landry (MHNG).

Paratypes: 6 ♂ and 3 ♀ with the same locality and date as holotype; 1 ♂ with the same locality, 6.vii.1997 (630 m), leg. B. Merz (MHNG, 1 pair in coll. Chvála, UMO).

DERIVATIO NOMINIS: The species is named after the Swiss type locality Leuk-Pfywald.

DISTRIBUTION: Known up to now only from a central Alpine valley in the canton Wallis.

41. *Hilara nigrocincta* de Meijere, 1935

REFERENCES: Chvála (2005a: 94) – description and illustration of male fore leg, male and female hind leg, and male postabdomen with genitalia.

DISTRIBUTION: A species of temperate and warm Europe, from the Netherlands, where it is common along large rivers, south through central parts of Europe including the Alpine region to the Mediterranean. From the end of May to the middle of August, mostly in lowlands at the border of large rivers.

MATERIAL EXAMINED: **Switzerland**: GE: Cartigny, Moulin de Vert (470 m) 4.vi.2001 1 ♀ (Merz & Eggenberger); Corsier-Port, vitre véranda 1.-31.vii.2008 1 ♀ (Besuchet). VS: Baltschieder, Kumme (650 m) 24.vi.2000 4♂; Leuk, Pfywald (630 m) 6.vii.1997 1♂; Leuk, Rotafen (620 m) 10.viii.1997 1♀ (all Merz); Branson, Follatères (460-750 m) 9.vi.2004 (Merz

& *Haenni*). ZH/LU: Maschwroanden, Rüss-Spitz (380 m) 20.vi.1995 1♂ 1♀ (*Merz & Bächli*). TI: Biasca, Loderio (350 m) 8.vii.1997 1♀ (*Merz*). **France**: Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 1♂ 1♀ (*Barták*).

42. *Hilara ternovens* Strobl, 1898

SYNONYM: *Hilara griseifrons* Collin, 1927

REFERENCES: Collin (1961: 664 as *H. griseifrons*), Chvála (2004: 97 as *H. griseifrons*) – description with illustration of male fore leg, female hind tibia, and male genitalia. Chvála (2008a: 70) – lectotype designation and synonymy.

DISTRIBUTION: This species was for a long time well known to dipterists as *Hilara griseifrons* Collin. Uncommon in northwest Europe (England, Norway), but fairly common from the Netherlands and northern Germany south to France, Switzerland, Slovenia, Bosnia and Herzegovina, and Bulgaria (Chvála, 2008a). In the Alpine regions at lower altitudes. For a long period from June to the beginning of September.

MATERIAL EXAMINED: **Switzerland**: GE: Corsier-Port, vitre véranda 2.-6.vii.2003 1♂, vi.2005 4♂ 3♀, 1.-31.vii.2003 1♂, 1.-30.vi.2006 2♂ 1♀, 20.-30.vi.2008 5♂ 4♀ (all *Besucht*). GR: S. Vittore, Rebberg (290 m) 8.vii.1997 1♂, same locality (300 m) 4.viii.1997 1♂ 1♀ (*Merz*). TI: Biasca, Loderio (350 m) 17.vi.1995 1♂ (*Merz & Bächli*), 8.vii.1997 3♂, 4.viii.1997 1♂ (all *Merz*). **France**: Gard, Dourbies, La Rouvière, Crouzoulous (970 m) 15.vii.2005 1♂ (*Haenni*).

43. *Hilara albipennis* von Roser, 1840

REFERENCES: Collin (1961: 669), Chvála (2005a: 107) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: From the British Isles and along the Baltic coast including southern Scandinavia south to the Alpine region. In central temperate Europe an early spring species, in April and May. Uncommon in lowlands, more abundant at higher altitudes and in mountains (Krkonosé Mts, the Alps). On alpine meadows and along streams on flowering willows in spring, sometimes swarming in large numbers.

MATERIAL EXAMINED: **Austria**: Styria: Admont (640 m) 28.iv.-14.v.2008 mass occurrence; Admont, Saugraben (700 m) 19.v.2003 2♂ 1♀; Arding, Ennstal (636 m) 3.v.2004 14♂ 2♀; Gesäuse Eingang (620 m) 4.v.2008 common; Haller Mauern, Buchauer Sattel, Grossbuchau (850 m) 9.-13.v.2008 common; Mühlau (750 m) 18.v.2003 1♀; Kaiserau (1100 m) 11.vi.1997 1♀ (all *Chvála*). **Switzerland**: ZH: Embrach, Haumüli (400 m) 29.vi.1998 1♂ (*Wolf*), 30.iv.1998 1♂ (*Merz*); Pfannenstiel (600-850 m) 21.v.1995 1♂; Zürich, Waldgarten (450 m) 24.v.1996 1♀; Zürich, Katzensee (440 m) 24.iv.1997 1♂, 3.v.1997 2♀; Zürich, Allmend (430 m) 6.v.1998 1♀ (all *Merz*).

Group 6 – *H. intermedia*-group

For a characterization of this group, and a revision of the European species, see Chvála (2002b – as *Hilara* “*quadrivittata*” group), and Chvála (2005a: 109 and 2008a: 72).

44. *Hilara intermedia* (Fallén, 1816)

REFERENCES: Strobl (1892a: 139 as *H. pubipes* Loew), Collin (1961: 585), Chvála (2005a: 110) – description and illustration of male fore and mid leg, female hind tibia, and male genitalia.

DISTRIBUTION: A common species in northern Europe including Lapland, on the British Isles especially in Scotland, not yet found in the lowlands of the Netherlands. Locally very common in the Alpine region, but rare in lowlands of temperate central parts of Europe south to the Alps; recently found also in the Romanian Transylvanian Alps. Apparently its distribution is boreomontane. An early summer species, in the Alps mainly in June and July, in lowlands already in May, high in mountains as late as August; Strobl (1893: 90) recorded it under the name *H. pubipes* from the Styrian Ennstaler Alpen and Rottenmanner Tauern.

MATERIAL EXAMINED: **Austria:** Styria: Rottenmanner Tauern, Hohentauern 1.viii.1891 and Scheiplalm 13.viii. 4♂; Admont, Lichtmessberg 7.-11.viii. 4♂ (all *Strobl*); Schladminger Tauern, Donnerbachwald (1600 m) 5.viii.1995 1♂ (*Barták*); Schladming, Untertal (1000 m) 6.vii.2001 7♂ 1♀, Kleinsölk (1000 m) 7.vii.2001 1♀; Haller Mauern, Mühlau (750 m) 19.vi.2007 swarms, Esslingbach (900 m) 7.vii.2002 swarms; Frauenberg, Ennstal (680 m) 26.vi.2002 swarms; Ziernitz near Admont (730 m) 30.vi.2005 and 4.vii.2001 swarms; Gesäuse, Johnsbach (1050 m) 5.vii.2002 1♂; Kaiserau (1100 m) 22.vii.1997 and 1.vii.2002 swarms; Rottenmanner Tauern, Hohentauern, Weber Teich (1300 m) 5.vii.2001 swarms (all *Chvála*). East Tyrol: Liezener Dolomiten, Obertilliach 1♂ (*Frey*). **Switzerland:** TI: Biasca, Loderio (350 m) 8.vii.1997 2♂ 1♀; Gordola, Verzasca-Ufer (205 m) 15.v.2006 3♂ 2♀. GR: S. Vittore, Rebberg (290 m) 2.vi.1997 1♂, 8.vii.1997 1♀ (all *Merz*). **France:** Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 1♂ 1♀ (*Barták*).

45. *Hilara tetragramma* Loew, 1873

REFERENCES: Chvála (2002b: 269) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: Mountain species, known from the Polish, Slovak and Romanian Carpathians, and from the Alps. A spring species, in May and June. In the Alps usually at lower warmer sites, at altitudes to 700 m only.

MATERIAL EXAMINED: **Switzerland:** TI: Biasca, Loderio (300-350 m) 2.vi.1997 8♂ 6♀; Gordola, Verzasca-Ufer (205 m) 15.v.2006 1♂. VS: Baltschieder, Rotten-Ufer (650 m) 17.v.1996 1♂ 1♀; Leuk, Bahnhof (625 m) 15.v.2000 1♂ (all *Merz*).

46. *Hilara hirta* Strobl, 1892

REFERENCES: Collin (1961: 595), Chvála (2005a: 112) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: This species was described from the Alps, but it is widely distributed in Europe from Fennoscandia including Lapland (where it is rare), south through temperate Europe to the Alpine region and Bulgarian Pirin Mts (2200 m). Recently Chvála (2008a: 73) recorded this species also from Israel. A late summer and autumn species, from August to October. In the Alps commoner at high altitudes. Strobl (1892a) described it from the Carinthian Villach collected by Tief, Becker collected it in Gastein (Salzburg), and later Strobl (1893: 91) mentioned another ♂ collected by him at the end of August at Mühlau near Admont; all specimens are preserved in the Strobl Collection in Admont, see Chvála (2004:130).

MATERIAL EXAMINED: **Austria:** Oberösterreich: Totes Gebirge, Hinterstoder (650 m) 23.viii.2001 1♂ (*Chvála*). Styria: Admont (640 m) 1.ix.1892 1♂ (*Strobl*); Haller Mauern, Mühlauerbach (1000 m) 25.viii.1999 3♂ 5♀, Esslingbach (900 m) 16.ix.2005 and 19.ix.2004 common; Oberlaussa, Polzambach (950 m) 25.viii.2001 3♂ 2♀; Rottenmanner Tauern,

Edelrautehütte (1725 m) 10.ix.2006 1♂, Bösenstein, Scheibelsee (1750 m) 15.ix.2005 1♂, 18.ix.2004 ♀ swarm (all *Chvála*). Salzburgland: Gastein 7.ix. 1♀ (*Becker* syntype); Obertauern, Grünwaldkopf (2000 m) 26.viii.1999 1♂ (*Chvála*). **Switzerland:** GR: Ausserferrera (1300 m) 11.ix.1994 1♀ (*Merz & Eggenberger*), same locality (1325 m) 28.-30.viii.2006 2♂ 7♀; Ausserferrera, Cresta (1300-1670 m) 1.ix.2006 1♀; S. Bernardino 31.viii.2006 1♀ (all *Merz*); Laax vii.-viii.1892 1♂; Bad Pignia, Andeer 12.ix.1913 1♂ (all *Escher-Kündig*). VS: Sierre 10.x.1886 1♂, 12.x.1887 2♂ (*Escher-Kündig*). UR: Unterschächen (1060 m) 25.viii.1997 1♂ (*Merz*). VD: Bex, Vallon de Nant (1580-1740 m) 8.x.1995 1♀ (*Haenni*).

47. *Hilara brevistriata* sp. n.

Figs 17-19

DIAGNOSIS: A small, dull grey species, body generally only about 2.5 mm long, but the clear wings longer. All setae and hairs on body and legs uniformly black. Frons and occiput dull velvety black, scutum with 4 shifting black stripes coalescing in posterior view; *acr* 2-serial, long and distinct, thoracic marginal setae fine but long; haltere black. Legs uniformly black, long and slender, also tarsi including ♂ *bt*₁ very long, ♀ *t*₃ slender and only very slightly curved, and all parts of legs covered with only short hairs and a few short setae.

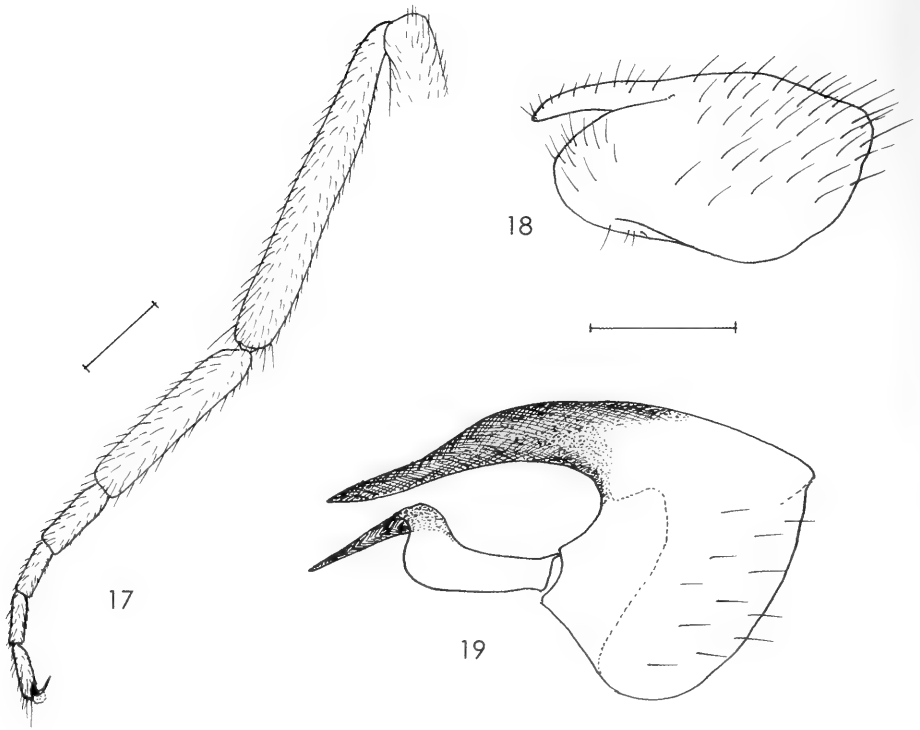
DESCRIPTION:

Male. Head dull velvety black on a wide frons and occiput, only the wide square-shaped face more greyish-black. All setae on head black and very long, the 2 pairs of equally long ocellar and frontal bristles the longest, longer than antennal segment 3 without style. Antennae black, style fairly long and not clearly thickened, about 2/3 length of segment 3. Palpi small, black, covered with several long black setae. Labrum about half as long as head is high, labium often porrect, and then much longer.

Thorax dull grey on pleura, more brownish-grey on scutum, prescutellar depression when viewed from above clearly chestnut-brown; when viewed from in front scutum with 2 dull black stripes between the rows of bristles, in dorsal view with 4 stripes, the lateral ones broader and larger, but in posterior view the lateral stripes still much broadened, and the central 2 stripes alter into a single black line on *acr* setae, and the space between *acr* and *dc* becomes light brownish as in *H. hirta*. All thoracic hairs and setae black, *acr* narrowly 2-serial, *dc* 1-serial, all fairly long, at least as long as the long antennal style; marginal bristles all fine but very long, about as long as the pairs of ocellar and frontal setae on head, including *h* seta; 6 *sc* setae, the inner 2 pairs very long, outer pair of half length. Pronotum with a single black seta on each side, otherwise prothorax practically bare; thorax is characteristically humped in this species, with head partly covered by thorax and, therefore, also a small size of the body in general.

Wings long, clear, with contrasting black veins and a long radial fork, a distinct dark stigma, and a long black costal seta. Squama dark grey, fringes blackish, or nearly light greyish in some light. Haltere completely black, including base of stalk.

Legs long and slender, uniformly black and somewhat subshining, except for dull grey coxae; *cx*₁ at tip with several strong black setae; *f*₁ posteriorly with a row of rather dense setae nearly as long as femur is deep, otherwise femora short pubescent, except for the usual anterior row of long setae on *f*₂, and a few slightly longer, fine anteroventral setae on *f*₃ before tip; *t*₁ (Fig. 17) covered with only short hairs, similarly



FIGS 17-19

Hilara brevistriata sp. n. ♂ (CH, TI: Magadino-Quartino, paratype). (17) Fore leg in posterior view. (18) Lateral genital lamella. (19) Hypandrium with postgonite. Scale: 0.2 mm.

like the unusually long and slender bt_1 and following tarsomeres on fore leg; posterior four tibiae slender and covered with only short indistinct hairs, but t_3 with 7-8 fine dorsal setae at most as long as tibia is deep.

Abdomen uniformly dull blackish-grey, rather densely short black pubescent, hind-marginal bristles long. Genitalia (Figs 18-19) fairly long, dull greyish-black like abdomen, but the long pointed apical half of hypandrium and apically very narrowed postgonites (often in a form of small spikes protruding up) distinctly shining black. The simple, and only short pubescent terminal process of lateral lamella clearly shows a close relationship of this species with the autumn species of *H. hirta* complex.

Length: body 2.3 – 2.9 mm, wing 3.5 – 4.2 mm, holotype body 2.5 mm, wing 3.8 mm.

Female. Very much like male, even the long bristling on head and thorax as in male, and wings practically clear as well. Legs long and slender, f_1 posteriorly with only an indication of the dense posterior bristling; t_3 long and only indistinctly thickened, much narrower than the corresponding femora, very slightly curved, rather undulating at middle, and the dorsal setae smaller than in male.

Length: body 2.2 – 3.0 mm, wing 3.0 – 3.6 mm.

DIFFERENTIAL DIAGNOSIS: Superficially, this species resembles the early spring species *H. brevivittata* and *H. bistriata*, which both have a shorter and stouter antennal style, shorter setae on scutum, wing squama with pale fringes, different ♂ genitalia with the circular and ventrally spinose terminal process on lateral lamella, and t_3 in ♀ is thickened and curved, as wide as corresponding femur; *H. brevivittata* has the similarly shifting black pattern on scutum, but it has much shorter and long pubescent legs, whereas *H. bistriata* has similar long slender legs with long tarsi, but the 4 black stripes on scutum are well visible even in posterior view. The same black pattern on scutum with partly coalescing black stripes when viewed from behind is present also in a French coastal, still undescribed species (differing by the yellow haltere and long pubescent and bristled short stouter legs, Chvála, in prep.), and in the Alpine *H. luteihalterata* sp. n. (but legs and abdomen are whitish pubescent).

It is evident, however, that although this early spring species shares many common characters with the two above discussed spring species of the *H. brevivittata* complex, based on the structure of male genitalia (the long simple terminal process of lateral lamella), *H. brevistriata* belongs to the *H. intermedia* complex of species sensu Chvála (2005a). It is closely allied to the two late autumn species, *H. hirta* Strobl and *H. hirtella* Collin, 1927 (see Chvála, 2005a: 114) having the same thoracic pattern with shifting black stripes, simple long slender legs devoid of distinct pubescence and bristles, and especially the structure of male genitalia is very similar. In addition to the very late summer occurrence, the larger size, dull grey occiput, yellow haltere, and the whitish pubescent abdomen may easily differentiate both these species from *H. brevistriata*.

Holotype ♂: **Switzerland:** TI: Magadino-Quartino 205 m, 2.iv.2007 / 2, leg. B. Merz (MHNG).

Paratypes: 13♂, 10♀ with the same data (MHNG, 4♂ and 2♀ UMO). **Austria:** Styria: Admont, Gesäuse Eingang, Enns River 620 m, 18.v.2003 1♀; Admont, Eichelau-Hall, Enns River 640 m, 22.v.2003 2♀, all leg. M.Chvála (UMO).

DERIVATIO NOMINIS: The species epithet is a combination of names of two closely similar spring Alpine species, *Hilara brevi-vittata* Macquart and *H. bi-striata* Zetterstedt.

DISTRIBUTION: A species of lower parts of southern Switzerland and the Austrian Alps, at altitudes about 200 – 650 m, in April and May.

48. *Hilara beckeri* Strobl, 1892

REFERENCES: Collin (1961: 592), Chvála (2005a: 117) – description and illustration of male fore leg, female hind tibia, and male genitalia.

DISTRIBUTION: Practically throughout Europe, from southern Fennoscandia to the Mediterranean. In temperate Europe a common species in lowlands. It occurs also at higher altitudes, in the Alps up to above 1000 m, but not at least a “mountain species”. A typical summer species, for a long period from May to the beginning of September, but common especially in July and August, though in lowlands of Switzerland (GE: Bernex) already at the end of April.

MATERIAL EXAMINED: **Austria:** Oberösterreich: St. Pankraz, River Steyer (490 m) 26.vi.2005 1 ♀. Styria: Admont (640 m) 8.vi.1996 2 ♀, 4.-7.vii.2006 5 ♀, 11.vii.2008 1 ♀ (all *Chvála*); Gesäuse, an Ennsufer Fels (620 m) 14.viii. 1 ♂ (lectotype), 1.viii.1881 1 ♀, 28.v. 1 ♀; Kalbling 14.viii. 1 ♀ (all *Strobl*); Gesäuse, Kaiserau (1100 m) 7.viii.1998 1 ♀ (*Chvála*). **Switzerland:** BE: Jura Schächental 2.vi.1963 1 ♂ (*Keiser*); Rubigen 26.v.1997 2 ♂ 1 ♀ (*Keller*). ZH: Zürich, Höggerberg (530 m) 17.vi.1997; 1 ♀; Zürich, Allmend (430 m) 6.v.1998 1 ♂ (all *Merz*); Embrach, Haumüli (400 m) 2.-19.vi.1998 2 ♀ (*Wolf & Merz*). TI: Biasca, Loderio (350 m) 17.vi.1997 1 ♂ (*Merz & Bächli*); 2.vi.1997 1 ♂, 17.vi.1995 1 ♂; Gordola, Verzasca-Ufer (205 m) 15.v.2006 1 ♂ (all *Merz*). GE: Chancy, Vers Vaux (335 m) 1.vi.2002 1 ♂; Bernex, Chante-Merle (415 m) 16.v.1999 1 ♂; Bernex, Signal (500 m) 30.iv.2007 1 ♀; Cartigny, Moulin de Vert (350 m) 5.vi.2006 1 ♀ (all *Merz*). **Slovenia:** Planinska Jama (800 m) 20.vi.2006 2 ♀; Gasparci, River Kolpa (310 m) 15.vi.2006 1 ♂ 1 ♀; River Čabarca (280-330 m) 15.vi.2006 2 ♂ 2 ♀; Spodnja Bilpa, River Kolpa (300 m) 15.vi.2006 7 ♂ 4 ♀ (all *Plant*). **France:** Gard, Dourbies, La Rouvière, Crouzoulous (970 m) 15.vii.2005 2 ♀ (*Haenni*).

49. *Hilara fuscipes* (Fabricius, 1794)

REFERENCES: Strobl (1892a: 144 as *H. carinthiaca* Strobl), Collin (1961: 590), Chvála (2005a: 115) – description and illustration of male fore leg, female hind tibia, male genitalia and postabdomen.

DISTRIBUTION: Widely distributed in Europe, from the British Isles and southern Scandinavia (Denmark and south Sweden) to the Mediterranean (France, Bosnia and Herzegovina). In central temperate Europe locally common. It occurs for a long period from May to August, both in lowlands and at lower altitudes in mountains, for instance in the Czech Šumava Mts up to 600 m. Strobl (1892a) described it as *Hilara carinthiaca*, but later recorded it (Strobl 1893: 91; 1898: 206) under the correct name *H. fuscipes* from the Styrian Gesäuse and Admont. It is surprisingly rather a rare species in the Alpine region.

MATERIAL EXAMINED: **Austria:** Lower Austria: Seitenstetten 1 ♀ (*Strobl*). Oberösterreich: Purgstall 14.vi.1971 1 ♀ (*Ressl*). Styria: Gesäuse viii. 1 ♂ 1 ♀ (*Strobl*). **Switzerland:** LU: Altbüron (530 m) 24.vi.1994 1 ♂ (*Merz*). ZH: Embrach, Haumüli (400 m) 11.vi.1997 1 ♂ 1 ♀ (*Merz & Zulliger*), 19.vi.1998 1 ♀ (*Merz*). **France:** Pyrenees. Ariège, Ax-les-Thermes (750 m) 8.vii.1990 2 ♀ (*Barták*); Gard, Dourbies, 2 km SSE, rive du Crouzoulous (855 m) 21.vii.2009 1 ♂ (*Haenni*). **Slovenia:** Julian Alps, Planinska jama (800 m) 20.vi.2006 1 ♀; Spodnja Bilpa, River Kolpa (300 m) 15.vi.2006 1 ♂; River Čabranca (330 m) 15.vi.2006 12 ♂ 1 ♀ (all *Plant*).

50. *Hilara quadrula* Chvála, 2002

REFERENCES: Chvála (2005a: 119) – description and illustration of male mid tibia, female hind leg, and male genitalia.

DISTRIBUTION: A continental species known from Denmark and southern Sweden south to France; a lowland spring species, mainly in May and June. In warm temperate Europe absent in mountains, although in the south, for instance in southern France, preferring higher altitudes and where it may be found already in April. For a long time not distinguished from the following species, *H. quadrifasciata*, and generally the two species were misquoted under the common name *H. quadrivittata* Meigen, a younger synonym of *H. fuscipes* (Fabricius). Common in lowlands of the Czech Republic, though less common towards the south, for instance not yet found in Austria, but not rare in Swiss and French lowlands.

MATERIAL EXAMINED: **Switzerland:** VS: Sierre 14.v.1888 1♀ (*Huguenin*); Baltschieder, Rotten-Ufer (650 m) 17.v.1996 1♂ (*Merz*). ZH: Zürich, Katzensee (440 m) 3.v.1997 1♂ 1♀. TI: Biasca, Loderio (350 m) 2.vi. 1♂, 8.vii.1997 1♂ (all *Merz*). GR: S.Vittore, Rebberg (290 m) 2.-8.vii.1997 1♂ 4♀ (*Merz*). **France:** Gard, Dourbies (1000-1040 m) 15.iv.1995 1♀ (*Haenni*).

51. *Hilara quadrifasciata* Chvála, 2002

REFERENCES: Collin (1961: 588 as *H. quadrivittata* Meigen, 1822), Chvála (2005a: 120) – description and illustration of frons, male fore leg and mid tibia, female hind leg, and male genitalia.

DISTRIBUTION: A species of cold and temperate Europe, in comparison with the preceding *H. quadrula* widely distributed throughout Fennoscandia and on the British Isles. In temperate Europe common also at higher altitudes, for instance in the Czech Šumava Mts frequently at about 800 m, but clearly of later occurrence, mainly in June and July. Towards the south only to the Alpine region, unknown in the Mediterranean. In the Austrian Alps fairly common as well above 1000 m, but not yet recorded from Switzerland and France.

MATERIAL EXAMINED: **Austria:** Styria: Admont (640 m) 11.v.2007 1♂, 8.vi.1996 swarms; Gesäuse Eingang, River Enns (620 m) 25.v.2009 1♂; Frauenberg, Ennstal (680 m) 14.vi.1997 1♀; Ennstaler Alpen, Unterlaussa (700 m) 14.vi.1997 1♀; Rottenmanner Tauern, Hohentauern, Weber Teich (1200 m) 5.vii.2001 swarm (all *Chvála*). Salzburgland: Schladminger Tauern, Obertauern, Tweng (1200 m) 17.vi.2000 2♂ (*Chvála*).

52. *Hilara pilipes* Zetterstedt, 1838

REFERENCES: Chvála (2005a: 128) – description and illustration of male fore and mid leg, and genitalia.

DISTRIBUTION: Northern species, common in the north of Fennoscandia including Lapland and Russian Kola Peninsula, south to the Baltic coast. In the continent only at scattered localities and very rare (Netherlands, Poland), but surprisingly not uncommon in the region of Berlin (as *H. anomala* Loew, 1840). Recently, it has been found in central Europe, in the Czech Krkonoše Mts (Riesengebirge), and it may have a boreomontane distribution and will be found also at other sites, for instance the Alps. So far, all published records of *H. pilipes* from the Austrian Alps refer to other, morphologically similar species. A spring and early summer species, from the end of April to July.

MATERIAL EXAMINED: **Czech Republic:** Krkonoše Mts, Labská louka (1350 m) 23.-26.v.2001 PT 2♂ (*Vaněk*).

53. *Hilara tanychira* Strobl, 1892

REFERENCES: Chvála (2004: 117, 2008b: 242) – type specimens, synonymy.

DIAGNOSIS: A small species, body only about 2.5 mm long, with body and legs black, scutum with faint blackish stripes and 2-serial *acr*, haltere yellow. Legs long pubescent and bristled, also hind tibia in ♂ with long bristly hairs dorsally (as in *H. pilosopectinata*). Antennae short, with very short style, and labrum long, as long as head is high.

REDESCRIPTION:

Male. Frons and occiput dull black, face grey. Antennae with short 3rd segment, and also style very short and stout (!), half length of 3rd segment; labrum long, as long as head is high, all main characters very much like as in *H. cantabrica* Strobl (syn. *H. lundbecki* Frey; see Chvála, 2005a: 169 and 2008a: 113).

Thorax black, scutum blackish-grey in anterior view, dark grey in lateral view, with 4 indistinct, almost polished broad black stripes. The four stripes (the 2 indistinct blackish narrow stripes between 2-serial *acr* and 1-serial *dc*, and the lateral 2 broader still less distinct stripes) very indistinct in anterior view, in posterior view scutum extensively blackish; in anterior view scutum usually almost unstriped. Mesonotal bristles long but rather hair-like.

Wings clear, haltere clear yellowish.

Legs quite black, t_1 only slightly shorter and deeper than posterior four tibiae, bt_1 twice as stout as tibia, 2.5 times as long as deep, and shorter than t_1 ; t_1 and bt_1 long pubescent, t_1 with 4 dorsal bristles twice as long as tibia is deep, also t_2 and t_3 densely pubescent; t_3 dorsally with long hairs, very much as in *H. pilosopectinata* (syn. *H. longesetosa* Strobl).

Genitalia large, not higher than abdomen, but produced below. Lateral lamellae long and slender, pointing up backwards; hypandrium very slender, long and strip-like, very much as in *H. morata* or *H. cuneata*.

Length: body 2.3 – 2.8 mm.

Female. Still smaller than the male, t_1 and t_3 in addition to the pubescence with 5 short bristles.

DIFFERENTIAL DIAGNOSIS: The Scandinavian *H. pilipes* Zetterstedt, found also in cold temperate continental Europe and in mountains of central Europe (Krkonosé Mts in the Czech Republic), is a larger species, body 3 – 4 mm long, with legs in ♂ covered with very long, fine bristly hairs, and with t_2 and bt_2 swollen and densely long pubescent (see Chvála, 2005a: 128, Figs 199-203). The smaller-sized Alpine *Hilara tiefii* Strobl has the head including occiput dull grey, and blackish haltere.

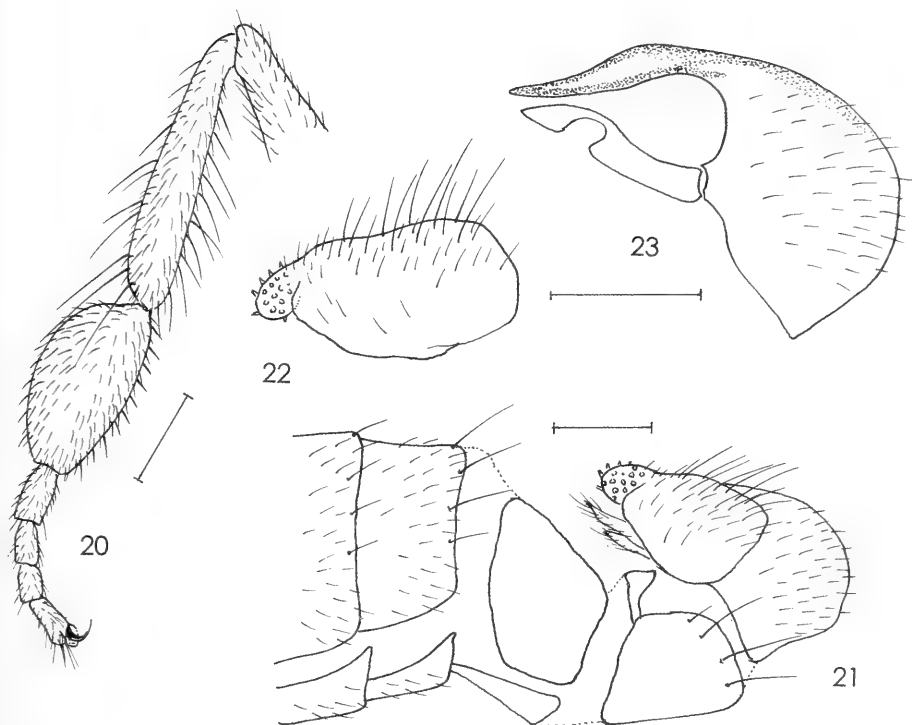
DISTRIBUTION: The species was described by Strobl (1892a) from Melk in Lower Austria as a species “in Menge schwebend Ende April 1885 über feinem Ufersande einer Donauau bei Melk”. Four syntypes, 3♂ and 1♀, collected on the banks of the River Danube in Austria were studied by Chvála (2004: 117) in the Strobl Collection in Admont, one ♂ was designated as lectotype. Further material is not available, and the 3♀ collected on 12 May by Prof. Tief at Paternion in Carinthia, also mentioned by Strobl (1892a) in the original description, were not found.

MATERIAL EXAMINED: **Austria:** Lower Austria: Melk, River Donau 13.iv.1885 3♂ 1♀ (syntypes, Strobl).

54. *Hilara luteihalterata* sp. n.

Figs 20-23

DIAGNOSIS: A small, dull grey species of the *H. intermedia*-group (body about 2.5 – 3 mm long), with yellow haltere, black legs, whitish pubescent legs and abdomen, and scutum dull grey, with distinct black altering stripes. Frons dull velvety black as in *H. flavohalterata* Strobl (known only from Croatia), and also occiput black when viewed from above, but extensively greyish when viewed from behind.



FIGS 20-23

Hilara luteihalterata sp. n. ♂ (CH, GE: Chancy, Vers Vaux, paratype). (20) Fore leg in posterior view. (21) Postabdomen (macrated). (22) Lateral genital lamella. (23) Hypandrium with postgonite. Scale: 0.2 mm.

DESCRIPTION:

Male. Frons and face very broad, face almost square-shaped and dull grey, frons velvety black, with a greyish triangular spot above antennae; vertex and occiput dull velvety black, although occiput, when viewed from behind, extensively greyish with only blackish shades, and on lower half below neck covered with whitish bristly hairs. Otherwise all setae on head black, vertical setae about as long as antennal segment 3, but the 2 pairs of ocellar and frontal setae very long and fine, much longer than upper setae on postocular margin. Antennae black, segment 3 short triangular, about twice as long as wide at base, style short and stout, only about half as long as segment 3. Palpi black, greyish pollinose, beneath with several long fine black setae. Proboscis short, labrum at most half as long as head is high.

Thorax dull grey on pleura, more brownish-grey dusted on scutum; when viewed from anteriorly scutum almost unstriped, in anterodorsal view with 2 dull black stripes between rows of bristles, in dorsal view scutum with 4 distinct dull black stripes, the lateral stripes broader and longer, and prescutellar depression clearly

brownish; when viewed from behind, the 2 slender median stripes turn to a single broad median stripe on the *acr* setae. All setae on thorax black, only notopleural depression with several whitish hairs, similar to those on prothoracic episterna; *acr* narrowly 2-serial, fine and small, about 15 in a row and as long as the short antennal style; *dc* 1-serial, clearly longer, but equally numerous; marginal setae in full number, 1 fine *h* seta, and last 2 pairs of prescutellar *dc* setae very long, as long as the inner pair of 4 *sc* setae.

Wings clear, nearly whitish in some lights, with contrasting dark veins and a distinct blackish stigma, radial fork of usual hilarine-shape; anal vein practically absent, a costal bristle scarcely as long as the outer pair of *sc* setae. Squama dark grey to brownish-grey, fringes whitish; haltere yellow, with extreme base of stalk darkened.

Legs uniformly black, almost subshining, finely greyish pollinose, and covered with mostly whitish hairs and also long setae are pale; only coxae dull grey like thoracic pleura, and covered with small whitish hairs; f_1 with a dense long whitish bristling posteriorly, the bristly hairs are much longer than femur is deep when viewed from above, also f_2 anteriorly with a row of long whitish setae (replacing the usual black anterior bristling), and f_3 covered mostly with short pale hairs, longer setae only anteroventrally before tip; t_1 (Fig. 20) rather stout, posteroventrally with similar long pale bristling as on femur, dorsally with several long blackish setae; bt_1 very stout but short, almost half as long a tibia, and covered with short hairs only; t_2 densely, rather brownish, long pubescent both anteriorly and posteriorly, the bristling is not much longer than tibia is deep (resembling in this way *H. intermedia* very much), but bt_2 slightly stouter than following tarsomeres, and densely, though shorter, bristled both antero- and posteroventrally (resembling in this way more *H. pilipes*); t_3 long and slender, only dorsally with about 7 to 8 fine blackish bristles about as long as tibia is deep; all tarsi rather short, but tarsomeres 2-4 on all pairs clearly longer than deep, although rather short on fore leg.

Abdomen almost uniformly rather light grey dusted, covered with fairly long whitish hairs, hind-marginal bristles long, black. Genitalia (Figs 21-23) small, pointing backwards, lamellae covered with dark setae; lateral lamella with the characteristic circular, ventrally spinose terminal process of the *H. brevivittata* complex of species sensu Chvála (2005a: 125).

Length: body 2.3 – 3.0 mm, wing 3.3 – 3.6 mm.

Female. Very much like male, head and thorax as in male, but wings with a tendency to be faintly clouded, not quite clear or whitish as in male. In contrast to the male the uniformly black legs are long and slender, covered (except for coxae) with only short dark hairs, long setae blackish and confined to the usual anterodorsal row on f_2 , and to about 4 long anteroventral preapical setae on f_3 . Anterior four tibiae without distinct setae, and f_1 posteroventrally (very densely long whitish bristled in ♂) with a row of only much shorter dark hairs, scarcely as long as femur is deep when viewed from above; t_3 distinctly thickened, rather laterally flattened, and as deep as femur, and distinctly curved when viewed from behind; dorsally with about 6-8 very fine dark setae much shorter than tibia is deep. All tarsi long and slender, even tarsomeres 2-4 on fore leg about twice as long as deep. Abdomen uniformly dull grey, more brownish-grey on dorsum, everywhere covered with short pale hairs, also the hind-marginal bristles fine and small, and clearly light brownish.

Length: body 2.2 – 3.0 mm, wing 3.0 – 3.6 mm.

DIFFERENTIAL DIAGNOSIS: Resembling *H. primula* Collin, 1927 (see Chvála, 2005a: 123) and *H. flavohalterata* Strobl, 1898 (see Chvála, 2008a: 75). *H. primula* has less distinct blackish stripes on scutum, clearly grey dusted occiput, longer antennal style (although thickened), t_2 in ♂ with short hairs, notopleura and humeri covered with black hairs, etc. The Mediterranean coastal *H. flavohalterata* seems to be more closely related, with similarly long pubescent ♂ t_2 , but it is a larger species, body 3 – 4 mm long, with antennal style also short but thin, wings are faintly brownish infuscated, and the pubescence on legs is blackish. Females of *H. luteihalterata* clearly differ from both above mentioned species by the t_3 which is thickened, about as wide as the corresponding femur, and distinctly curved. There is another similar species, *H. embartaki* Chvála, which is easily separated by a long slender antennal style, scutum with only 2 blackish central stripes visible from all points of view, the wing squama is very pale, the legs in ♂ are differently shaped, covered with black setae, and t_2 in ♂ bears short spine-like setae. It is not “woolly pubescent” as in *H. luteihalterata*, *H. intermedia* or *H. brevivittata*; also ♂ genitalia are different (see Chvála, 2008a: 74, Figs 67-70).

Holotype ♂: **Switzerland:** GE: Chancy, Vers Vaux (335 m) 9.iv.2007 (10), leg. B. Merz (MHNG).

Paratypes: 2♂ and 9♀ with the same data as holotype (MHNG, 1♂ and 3♀ UMO).

DERIVATIO NOMINIS: *lutei* – *halterata*, indicates the yellow colour of haltere, but also its similarity with the Croatian *H. flavohalterata* Strobl.

DISTRIBUTION: Only known from the most southwestern locality in Switzerland, at the French border, on the border of the Rhône river. A very early spring lowland species, in the beginning of April.

55. *Hilara embartaki* Chvála, 2008

REFERENCES. Chvála (2008a: 73) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: Morphologically similar with *H. luteihalterata*, but also with the next new species of the Bulgarian Rhodope Mts, *H. polleti*. It has been described only very recently from the Gulf of Lions south of the French Massif Central, and now it is recorded also as a real mountain species of the French Massif Central, at an altitude above 1500 m. Its occurrence in western Alps is very probable.

MATERIAL EXAMINED: **France:** Hérault, Golfe du Lion, Col du Cabaretous (940 m), NW of Beziers, 22.v.2006 3♂ 1♀ (*Barták*); Lozère, Sommet de Finiels, 1 km S (Valat de la Mouline) (1570 m) 11.vii.1998 1♂ (*Haenni*).

56. *Hilara polleti* sp. n.

Figs 24-26

DIAGNOSIS: Medium-sized dark dull grey species (body slightly more than 3 mm long), with occiput and frons dull black, scutum dull brownish-grey, with 2-serial *acr*, and 4 blackish longitudinal stripes; legs densely, mostly black pubescent, wings faintly brownish and haltere yellow, abdomen whitish pubescent on basal segments.

DESCRIPTION:

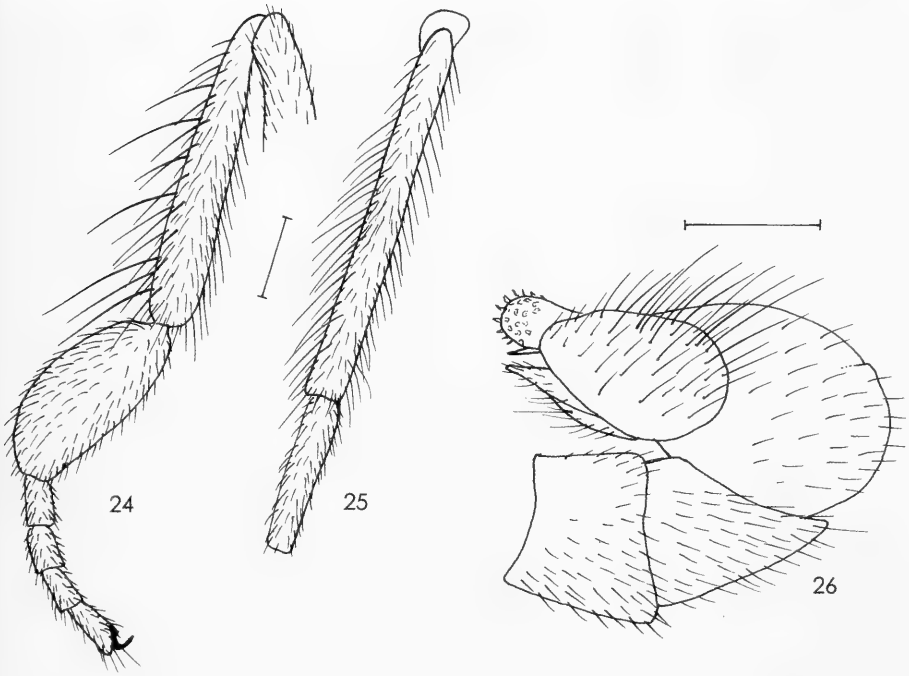
Male. The square-shaped face light grey, frons equally wide but dull black like vertex and occiput, only above antennae with a slight greyish shadow; lower part of occiput below neck greyish dusted and covered with whitish hairs. Other hairs and bristles on head black, ocellar and frontal bristles equally very long, longer than antennal segment 3 without style, postvertical bristles smaller. Antennae black, segment 3 long, style rather slender and about two-thirds length of segment 3. Palpi greyish, short black pubescent ventrally, and with a very long preapical bristle before tip. Labrum short, much shorter than head is high.

Thorax rather light grey dusted on pleura, scutum including scutellum uniformly contrasting dull brownish-grey, when viewed from in front scutum quite unstriped, in all other views with 4 dull black stripes, the 2 narrower blackish stripes between *acr* and *dc* bristles visible in anterior half of scutum only, absent in prescutellar region, laterally of *dc* 2 broader and longer similarly black stripes; when viewed from behind, the lateral stripes less distinct; compared with all related species of the *H. brevivittata* complex, the scutum is almost uniformly dull brownish-grey, not velvety black as usually. All thoracic setae black, *acr* narrowly 2-serial, *dc* 1-serial, all shorter than antennal style; *acr* less numerous, only about 10 setae in a row, *dc* more numerous; large marginal setae in full number, *h* and *ih* setae rather small and fine, other setae strong, the inner pair of 4 *sc* the longest. A small, but stout bristle on each side of pronotum, otherwise prothoracic episterna and prosternum with minute whitish hairs; prothoracic spiracle contrasting black.

Wings faintly brownish clouded, not quite clear, with contrasting dark veins and a distinct dark brown stigma; a long radial fork, anal vein indistinct, and costal seta about as long as *pa* seta. Squama light greyish with a very dark margin, fringes whitish. Haltere clear yellow on knob, stalk blackish-brown.

Legs uniformly black, including "knees", finely greyish pollinose, and covered with dense black hairs and setae, only *cx*₁ with white hairs; *f*₁ posteriorly with long dense bristling about as long as femur is deep, *f*₂ with usual long anterior setae, but otherwise with short fine pubescence, as in *f*₃, with the exception of 3 to 4 long anteroventral setae before tip of the latter; *t*₁ (Fig. 24) stout, dorsally with 5 pairs of very long black bristles directed dorsally and posterodorsally, and posteriorly with dense bristling at least as long as tibia is deep; *t*₂ (Fig. 25) with similar long dense bristling as in *H. intermedia*, anterior bristles longer than tibia is deep, posterior bristling denser, but shorter; *t*₃ ventrally with about 7 to 8 setae not longer than tibia is deep, dorsally with the same number of longer setae; *bt*₁ (Fig. 24) very thickened, clearly shorter than corresponding tibia, but as long as rest of tarsus, and even on dorsum covered with only short hairs; tarsi short, tarsomeres on fore leg rather stout, only slightly longer than deep, those on posterior four tarsi longer, and all covered with short hairs only.

Abdomen densely dull grey dusted, more brownish-grey on dorsum, when viewed from behind with distinctly paler, almost silvery grey, narrow hind margins; pubescence whitish on basal two segments, especially long on the narrow basal segment, following segments covered with black hairs, the long hind-marginal bristles on all segments also black. Genitalia (Fig. 26) small and rather narrow, pointing backwards, very much like as in the more northern *H. brevivittata* Macquart; hypandrium



FIGS 24-26

Hilara polleti sp. n. ♂ (BG, Rhodope Mts, paratype). (24) Fore leg in posterior view. (25) Mid leg with basitarsus in dorsal view. (26) Postabdomen and genitalia. Scale: 0.2 mm.

only slightly produced posteriorly, very narrowly pointed apically; lateral lamella covered with long blackish setae, and apically with the usual circular ventrally spinose apical process of the *H. brevivittata* complex of species.

Length: body 3.2 – 3.3 mm, wing 4.2 – 4.5 mm.

Female unknown.

DIFFERENTIAL DIAGNOSIS: This species of the Bulgarian Rhodope Mts is most closely related to *H. embartaki*, known so far only from mountains of the French Massif Central. *H. embartaki* is in general a smaller-sized species (body 2.8 – 3.2 mm, wing 2.9 – 3.3 mm), especially wings are shorter, there are only 2 dark stripes on scutum between lines of bristles (lateral stripes absent), the median region on *acr* setae is clearly greyish, and the 2 blackish median stripes are much more distinct in posterior view; *acr* and *dc* similar but more numerous, with about 16 *acr* setae in one row (only 10 setae in *H. polleti*), wings are almost clear in *H. embartaki*, iridescent, and haltere entirely very pale yellow including the stalk. Legs are in *H. embartaki* similarly uniformly black, although only finely pollinose, much more subshining; bristling on femora is similar, but t_1 bears only a few, usually 4 dorsal bristles in one row, and t_2 bears only 3 short spine-like anteroventral bristles about as long as tibia is deep. The long dense bristling of *H. polleti* on tibiae is absent. Genitalia of *H. embartaki* differ from those of *H. polleti* by only a sparse long bristling of lateral lamella, and the apical circular process is spinose along margins only, ventrally it is bare.

Holotype ♂: **Bulgaria** (Rhodope Mts): Blagoevgrad, 15.iv.1973, sipei. kol., leg. V. Beschovsky (UMO).

Paratypes: 1 ♂ with the same data as holotype, pinned with the holotype on the same pin (UMO).

DERIVATIO NOMINIS: The species is named after the Belgian dolichopodid specialist Dr Marc Pollet.

DISTRIBUTION: Bulgaria; in the western part of the Rhodope Mts close to Macedonia, its distribution along the Balkan mountain ranges west to the Alps may be anticipated.

57. *Hilara hirtipes* Collin, 1927

REFERENCES: Collin (1961: 599), Chvála (2005a: 132) – description and illustration of male fore and mid leg, and genitalia.

DISTRIBUTION: A species with a still problematic and unclear distribution in Europe. Described from Great Britain, and with certainty known so far along the Baltic Coast, from the Netherlands, Belgium and Germany. Further, it was recorded from Central Europe from Switzerland by Schiegg *et al.* (1999). Other records from mountains of central temperate Europe and from the Alps need revision because of their possible confusion with morphologically similar species. The only other verified identification from Central Europe is a male in the Admont Strobl Collection from Vorarlberg, identified by Strobl as *H. bistriata* Zetterstedt. Mainly a spring species, from April to the beginning of July.

MATERIAL EXAMINED: **Austria**: Vorarlberg 13.v. 1 ♂ (coll. *Strobl*). **Switzerland**: ZH: Sihlwald 24.v.-19.vi.1996 3 ♂ (*Schiegg*).

58. *Hilara bistriata* Zetterstedt, 1842

REFERENCES: Collin (1961: 603), Chvála (2005a: 135) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: A boreomontane species, common throughout Fennoscandia including Lapland and Kola Peninsula, on the British Isles mainly in Scotland, and then in mountains of central Europe including the Alps. For full data on its distribution in Europe, see Chvála (2002b: 238). A species of peat-bogs in the Czech Šumava Mts (Böhmerwald) at altitudes between 700 and 800 m; at similar altitudes as well in the Styrian Alps, mainly along streams on flowering willows. An early spring species, in the Alps mainly in April and May. Strobl (1893: 90, and 1898: 206) recorded it also as a common species in May and June in Carinthia, and later from Admont and Gesäuse.

MATERIAL EXAMINED: **Austria**: Styria: Admont 2.vi. 1 ♂, Krumau 2.v. 1 ♂; Gstatterboden 28.v. 1 ♂ (all *Strobl*); Ennstal near Admont (640 m) 28.iv. 1 ♂, 3.v.2008 1 ♀; Gesäuse Eingang, River Enns (620 m) 23.-29.iv.2004 13 ♂ 1 ♀, 18.v.2003 1 ♀; Seebacher near Ardning (640 m) 3.v.2004 2 ♂ 5 ♀ (all *Chvála*). Carinthia: Villach 15.v. 1 ♂ (*Strobl*).

59. *Hilara brevivittata* Macquart, 1827

REFERENCES: Collin (1961: 600), Chvála (2005a: 134) – description and illustration of male fore leg and mid tibia, postabdomen, and genitalia.

DISTRIBUTION: A species of temperate Europe, uncommon in England and very rare in the south of Scandinavia. Fairly common in spring in lowlands of central Europe south to France and the Alpine region. In the Alps, and other central European mountains, only at lower altitudes, at most up to 800 m. A very early spring species, mainly in April and May, only occasionally in June. For full data on its distribution in Europe, see Chvála (2002b: 240).

MATERIAL EXAMINED: **Austria:** Styria: Admont 12.v. 1 ♀; Gesäuse 10.v. 1 ♂ (all *Strobl*); Ennstal, Seelbacher near Ardnig (640 m) 3.v.2004 1 ♀; River Enns near Admont (640 m) 22.v.2003 2 ♀ (all *Chvála*). Carinthia: Villach 1 ♂ (*Strobl*). **Switzerland:** SZ: Gersau, Oberholz (550 m) 14.iv.1981 1 ♂ (*Rezbanyai*). GR: S.Vittore, Rebberg (290 m) 8.iv.1997 1 ♂ 3 ♀. TI: Biasca, Loderio (350 m) 9.iv.1995 7 ♂ 4 ♀. UR: Bauen (436 m) 4.vi.1997 1 ♂. ZH: Zürich, Katensee (440 m) 19.iv.1997 1 ♀ (all *Merz*). **Italy:** Pallanza, Sallmuzz 28.iv.1900 1 ♂ (*Escher-Kündig*).

60. *Hilara coracina* Oldenberg, 1916

REFERENCES: Chvála (2002a: 73) – description, lectotype designation, and illustration of head, male fore and hind leg, and genitalia; Chvála (2005a: 137).

DISTRIBUTION: A boreomontane species, known from central parts of Sweden and Norway, the Baltic coast of Finland, and again in mountains of central Europe (Šumava Mts, Bayerischer Wald, Beskydy Mts) south to the Alps and Romanian Carpathians. Everywhere a rare species, from May to July.

MATERIAL EXAMINED: **Austria:** Styria: Admont, Saugraben (830 m) 19.vi.2000 1 ♂ (*Chvála*). Salzburgland: Gastein 23.vii.1907 1 ♀ (*Oldenberg*). **Switzerland:** SH: Merishausen, Gräte (520–720 m) 1.vi.1996 1 ♀ (*Merz & Eggenberger*). **Italy:** BZ: Bozen 5.-7.vi.1914 6 ♂ 1 ♀ (syntypes, *Oldenberg*); Tyroler Dolomiten, Ratzes 27.vii.1911 1 ♀ (*Oldenberg*).

Group 7 – *H. cornicula*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 139 and 2008a: 77).

61. *Hilara cornicula* Loew, 1873

REFERENCES: Collin (1961: 629), Chvála (2005a: 139) – description and illustration of male fore leg, postabdomen, and genitalia.

DISTRIBUTION: Very common and widely distributed European species, from the British Isles and southern parts of Fennoscandia through temperate Europe south to France, the Balkans and Romania. A common species in lowlands of temperate Europe from May to July. In the Alpine region already at the end of April, mainly at lower altitudes, only rarely at about 1000 m. Strobl (1893: 87, and 1898: 205) recorded it from Styrian Admont, and from Ennsauen near Admont and Gesäuse.

MATERIAL EXAMINED: **Austria:** Styria: Admont, Saugraben (700–830 m) 19.-25.v.2003 common; Hieflau, Waaggraben (600 m) 24.v.2003 common; Weissenbach bei Liezen (700 m) 25.v.2003 3 ♂ 3 ♀; Haller Mauern, Oberlaussa, Polzalmbach (750–850 m) 24.v.2003 common, 18.vi.2000 swarms; Hengstpass (1000 m) 18.vi.2000 3 ♀; Frauenberg near Admont, Edelgraben (680 m) 4.vii.2001 1 ♀ (all *Chvála*). **Switzerland:** GE: Bernex, Signal (510 m) 27.iv.2007 1 ♂, 2-12.v.2008 2 ♂ 4 ♀, 24.v.2002 1 ♂ 1 ♀ (all *Merz*); Cartigny, Moulin de Vert (350 m) 24.v.1999 2 ♀ (*Merz & Müller*), same (360 m) 29.iv.-1.v.1999 12 ♂ 2 ♀ (*Merz*); Bernex, Chante-Merle

(415 m) 30.iv.2007 1 ♀; Chancy, Vers Vaux (335 m) 1.vi.2002 1 ♂ (all *Merz*); Veyrier 8.v.1927 1 ♀ (*Naville*). AG: Klingnau (400-450 m) 20.v.1998 common (*Merz & Botta*). UR: Bauen (436 m) 4.vi.1997 1 ♀ (*Merz*). ZH: Embrach Haumüli (400 m) 29.iv.-10.vii. 1995-1998 common (*Wolf & Merz*), same (430 m) 29.v.1996 2 ♂ 1 ♀; Zürich (Zürichberg, Hönggerberg, Waldgarten, Irchel, Allmend, Katzensee, Ziegelhütte) (450-670 m) 6.v.-10.vi.1995-1998 11 ♂ 15 ♀ (all *Merz*). **Slovenia**: Julian Alps, Spodnja Bilpa, River Kolpa (3000 m) 15.vi.2006 1 ♀; River Čabranica (330 m) 15.vi.2006 1 ♂; Planinska Jama (800 m) 20.vi.2006 1 ♂ (all *Plant*).

62. *Hilara longifurca* Strobl, 1892

SYNONYM: *Hilara monedula* Collin, 1927

REFERENCES: Collin (1961: 627 as *H. monedula*), Chvála (2005a: 142) – description and illustration of male fore leg, postabdomen, and genitalia.

DISTRIBUTION: Until recently usually identified and published under the name *H. monedula* (e. g., Chvála *et al.*, 1998). Widely distributed and fairly common species in Europe, from Fennoscandia south to the Alpine region, and east to Moscow region in central European Russia. In temperate Europe in lowlands for a long period from May to the beginning of August. Strobl (1893: 87) recorded it as a common species in July and August in the vicinity of Admont, at Krumau, under the variety name *H. clypeata* var. *longifurca*.

MATERIAL EXAMINED: **Austria**: Styria: Gesäuse, Ennsufer (620 m) 19.viii. 1 ♂ 1 ♀; Admont (640 m) 18.vii. 1 ♀ (all *Strobl*, syntypes); River Enns near Admont (640 m) 7.vi.1996 1 ♂, 14.-16.vi.2000 10 ♂, 2.vii.2002 1 ♂ 2 ♀; Gesäuse Eingang (620 m) 25.v.2003 1 ♂ (all *Chvála*). **Switzerland**: NE: St. Blaise, Les Riedes (470 m) 19.v.2001 1 ♀ (*Merz*). VS: Grône, Poutafontana (510 m) 18.v.1996 1 ♂ (*Merz & Bächli*). TI: Biasca, Loderio (350 m) 17.vi.1995 1 ♂; Gordola, Bolle (220 m) 19.-20.vi.1995 1 ♂ 2 ♀ (all *Merz & Bächli*); Gordola, Verzasca-Ufer (205 m) 15.v.2006 1 ♂ 1 ♀; Gordola, Bolle di Magadino (200 m) 19.v.2006 13 ♂ 3 ♀; Tenero, Lido (205 m) 15.v.2006 6 ♂ 5 ♀ (all *Merz*); Bolle di Magadino, Marais (196 m) 30.iv.1996 7 ♂ 8 ♀; Vezia, Bolle di S. Martino (400 m) 2.vi.1996 1 ♂ (all *Pollini*). GE: Cartigny, Moulin de Vert (350 m) 24.v.1999 2 ♂ 1 ♀, 5.vi.2006 2 ♂ 2 ♀ (all *Merz*); Corsier-Port, vitre véranda 1.-30.vi.2006 1 ♀ (*Besuchet*). ZH: Embrach, Haumüli (400 m) 28.v.1997 1 ♂, 29.v.1996 1 ♀; Zürich, Zürichberg (600-650 m) 25.v.1995 1 ♀, 17.vi.1997 2 ♂; Zürich, Katzensee (440 m) 25.v.1996 2 ♂ 2 ♀, 31.v.1997 2 ♂ 1 ♀, 17.vi.1995 1 ♀; Zürich, Hönggerberg (530 m) 4.vi.1996 1 ♂ (all *Merz*). **France**: Savoie, Brides 5.-20.vii.1927 1 ♀ (*Naville*).

63. *Hilara campinosensis* Niesiolowski, 1986

REFERENCES: Chvála (2005a: 143) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: Known so far in lowlands of southern Fennoscandia around the Baltic coast, but everywhere rare, as for instance in central Poland. Obviously an overlooked species, known from only a few scattered localities, in the Czech Republic only from the Šumava Mts (Böhmerwald), or from one record from a peat bog in Switzerland where males were collected in large numbers at a light trap. A summer species, records are available from June to August.

MATERIAL EXAMINED: **Switzerland**: ZH: Illnau, Wildert (515 m) 29.vi.1998 LF 20 ♂ (*Merz*).

64. *Hilara pygialis* Chvála, 2008

REFERENCES: Chvála (2008a: 79) – description and illustration of male fore leg, female hind tibia, and male genitalia.

DISTRIBUTION: Only recently described from the Spanish mountains, and also from low altitudes in the southern Alps of France (Alpes-de-Haute-Provence, Montagne de Lure). As it has recently been found also in the eastern French Pyrenees it may occur as well in central and eastern Alps at lower altitudes. For this reason it is included here. In June and July, at altitudes between 500 – 900 m.

MATERIAL EXAMINED: **France:** Pyrenees, Can Baills, 10 km SW Thuir (610 m) 11.vi.2007 2♂ 3♀ (*Merz*).

65. *Hilara nigrohirta* Collin, 1927

REFERENCES: Collin (1961: 662), Chvála (2005a: 148) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: Described from England and still known only in the south of the British Isles (England and Wales), unknown in Scandinavia. Recorded only from scattered sites of warm temperate Europe. Recently the first specimens from a region south of the Czech Republic and Hungary were identified. A lowland species of a very late occurrence in summer and autumn, in central Europe from the end of August to October. This may be the reason for its rarity in collections although locally it occurs in large swarms above standing water.

MATERIAL EXAMINED: **Switzerland:** GR: Grono, Dorf (350 m) 31.viii.2006 1♀ (*Merz*). **France:** Ardèche, Vals les Bains 3.-12.ix.2004 1♀ (*Ackland*).

REMARK: This species is here recorded for the first time from Switzerland.

66. *Hilara pseudocornicula* Strobl, 1909

SYNONYM: *Hilara subpollinosa* Collin, 1927

REFERENCES: Collin (1961: 633 as *H. subpollinosa*), Chvála (2005a: 149 as *H. subpollinosa*) – description and illustration of male fore leg and hind femur, female hind tibia, and male genitalia. Chvála (2008a: 85) – new synonymy and distribution.

DISTRIBUTION: This species was for a long time well known to dipterists in colder and temperate Europe as *Hilara subpollinosa* Collin. A species described from England, known so far from the south of Scandinavia and from central temperate Europe east to central European Russia. In central Europe mainly in mountains above 1300 m. However, the species was described already earlier from Spain as *H. pseudocornicula*, where it is locally very common, even on Mediterranean Islands (Malta). According to Strobl (1909) “in large numbers above puddles” in Spain. Therefore, the occurrence in the Alpine countries is also possible.

MATERIAL EXAMINED: **Czech Republic:** Krkonoše Mts (Riesengebirge, or Giant Mts), Labská bouda (1350 m) 23.-26.v.2001 PT 1♂ (*Vaněk*); Labská and Pančavská louka (meadow) (1340 m) 16.-17.vi.2005 2♀ (*Barták*). **Slovakia:** Velká Fatra Mts, Kantorská dolina 29.vi.1975 1♂ (*Barták*).

67. *Hilara quadrifaria* Strobl, 1892

REFERENCES: Straka (1976: 22 as *H. triglavensis* Straka, sp. n., a junior synonym) – description and illustration of male fore leg and genitalia. Chvála (1997c: 318) – description and illustration of male fore leg and genitalia, synonymy.

DISTRIBUTION: A characteristic mountain species, originally described by Strobl (1892a) from Austria and Switzerland, later by Straka (1976) as *H. triglavensis* from the Slovenian Julian Alps. Besides the Alps the species is known also from the Slovak and Romanian Carpathians. For a long period from May to August.

MATERIAL EXAMINED: **Austria:** Oberösterreich: St. Pankraz, River Steyer (490 m) 14.v. 1♂, 12.vi.2000 4♂ 1♀ (Chvála). Styria: Almsee near Turrach, Gurktaler Alpen 2♂; Gstatterboden 28.v. 1♂ (all Strobl); Hieflau, Waaggraben (600 m) 24.v.2003 1♂; Hall near Admont (640 m) 5.vi.1996 2♂; Admont, Saugraben (760 m) 12.vi.2000 1♂; Ennstaler Alpen, Unterlaussa (700 m) 14.vi.1997 2♂, 18.vi.2000 2♂; Gesäuse, Johnsbach (900 m) 8.vi.1996 1♂ 1♀; Kaiserau (1100 m) 11.vi.1997 2♂ 1♀; Kalblinggatterl (1400 m) 15.vi.1997 4♂ 2♀; Rottenmanner Tauern, Hohetauern, Weber Teich (1200 m) 5.vii.2001 1♂ (all Chvála). **Switzerland:** GR: St. Moritz 8.vii. 1♂ (Becker); Valbella See (1490 m) 10.vii.1996 4♂ 1♀; Lenz, St. Cassian (1450 m) 11.vii.1996 1♂; Susch, Dorf (1420 m) 6.viii.1996 1♂ (all Merz), same 6.viii.1995 2♂ (Merz & Bächli); Valbella, Casoja (1490-1500 m) 13.-14.vii.1998 4♂ 2♀ (Merz); Müstair (1300 m) 15.vii.1980 1♂ (Haenni). TI: Gordola, Verzasca-Ufer (205 m) 15.v.2006 1♂; Tenero, Lido (205 m) 15.v.2006 1♂ (all Merz). VS: Morgins, En Tey (1300 m) 22.vi.2003 1♂ (Merz); Aletsch, Tieffenwald (1800 m) 4.vii.1996 3♂ (Haenni). **Slovenia:** Julian Alps, River Lepena (530 m) 19.vi.2006 2♂; River Bistrica, Slap Perinik (775 m) 19.vi.2006 1♂; Vrsnik, River Soča (485 m) 19.vi.2006 1♂; River Kolpa (240 m) 15.vi.2006 1♀ (all Plančič). **France:** Alpes Maritimes, Sospel, 11 km NNW E col de Turini (1200 m) 12.vi.1994 1♂ (Haenni & Dufour).

68. *Hilara lurida* (Fallén, 1816)

REFERENCES: Collin (1961: 625), Chvála (2005a: 154) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: A widely distributed species in Europe, from Fennoscandia south to the Mediterranean and the Balkans. Flight period in central Europe from May to August. Mainly in lowlands and at lower altitudes to about 700 m in mountains including the Alps. In Austrian Alps in swarms above streams, but Strobl (1910: 70) recorded it only at “forests near Admont”, and “very sparsely”. Known also from the French Pyrenees.

MATERIAL EXAMINED: **Austria:** Styria: Admont (640 m) 13.-16.vi.2000 swarms; River Enns near Admont (640 m) 2.vii.2002 1♂; Admont, on window (640 m) 1.-8.vii.2002 2♀, 11.vii.2008 1♀ (all Chvála). **Switzerland:** NE: Hauterive, Champréveyres-Dessous (435 m) 19.vi.2004 1♂; Neuchâtel, Gorges du Seyon (495 m) 21.vi.2006 1♂ (all Haenni). GE: Cartigny, Moulin de Vert (350 m) 24.v.1999 1♀ (Merz & Müller); Chancy, Vers Vaux (335 m) 1.vi.2002 1♂ (Merz); Rés[ervoir] Nant de la Dronde (400 m) 21.vi.2006 PL 1♂ (Stucki). TI: Tenero, Lido (205 m) 15.v.2006 6♂ (Merz); Biasca, Loderio (350 m) 17.vi.1995 1♀; Gordola, Bolle (220 m) 18.vi.1995 1♀ (all Merz & Bächli). ZH: Sihlbrugg (670 m) 29.vi.1994 1♀ (Rüegg); Embrach, Haumli (400 m) 11.vi.1997 1♂ 1♀, 10.vii.1997 2♂ (all Merz), 4.-19.vi.1998 common (Wolf); Zürich, Hönggerberg (550 m) 5.vii.1994 1♂, 17.vi.1997 1♂; Zürich, Zürichberg (600 m) 18.vi.1996 2♂ 1♀; Zürich, Katzenssee (440 m) 31.v.1997 7♂ 2♀; Zürich, Ziegelhütte (460 m) 29.vi.1997 2♂ 1♀; Zürich, Rütihof (500 m) 1.vii.1993 1♀; Meilen, Veltlin 1.vi.1997 1♀ (all Merz). **Slovenia:** Julian Alps, Planinska jama (800 m) 20.vi.2006 1♀; Spodnja Bilpa, River Kolpa (300 m) 15.vi.2006 4♂ 1♀ (all Plančič). **France:** Gard, Dourbies (1045 m) 9.vii.1989 1♀ (Haenni); Alpes Maritimes, Menton (280 m) 13.vi.1994 2♂ (Haenni & Dufour).

Group 8 – *H. lasiochira*-group

For a characterization of this group, and a revision of the six up now known European species, see Chvála (2008a: 92).

69. *Hilara pilosopectinata* Strobl, 1892

SYNONYM: *Hilara longesetosa* Strobl, 1910

REFERENCES: Chvála (2008a: 92, as *H. longesetosa*) – description and illustration of male fore and hind leg, postabdomen and genitalia; for a brief informal synonymy, see Chvála (2008b: 155 and 211).

DISTRIBUTION: Central European species, known so far from Germany, Czech Republic and Slovakia, and south to the Alpine countries. Mostly in lowlands, less often in submountain regions, for a long time in summer, from June to August. The distribution in England needs verification.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Gmunden 1♂ 1♀ (syntypes) (*Schiner*). Styria: Admont, Fels (Pitzwalde, 900 m) 5.vii. 1♂ (*Strobl*) [holotype *H. longesetosa*]. **Switzerland:** GE: Dardagny, Le Moulin (360 m) 5.vi.2006 3♂ 1♀, 30.vi.2001 1♂ (all *Merz*), 11.viii.2000 1♂ (*Merz & Bächli*); Dardagny, Roulave (420 m) 30.vi.2001 1♂ (all *Merz*); Corsier-Port, vitre véranda vi.2005 1♀ (*Besuchet*); Bernex, Saule (440 m) 19.vi.2008 1♀; Bernex, Signal (510 m) 21.vi.2008 1♀ (all *Merz*); Moulin de Veigy, source (410 m) 22.vi.2006 (at light) 2♂ 1♀ (*Stucki*). BE: Mörigen, Bucht (430 m) 7.vii.2002 1♂ (*Merz*). AG: Aarau 26.vi.1926 1♀, 12.vii.1917 1♂ (*Zürcher*). ZH: Embrach, Haumüli (400-430 m) 11.vi.1997 1♂, 3.vii.1996 1♂ 1♀ (all *Merz*), 23.-29.vi.1998 1♂ 2♀ (*Wolf*), 24.vi.1995 1♂ 1♀ (*Brandes*). **Slovenia:** River Dragonia 20.vi.2006 2♂ (*Plant*).

REMARKS: *Hilara pilosopectinata* was described by Strobl (1892a: 169) as “Ein leider nicht gut erhaltenes Pärchen dieser wunderbaren Art steckt in der Sammlung Schiner’s als n. sp. aus Oesterreich”. In comparison with other descriptions of Strobl, this species was described only briefly, incompletely, and even erroneously. It was arranged in Strobl (1892a) in the group B [Arten mit dunklem Thorax, aber wenigstens theilweise (auch ausser den Knieen) lichten Beinen], i.e. within the *Hilara* species with yellow legs; it was arranged behind *Hilara lasiopa* (as *H. matrona* Haliday), followed by two species of the *Hilara clavipes* group, and *H. lurida*. The size was not mentioned, and the main errors were the “pedibus et halteribus brunneoflavis”, and the legs as “femoribus, tibiis et metatarsi longe pilosopectinatis”. The female, mentioned as “in copula gefangen”, was briefly described in one sentence as “gleich sehr dem ♂, aber der Hinterleib ist gelbbraun, die Bewimperung der Beine um sehr viel kürzer; doch ist ...” – this short diagnosis corresponds neither with *H. longesetosa*, nor with the diagnosis of Engel (see below).

The only available published record was presented by Engel (1941: 263) who mentioned three specimens in the Vienna Museum, including a pair “♂ u. ♀ Gmunden (*Schiner* leg., *Strobl* det.)”. The Engel’s (1941) redescription led only partly to *H. longesetosa* Strobl, especially the figured male legs (Figs 156, 157), where basitarsi were shown as not bristled; however, Engel described legs in female as “einfach, aber in gleicher Weise pubeszent und beborstet wie beim ♂”. This characteristics clearly eliminated *Hilara longesetosa*. Furthermore, Strobl (1892a) mentioned the two syntypes to be from „Oesterreich“, not from Gmunden, although he always presented precise Austrian localities in his descriptions.

Therefore, Chvála (2005a: 153) doubted the synonymy of *H. pilosopectinata* with *Hilara longesetosa* but, on the other hand, he admitted that both Engel (1941) and later Andrewes (1966) could have identified specimens of *H. longesetosa* Strobl under the name of *H. pilosopectinata*. It was assumed that the latter was a distinct species

differing from *H. longesetosa* by its yellowish, strongly bristled legs including the fore basitarsi, and that it was not correctly recognized probably because of its more southern origin of the former historically largely extended Austrian Empire of the 19th century (south right up to the Mediterranean Sea). Only in 2008, the first author (MC) studied the Vienna syntypes, and found them to be insufficiently described by Strobl, but clearly conspecific with *Hilara longesetosa* Strobl. Consequently, the latter becomes a junior synonym of *H. pilospectinata* which was obviously not recognized by Strobl 18 years later when he described *H. longesetosa* based on the specimens from Gmunden. For a full redescription with illustrations of *H. longesetosa*, classified within the *Hilara lasiochira* group, see Chvála (2008a: 92), for the holotype identification, see Chvála (2004: 120).

Lectotype designation. The species was described from a pair (in copula) from the Schiner's Collection, as "aus Oesterreich". The 2 syntypes, mounted on one pin, are in the Naturhistorisches Museum, Wien, and are labelled "Gmunden Alte Sammlung", and "*H. pilospectinata* Strobl" (a label written by Strobl). The specimens are of a very old origin, they have really reddish legs. Although they are scarcely immature specimens, but they were more probably killed by ammoniac. Furthermore, the legs in the male are crossed, and the basitarsi, covered by tibiae, look like as they were long bristled as well. The syntypes were studied in September 2008, the ♂ was selected and labelled as lectotype, and the ♀ is paralectotype (Chvála, 2008b: 211). Together with the syntypic pair there are further 2♂ under *H. pilospectinata* in the Vienna Museum, both are conspecific with the syntypes: 1♂ is labelled "Wien Hadersdorf Bachrand 15.VII.51 leg. Mayer" and "*Hilara pilospectinata* Str. det. Mayer 1952"; the second ♂ is labelled "Hint. Brühe 20.7.82" and "Coll. Becher", and this is the third specimen mentioned by Engel (1941).

70. *Hilara lasiochira* Strobl, 1892

REFERENCES: Chvála (2005a: 151) – description and illustration of male fore leg, female hind tibia, and male postabdomen with genitalia.

DISTRIBUTION: Widely distributed in mild temperate Central Europe, north to Denmark and south Sweden, southwards to French Provence and Bulgaria. A lowland, spring and early summer species, from May to July. Everywhere uncommon.

MATERIAL EXAMINED: **Austria:** Tyrol: Blumau 31.v.1914 1♂ 1♀ (*Oldenberg*). **Switzerland:** GE: Jussy, Prés de Vilette (675 m) 18.v.2004 1♂; Chancy, La Laire (350 m) 9.vii.2002 1♂ (all *Merz*); Russin, Les Bailleys (405 m) 1.vii.2002 1♂ (*Merz & Hermann*). ZH: Zürich, Katzensee (440 m) 3.v.1997 1♂. TI: (205 m) Tenero, Lido (205 m) 15.v.2006 1♂ (all *Merz*); Vezia, Bolle di S. Martino (407 m) 2.vi.1996 1♂ 1♀ (all *Pollini*). **France:** Haute Savoie (500 m) iv.2001 1♂ (*Siffointe*). Hérault, Prates, 10 km N Montpellier 26.v.2006 2♀ (*Barták*). **Italy:** BZ: Bolzano 14.vi.1873 1♂ (*Kowarz*).

REMARK: This species is here recorded for the first time from Switzerland.

71. *Hilara strakai* Chvála, 1981

REFERENCES: Chvála (2008a: 100) – description and illustration of male fore leg.

DISTRIBUTION: West Mediterranean species, it has been known until now only from southern Spain between Malaga and Almeria from 300 - 600 m (see Chvála, 2008a), now it is recorded also from Switzerland. A good example that some of the supposedly exclusively “Spanish” *Hilara* species (as *H. ponti*, *H. veletica*, *H. pygialis*) may well occur also in the Central Europe. An early spring species, in April and May.

MATERIAL EXAMINED: **Switzerland:** GE: Bernex Signal (500 m) 30.iv.2007 1♂ 1♀, same (510 m) 2.v.2008 1♂ (all *Merz*).

REMARK: This species is here recorded for the first time from Switzerland.

Group 9 – *H. interstincta*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 156 and 2008a: 101).

72. *Hilara interstincta* (Fallén, 1816)

REFERENCES: Collin (1961: 606), Chvála (2005a: 156) – description and illustration of fore and mid leg, and genitalia.

DISTRIBUTION: *Hilara interstincta* is the only species of the genus with a confirmed Holarctic distribution. In the old world known throughout Europe including Siberia. In the Nearctic region it was found in northeast Canada. Throughout Europe, from the north of Fennoscandia south to the Mediterranean. In temperate Europe everywhere very common both in lowlands and high in mountains, from May to August. However, in the Alps only for a shorter period in June and in July, then it is replaced at the same sites by the exclusively alpine, but also very common, *H. dimidiata*. Strobl (1910: 69) recorded mass occurrence of *H. interstincta* at Turrach in southern Styria, but recorded it as much less common in the vicinity of Admont.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Totes Gebirge, Wurzeralm (1400 m) 30.vi.2002 swarms; Hinterstoder (700 m) 8.vii.2001 2♀. Styria: Haller Mauern, Mühlau (750 m) 19.vi.2007 1♀; Ennstal, Frauenberg near Admont (680 m) 25.vi.2002 2♀, 4.vii.2001 swarms; Admont, Kematengraben (1000 m) 9.vii.2001 1♂; Weissenbach bei Liezen (700 m) 8.vii.2002 1♂ 1♀; Gesäuse, Kalbling (1500 m) 1.vii.2002 swarms; Kaiserau, (1100 m) 1.vii.2002 1♂ 2♀; Gesäuse, Johnsbach (1050 m) 5.vii.2002 common; Rottenmanner Tauern, Hohentauern, Weber Teich (1200 m) 5.vii.2001 swarms; Bösenstein, Scheibelsee (1750 m) 6.vii.2002 swarms; Schladming, Planai (1850 m) 6.vii.2001 swarms; Schladminger Tauern, Sölkpass (1800 m) 7.vii.2001 9♂ 1♀; Kleinsölk (1000 m) 7.vii.2001 5♂ 1♀ (all *Chvála*). **Switzerland:** GR: Lenzerheide (2000 m) MT [= Malaise trap] 21.-31.vii.2000 1♂; Valbella, Casoja (1500 m) 19.-24.vii.1997 3♂ 6♀, 24.vii.1999 2♂ 1♀; Ftan (1650 m) 27.vi.1994 1♂ (all *Merz*). ZH: Embrach, Haumüli (400 m) 24.vi.1995 1♀ (*Soliva*), 11.vi.1997 1♂ (*Ruckstuhl*); Zürich, Zürichberg (650 m) 28.vi.1995 1♂ (*Ungricht*); Zürich, Katzenssee (440 m) 31.v.1997 1♀ (*Merz*). BE: Hasliberg viii.1891 1♂ 1♀ (*Escher-Kündig*). TI: Piora (1860-1880 m) 21.-23.vii.1981 1♂ 1♀ (*Sauter*), 15.-20.vii.1896 7♂. **Italy:** Madesimo 31.vii.1910 1♂ (all *Escher-Kündig*). **Slovenia:** Julian Alps, Pohorje Mts, Rogla (1300 m) 17.vi.2006 14♂ (*Plant*).

73. *Hilara lugubris* (Zetterstedt, 1819)

REFERENCES: Collin (1961: 609), Chvála (2005a: 158) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: Although described from the south of Sweden (Skåne), very rare in Scandinavia. Everywhere uncommon at scattered localities from England and the

Netherlands south to the Alpine countries and Romania. Both in lowlands and in mountains, without any preference. Flight period from May to July.

MATERIAL EXAMINED: **Austria:** Styria: Scheibleggerhochalpen, Kalbling (5000') 18.vii.1890 1♂; Hohentauern Wolfsgraben 1♀ (all *Strobl*); Rottenmanner Tauern, Weber Teich (1300 m) 5.vii.2001 swarm, 6.vii.2002 1♂ (*Chvála*). **Switzerland:** GR: Zernez (1450 m) 29.vi.1957 1♂ (*Sauter*). VS: Raron, Heidnischbiel (700-770 m) 26.v.1999 3♀ (*Merz*).

74. *Hilara dimidiata* Strobl, 1892

Figs 27-30

REFERENCES: Strobl (1892a: 128).

DIAGNOSIS: Large, body 3.5 – 5 mm long, dull greyish-black species, with all hairs and bristles on body and legs black. A strongly black bristled species, *acr* regularly 4-serial, legs long and rather slender, male *bt*₁ long ovate and not much wider than corresponding tibia, female *t*₃ slender on basal half, and very dilated towards tip.

REDESCRIPTION:

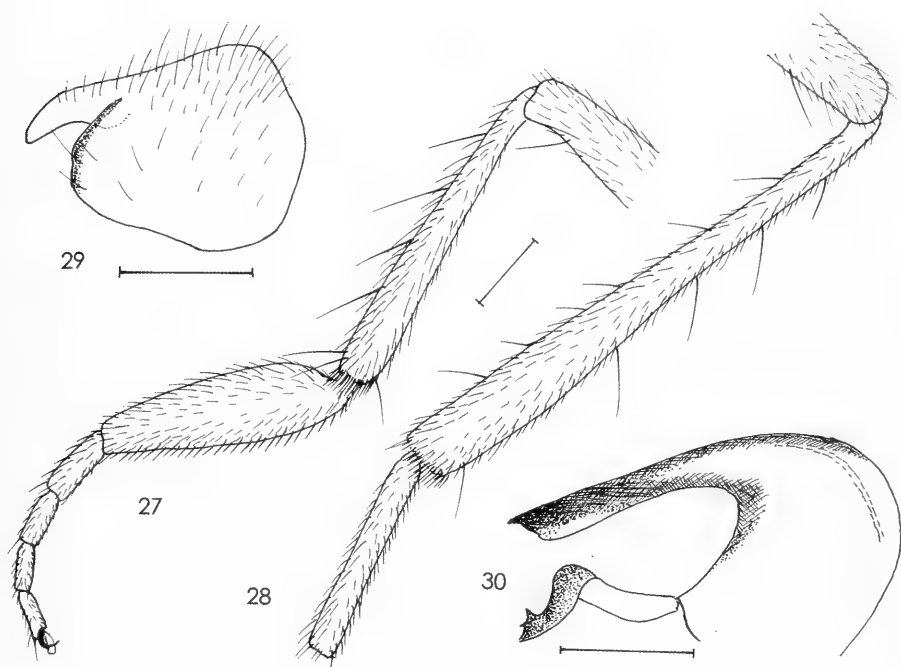
Male. All hairs and strong bristles on head black. Frons wide, and like vertex and occiput dull velvety black, frons with only a small triangular patch just above antennae grey; face as wide as frons below, dull grey. Ocellar and frontal bristles equally long and strong, upper vertical setae only slightly shorter. Antennae black, style long and slender, as long as the narrowly triangular segment 3. Palpi greyish-black, densely black pubescent beneath, and with a very long preapical seta, clearly longer than the short labrum, which is scarcely half as long as head is high.

Thorax uniformly dull greyish-black, pleura lighter grey, and scutum in dorsal view more blackish, leaving humeri (postpronotum), narrow margins, and scutellum lighter grey. All setae black, *acr* numerous, regularly widely 4-serial, lying in anterior view on a darker central stripe (turning to brownish stripe when viewed from behind), all strong but not very long, *dc* uniserial and clearly longer, posterior prescutellar pairs very long. Other marginal bristles in full number, long and strong, especially a *pa*, 3 *ntpl*, a *sa*, and the inner pair of the 4 *sc*: pronotum with a strong seta on each side, and additional usually 4 small setae towards middle.

Wings almost clear, with strong blackish veins and a distinct dark stigma, anal vein indistinct, and radial fork long. Squamae whitish-grey with whitish fringes. Haltere blackish, but stem clearly paler, brownish to yellowish-brown.

Legs long and rather slender, subshining black and finely greyish pollinose, *cx*₁ and base of *f*₁ often with a tendency to be slightly translucent brownish. All hairs and setae black, femora without distinct bristles, except for a row of the usual very long strong anterior bristles on *f*₂; *t*₁ (Fig. 27) with several dorsal bristles slightly longer than tibia is deep, similar dorsal bristling also on *t*₃, and some shorter but more numerous anteroventral bristles; *t*₂ with only a few (2 or 3) short antero- and posteroventral setae in apical half; all tibiae also with a comb of distinct preapical setae. All tarsi long and slender, covered with short hairs, *bt*₁ (Fig. 27) long ovate, and not much stouter than tibia.

Abdomen subshining black on dorsum, sterna dull greyish; pubescence dense, hind-marginal bristles on terga strong. Genitalia (Figs 29-30) in general structure and also in details as in *H. interstincta*, but the terminal blunt-ended process of lateral lamella broader, and also terminal part of hypandrium much broader.



FIGS 27-30

Hilara dimidiata Strobl (A, Styria, Schladminger Tauern, Sölkpass). (27) Male fore leg in anterior view. (28) Female hind tibia and basitarsus in posterior view. (29) Lateral genital lamella. (30) Hypandrium with postgonite. Scale: 0.2 mm.

Length: body 4.0 – 5.0 mm, wing 4.3 – 4.9 mm.

Female. Very much like male, also the bristling on legs similar, only t_1 dorsally with shorter setae, as long as tibia is deep, but the characteristic bristling of t_2 exactly as in male; t_3 (Fig. 28) very characteristic by its narrow basal half, and very dilated apical half (resembling in this way especially *H. nigrocincta*). Abdomen similarly almost shining black on dorsum of basal 5 segments, apical segments dull grey, and hind-marginal bristles on terga not absent.

Length: body 3.3 – 4.6 mm, wing 4.2 – 4.8 mm.

DIFFERENTIAL DIAGNOSIS: Morphologically resembling *H. interstincta* and occurring in the same habitats but has a later flight period. It clearly differs by the absence of ventral spine-like bristles on f_2 which are present in *H. interstincta* and *H. lugubris*, and the female of *H. dimidiata* is very characteristic by its unusually thickened t_3 on apical half (tibia is simple and slender in both *H. interstincta* and *H. lugubris*).

DISTRIBUTION: An endemic Alpine species, very common everywhere but only at high altitudes, forming common swarms above puddles and streams in late summer, mainly from August to the beginning of October. Strobl (1893: 89) recorded its mass occurrence in the Styrian Alps from the Ennstaler Alpen, Gesäuse and Rottenmanner

Tauern in July and August. In the original description Strobl (1892a: 128) described it as one of the commonest *Hilara* species in the Styrian Alps, swarming above streams, lakes and puddles.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Hinterstoder, River Steyer (650 m) 23.viii.2001 common (*Chvála*). Styria: Natterriegel 27.vii.1891 1♂; Scheiplalm (at Bösenstein, 1700 m) 13.viii.1882 1♀; Veitlgraben 1♀; Triebenthal 10.viii. 1♂; Krumau (near Admont, 640 m) 15.viii.1883 1♀; Gesäuse 6.viii. 1♂; Rottenmanner Tauern, Hochschwung (about 2000 m) 30.viii.1890 1♂ 2♀ (all *Strobl*); Scheibleggerhochalpe, Kalblinggatterl (1500 m) 27.vii.1997 swarms; Gesäuse, Johnsbach (970 m) 1.viii.2003 1♂; Kaiserau (1150 m) 2.viii.2009 swarms; Haller Mauern, Oberlaussa, Polzalmbach (950 m) 25.viii.2001 common; Buchauer Sattel (830 m) 12.ix.2006 1♂; Mühlau, Esslingbach (900 m); Rottenmanner Tauern, Bösenstein, Scheibensee (1750 m) 2.viii.2003, 10.ix.2006, 18.ix.2004 common; Edelrautehütte (1725 m) 10.ix.2006 swarms; Hohentauern (1300 m) 10.ix.2006 swarms; Schladminger Tauern, Sölkpass (1900 m) 24.viii.2001 swarms (all *Chvála*). **Switzerland:** GR: Ausserferrera (1300 m) 28.viii.2006 1♂ 7♀; Ausserferrera, Cresta (1300-1670 m) 1.ix.2006 2♀ (all *Merz*); Susch, Dorf (1420 m) 6.viii.1996 1♂ (*Merz & Bächli*); Laax vii.-viii.1892 5♂ 1♀ (*Escher-Kündig*). GL: Klöntal, Richisau (1150 m) 7.-8.viii.1995 2♂ (*Merz*), 8.viii.1991 1♂ (*Bächli*). SG: Unterwasser (910 m) 15.viii.1997 1♂ 1♀. UR: Unterschächen (1060 m) 25.viii.1997 4♂ 3♀ (all *Merz*). BE: Weissenburg im Simmental 5♂ (*Huguenin*). VS: Visperterminen, Dorf (1400 m) 30.vii.1998 1♀ (*Merz & Bächli*); Visperterminen, Gebidemsee (1900-2200 m) 28.viii.2001 1♂ (*Merz & Landry*), 10.ix.2005 1♀ (*Ismay & Schulten*). FR: Schwarzsee (1046 m) 11.ix.1995. TI: Bodio (Bitanengo) Ri della Fontana (1000 m) 19.viii.1988 3♀. VD: Bex, Vallon de Nant (1580-1740 m) 8.x.1995 2♀ (all *Haenni*).

REMARK: The species was listed from Switzerland in the Checklist (*Chvála et al.*, 1998) from literature records only. Herewith its presence in Switzerland is confirmed by specimens collected and studied recently by the authors.

75. *Hilara scrobiculata* Loew, 1873

REFERENCES: Collin (1961: 612), Chvála (2005a: 160) – description and illustration of male fore leg, postabdomen and genitalia.

DISTRIBUTION: Widely distributed in Europe, described from the western slopes of East Carpathians, but not rare as well in northern parts of Fennoscandia, known also from Scotland, the Romanian Carpathians and the Austrian, Swiss and French Alps. A species of boreoalpine or boreomontane distribution in Europe, frequently in the Alps at altitudes above 2000 m, mainly in July and August. The only *Hilara* species recorded by Menzel & Ziegler (2001) from the Hohe Tauern National Park in Austria.

MATERIAL EXAMINED: **Austria:** Styria: Haller Mauern, Natterriegel 11.viii.1890 1♀ (*Strobl*); Admonter Haus (1700 m) 8.viii.1998 2♂ (*Chvála*); Rottenmanner Tauern, Hochschwung (2100 m) 20.viii.1890 1♂ (*Strobl*). Tyrol: Grossglockner (2250 m) 17.viii.1893 1♂ 3♀ (*Strobl*), 31.vii.1988 2♀ (*Barták*); Oberes Mölltal, Pockhomer Wiesen (2000 m) 24.vii.1996 1♂ 1♀ (*Kreisich*). **Switzerland:** GR: St. Moritz 29.vi. 1♀ (holotype of *H. coerulea* Becker, 1887, a synonym of *H. scrobiculata*), 29.vi. 1♂ 1♀ (No.9847, 9849) (*Becker*); Zuoz, Stipawiese (1675 m) 15.vii.1975 1♀, same (1685 m) 22.vii.1987 2♀ (*Sauter*); Valbella, See (1490 m) 10.vii.1996 3♂ 1♀; Valbella, Casoja (1550 m) 13.vii.1996 1♂, same (1500 m) 14.vii.1998 1♀ (all *Merz*). **France:** Pic Long (2200 m) 9.vii.1990 2♀; Hautes-Alpes, Montgenevre (1800 m) 17.vii.1990 4♂ (all *Barták*).

76. *Hilara sirbitzmatrona* sp. n.

Figs 31-32

DIAGNOSIS: Medium-sized, body about 3 – 3.5 mm long, black coloured and strongly black bristled species, with short labrum, dull black occiput, thorax with

shifting black pattern on a cupreous brown scutum; *acr* 4-serial, haltere and legs uniformly black, male fore tibia and tarsus very stout and strongly black bristled.

DESCRIPTION:

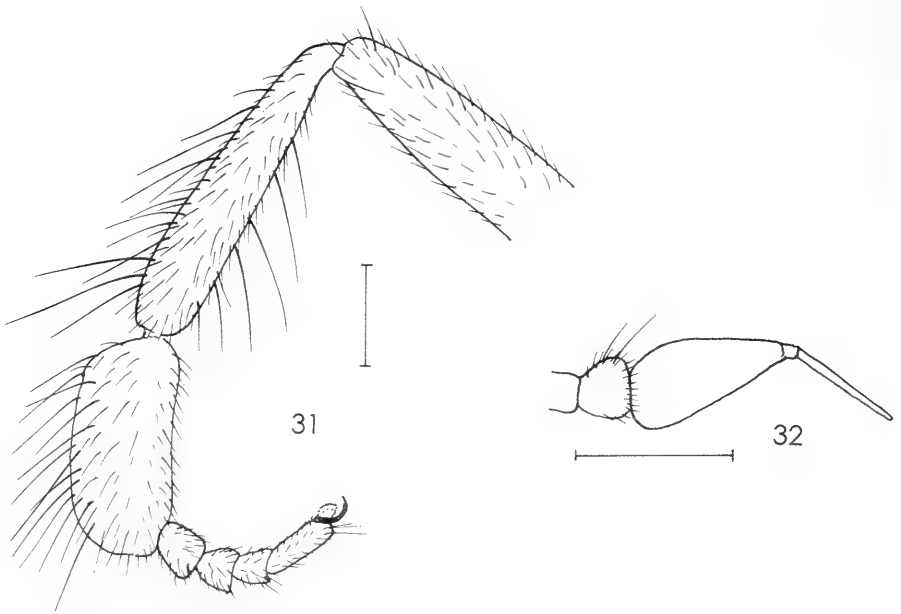
Male. Frons and face very broad, frons velvety black with a brownish patch above antennae, face dull grey, short, nearly light grey in some lights, vertex and occiput dull velvety black. Black ocellar and frontal bristles equally very long and thin, nearly as long as 3rd antennal segment including style, and longer than upper post-ocular occipital bristles. Occipital pubescence rather small and fine, although dense and uniformly black, upper postocular bristles forwardly curved. Antennae (Fig. 32) black, basal segments as long as deep, 3rd segment broad, and style slender, nearly as long. Palpi black, greyish pollinose beneath and finely short dark pubescent, and with a single very long black bristle before tip. Labrum short, scarcely half as long as head is high.

Thorax dull grey, pleura, and prosternum in particular, lighter grey dusted. Thoracic pattern very much as in some species of the *H. andermattensis*-group: scutum when viewed from in front almost uniformly cupreous-brown dusted, in dorsal view first with 3 dull black stripes on lines of bristles, then the stripes coalesce and dorsum is deep black, leaving only postalar calli and scutellum cupreous, and in posterior view with 2 very pale cupreous lines between the rows of bristles. Large bristles black and in full number but rather fine and small, smaller than the ocellar and frontal bristles; *acr* irregularly 4-serial (less numerous anteriorly), *dc* 1-serial, all rather small and fine; a small *h* bristle, similarly fine *ih* and *ph*, 3 *npl* stronger, a fine black *pa* and last pre-scutellar pair of *dc*, 2 pairs of *sc*, the inner pair the longest thoracic bristles. Pronotum microscopically dark pubescent and with a fine black bristle on each side, prothoracic episterna and whole prosternum also between fore coxae covered with dense, minute black hairs; spiracles very dark.

Wings faintly brownish clouded, although in some lights nearly clear, with dark contrasting veins and a distinct dark brown stigma, and a small black costal bristle. Squama blackish with dark fringes, haltere black.

Legs uniformly black, finely greyish pollinose, especially on tibiae in some lights; f_1 almost bare except for a few preapical black bristly hairs dorsally, posterior four femora with longer dark hairs only ventrally, f_2 with a row of the usual strong black bristles anteriorly; f_3 with fine bristly hairs dorsally, and a row of anteroventral bristly hairs ending in 2 long, apically curved preapical bristles; t_1 (Fig. 31) stout and widening towards tip, densely long black bristled dorsally and posteriorly, the bristles on apical third of tibia more than twice as long as tibia is deep; t_2 with short black bristly hairs antero- and posteroventrally, and 2 short bristles dorsally before tip; t_3 short pubescent, somewhat longer bristles (not longer than tibia is deep) only anteroventrally; bt_1 (Fig. 31) very thickened, much wider than the already stout tibia, dorsally clothed with densely set long black bristly hairs nearly as long as the basitarsus is deep; following tarsomeres short and stout, almost as long as deep, and rest of tarsus is scarcely as long as basitarsus; posterior four tarsi rather slender and only short pubescent, also tarsomeres 3 and 4 on mid leg very short.

Abdomen dull, densely rather light grey to greyish-brown dusted, almost brownish on dorsum; pubescence short, dark, no distinct hind-marginal bristles,



FIGS 31-32

Hilara sirbitzmatrona sp. n. ♂ (A, Styria: Sirbitzkogel, holotype). (31) Fore leg in posterior view. (32) Antenna. Scale: 0.2 mm.

although hind margins of terga with longer hairs. Genitalia rather large and compact, mostly greyish dusted, concolorous with abdomen, only tips of lateral lamellae and hypandrium almost shining, and all lamellae covered with only minute dark hairs.

Length: body 3.3 mm, wing 3.7 mm (holotype).

Female unknown.

Holotype ♂: **Austria**: Sirbitzkogel. Collection Strobl, Admont (Sirbitzkogel = Zirbitzkogel, peak 2396 m high in the Seetaler Alpen, southern Styria) (BSA).

The holotype was placed in the so-called Type Collection of Strobl (Typen-Sammlung; see Chvála, 2008b: 164) as *Hilara matroniformis* Strobl, 1892 (see Chvála, 2008a: 49) as a species originally described by Strobl (1892b: 40) from the Mediterranean coast. This male, No. 1046 of the "Type Collection", was labelled "*matronif.* v. ? Beine ganz schwarz. ♂ Sirbitzkogel", thus as a probable blacklegged variety of the southern European *H. matroniformis*, and it was erroneously labelled by Morge in 1961 as "Typen-Exemplar" of *Hilara matroniformis* Strobl (for details see Chvála, 2004: 116).

DERIVATIO NOMINIS: The species name (epithet) is a compound word of the mountain *Sirbitz*-kogel, the type locality, and the original species name *matrona*, of which the Mediterranean *H. matroniformis* was derived by Strobl in 1892.

DISTRIBUTION: So far only known from the holotype collected in Austria.

77. *Hilara angoldanica* Lundbeck, 1913

REFERENCES: Collin (1961: 623), Chvála (2005a: 164) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: As it is obvious from the species name (epithet) it was described from England and Denmark, later found also in the south of Sweden, and at scattered lowlands localities in central parts of temperate Europe, south to the Alpine region. At most at altitudes of about 500 m. A spring species, in May and June in the Alps. Surprisingly not yet found in Austria.

MATERIAL EXAMINED: **Switzerland:** GE: Chancy, Vers Vaux (335 m) 1.vi.2002 1♂; Bernex, Chante-Merle (415 m) 16.v.1999 1♂; Cartigny, Moulin de Vert (350 m) 5.vi.2006 8♂ 3♀ (all *Merz*); Corsier, Port vi.2005 1♂ (*Besuchet*); Rés[erve] de Nant de la Dronde (400 m) 21.vi.2006 PL 1♂ (*Stucki*). ZH: Zürich, Hônggerberg (530 m) 10.vi.1997 10♂ 3♀ (*Merz*); Embrach, Haumüli (400 m) 11.vi.1997 1♂ (*Zulliger*). **France:** Grand Bois, 30 km S of Lyon (440 m) 21.v.2006 7♂ 2♀ (*Barták*).

78. *Hilara aeronetha* Mik, 1892

REFERENCES: Collin (1961: 616), Chvála (2005a: 168) – description and illustration of male genitalia.

DISTRIBUTION: This species is morphologically very similar to the following species, *H. angustifrons*, and old faunistic records should be treated with caution. The two species can be distinguished by the combination of characters given by Chvála (2005a: 166-169). Mostly in central parts of temperate Europe, south to the Alpine region, the Pyrenees and the Romanian Carpathians. *H. aeronetha* seems to be more abundant in the Austrian Alps. A spring and early summer species, in the Alpine region for a short period from the middle of May to the middle of July, mainly in June. Strobl (1910: 69) recorded swarms in July at the Johnsbach valley in the Styrian Gesäuse.

MATERIAL EXAMINED: **Austria:** Styria: Admont, Kematengraben (950-1000 m) 14.vi.2000, 26.vi.2002 and 9.vii.2001 swarms; Haller Mauern, Mühlau, Esslingbach (900 m) 3.vii.2002 2♂; Gesäuse, Johnsbach (1050 m) 5.vii.2002 1♂ (all *Chvála*). **Switzerland:** TI: Mte. S. Giorgio, Meride-Cassina (580-900 m) 17.v.2006 1♂ (*Merz*). **Slovenia:** Julian Alps, Vrsnik, River Soča (485 m) 19.vi.2006 1♀; Gasparci, River Kolpa (310 m) 15.vi.2006 2♂; Čabor, River Čabranca (280-330 m) 15.vi.2006 11♂ 1♀; Spodnja Bilpa, River Kolpa (230-300 m) 15.vi.2006 3♂ (all *Plant*). **France:** Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 3♂ 2♀ (*Barták*); Pyrenées-Orientales, Can Baills, 10 km SW Thuir (610 m) 11.vi.2007 4♂ (*Merz*).

79. *Hilara angustifrons* Strobl, 1892

REFERENCES: Collin (1961: 614), Chvála (2005a: 166) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: Very often confused with the morphologically similar *H. aeronetha* (see above) and old records are therefore not always reliable. Widely distributed species in Europe, common on the British Isles including Scotland, and from southern Scandinavia south to the Alpine region and the Pyrenees. In central parts of Europe only at higher altitudes and in mountains, for a long period from June to August, though everywhere rather rare. Strobl (1893: 89) recorded it in the Styrian Alps as a “not rare” species at several sites in the close vicinity of Admont, for details on the specimens, see Chvála (2004: 125).

MATERIAL EXAMINED: **Austria:** Styria: Gesäuse 16.vii.1885 1♂; Admont, Schafferweg 18.vii.1885 1♀; Admont, Kalkofen at Kematen 15.viii.1891 3♂ 2♀ (all *Strobl*); Hieflau 10.viii.1891 1♂ 1♀ (*Mik*); Haller Mauern, Mühlau, Mühlauerbach (850-900 m) 11.viii.1998 1♂, 25.-28.viii.1999 2♂ 1♀, 3.vii.2002 1♀ (*Chvála*). **Switzerland:** TI: Piora (1880 m) 23.vii.1981 1♀ (*Sauter*). **Slovenia:** Julian Alps, Pohorje Mts (1300 m) 17.vi.2006 1♀ (*Plant*).

80. *Hilara caerulescens* Oldenberg, 1916

REFERENCES: Chvála (2002a: 71) – description and illustration of antenna, male fore leg, and genitalia.

DISTRIBUTION: A species of warm regions of temperate central parts of Europe (Czech Republic, Slovakia), although in the Alps it prefers higher altitudes from 600 m up to 2200 m. A typical spring species, in the Alpine region from 5 April to 12 July. In Switzerland, where it is fairly common, mainly in April and May. At Lenzerheide the males were observed by the second author (BM) swarming in large numbers over snow patches.

MATERIAL EXAMINED: **Austria:** Lower Austria: Krems env., Dürnstein 3.vi.2006 1♂ (*He man*). **Switzerland:** GR: Lenzerheide, Sanaspans (1700-1900 m) 18.v.1997 6♂ (*Merz & Eggenberger*). VS: Leuk, Platten (630 m) 22.iv.1998 1♂ 4♀ (*Merz & Botta*), same (650 m) 5.iv.2007 2♂ 4♀, (625 m) 2.v.1999 5♂ 4♀ (all *Merz*); Leuk, Brentjong (900 m) 19.v.1996 1♂ (*Merz & Bächli*); Leuk, Pfywald 23.iv.1998 1♂ (*Merz & Botta*); Forêt d'Aletsch (1900 m) 26.vi.1975 1♂; Aletsch, Riederfurka, Hohfluh (2000-2200 m) 3.vii.1996 1♂ (all *Haenni*). **Italy:** Tyroler Dolomiten, Tschamintal (1300-1400 m) 12.-27.vi.1914 9♂. BZ: Tiers 16.-22.vi.1914 3♂ (all syntypes, *Oldenberg*). **France:** Hautes-Alpes, Montgenevre (1800 m) 12.vii.1990 2♂ (*Barták*).

Group 10 – *H. andermattensis*-group

For a characterization of this group, and a revision of the seven up to recently known Alpine species, see Chvála (1999a).

81. *Hilara helvetica* Chvála, 1999

REFERENCES: Chvála (1999a: 36) – description of male, and illustration of head, male fore leg and genitalia.

DIAGNOSIS: A medium-sized dull velvety black species about 3 – 3.3 mm long, with labrum at least as long as head is high, f_1 with short hairs posteriorly, and a stout antennal style. Male genitalia unusually large, and both t_1 and the very thickened bt_1 in ♂ covered with long setae. Female remained unknown until now.

DESCRIPTION:

Female. Frons very broad, dull black, with only a small greyish patch above antennae, face as wide, but greyish. Antennal style stout, and only slightly shorter than segment 3. Palpi blackish, ventrally with a single very long seta in apical third about half as long as labrum, which is at least as long as head is high. Scutum greyish in anterior view, in anterodorsal view with 3 blackish stripes on the lines of 2-serial *acr* and 1-serial *dc*, in dorsal view almost velvety black; when viewed from behind with narrow greyish lines between the rows of bristles, prescutellar depression and scutellum greyish. Wings as in male, very slightly clouded, veins very dark, but the blackish squa-

mae with whitish fringes. Legs rather slender, t_1 dorsally at about middle with a single black seta as long as tibia is deep, t_2 only short pubescent, t_3 slender and simple, unmodified, and only dorsally with 2 longer black bristles at middle and before tip as long as tibia is deep. Tarsi unmodified but longer than in male, bt_1 about 3 times as long as deep, 2nd tarsomere about twice as long, and 3rd and 4th tarsomeres on fore leg as long as deep. Abdomen finely silvery-grey pollinose, pubescence short and blackish, hind-marginal bristles absent. Length: body 3.3 mm, wing 3.3 mm.

DISTRIBUTION: Swiss and Italian Alps. The species was described on the basis of 2♂ from Zernez in the Swiss Alps, but now an additional pair was found in the collection of W. Schuse in the Dresden Museum, collected by L. Oldenberg in the northwestern Italian Alps.

MATERIAL EXAMINED: **Switzerland:** GR: Zernez, Gondas (1480 m) 4.viii.1996 2♂ (*Merz & Bächli*). **Italy:** VB: Macugnaga 2.viii.1900 1♂ 1♀ (*Oldenberg*).

82. *Hilara maior* Strobl, 1910

SYNONYM: *Hilara tatra* Niesiolowski, 1991, **syn. n.**

REFERENCES: Chvála (1999a: 38) – description and illustration of male fore leg and genitalia.

DIAGNOSIS: This large-sized species of the *H. andermattensis*-group was originally described by Strobl (1910) as a variety of *Hilara longevittata* [sic] Zetterstedt sensu Strobl, and later also by Niesiolowski (1991) as *Hilara tatra* from the Polish Carpathians. For more details on the morphology of this species see below under *H. parvimaior* sp. n.

DISTRIBUTION: *H. maior* is the only species of the *H. andermattensis*-group which is not endemic in the Alps, as it is known also in from the Slovak and Polish Carpathians (High Tatra Mts). High mountain summer species, at altitudes above 1600 m, mainly in August.

MATERIAL EXAMINED: **Germany:** Allgäuer Alpen, Hinterstein 29.vii.1925 2♀ (*Oldenberg*). **Austria:** Styria: Gesäuse, Johnsbachalpen, above Wolfbauern 4♂ 2♀ (syntypes); Haller Mauern, Natterriegel (1700–2000 m) 22.viii.1891 1♂ (all *Strobl*); Schladminger Tauern, Sölkerpass (1900 m) 6.–8.viii.1995 2♂ 1♀ (*Barták*). Tyrol: Grossglockner (2000–2250 m) 31.vii.1988 12♂ 2♀ (*Barták*); Kals am Grossglockner, Teichnitzal (2200 m) 24.vii.1982 1♀ (*Havel*). **Switzerland:** BE: Grimsel, 17.viii.1899 1♀ (*Escher-Kündig*). VS: Grimselpass, Totensee (2200 m) 8.viii.2006 1♂ 1♀ (*Haenni*). GR: Ausserferrera, Alps Moos (2250 m) 20.viii.1993 1♀ (*Merz*).

NOTES ON ITS SYNONYMY: Thanks to Dr J. Wiedeska of the Łódź University the first author (MC) had the opportunity to study the only specimen of *Hilara tatra* Niesiolowski, the holotype ♂ collected on 14.vii.1986 by S. Niesiolowski at the “source of Strzyżski Stream (1100 m)” in the Polish Tatra Mts; it “was caught on streamside plants”. The holotype was labelled as partly mounted on a microscope slide, partly as kept in an alcohol vial. The microscope slide includes two (!) conspecific fore legs, both genital lateral lamellae, both cerci (as illustrated in the description of *H. tatra*), and the tip of hypandrium. Its examination shows that on both sides before the tip there is only a single sharp projection, not several teeth as drawn on the illustration of Niesiolowski (1991: 80, Fig. 2.5). The specimen kept in the alcohol vial, and

labelled as holotype of *H. tatra* as well, possesses left fore leg, and it is clearly a male of *H. maior* Strobl. It is evident that the structures kept in the microscope slide (with both fore legs) belong to a different species. Based on the original description, and the male specimen kept in the alcohol vial (labelled by Niesiolowski as holotype and with the same data of capture as in the description), the species *Hilara tatra* Niesiolowski, 1991, is a junior synonym of *Hilara maior* Strobl, 1910 (new synonymy).

83. *Hilara parvimaior* sp. n.

Figs 33-35

DIAGNOSIS: A small, body 2.3 – 2.8 mm long, uniformly dull velvety black species of the *H. andermattensis* group. Labrum short, occiput and scutum uniformly black, *acr* small and narrowly 2-serial, wings brownish. Legs uniformly black and short pubescent, *bt*₁ in ♂ short and very thickened, tarsi short with tarsomeres as long as deep, and ♀ *t*₃ distinctly thickened and curved.

DESCRIPTION:

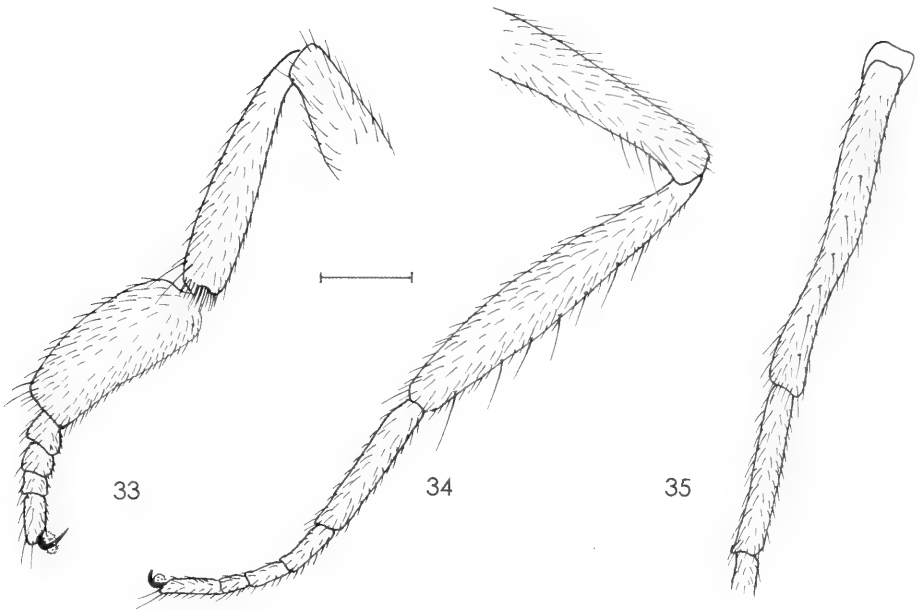
Male. Frons and face very broad; frons, vertex and occiput dull black, only face and a small patch just above antennae greyish. All hairs and bristles on head black, ocellar setae as long as antennal segment 3 without style, frontal setae only indistinctly smaller, upper postvertical setae smaller. Antennae black, style slender, two-thirds length of segment 3. Palpi black bristled beneath, the single preapical ventral seta very long, as long as labrum; latter short, half as long as head is high.

Thorax uniformly black, pleura with a slight silvery-grey tomentum, varying in size and sharpness in different points of view. Scutum as in *H. maior*, in anterior view finely brownish grey dusted with 3 darker stripes on lines of bristles which are also visible in anterodorsal view, when viewed from above and behind uniformly dull velvety black, only scutellum and a small prescutellar area brownish. All setae black, *acr* narrowly 2-serial, widely separated from 1-serial *dc*, all small and fine, numerous (more than 12 setae in one row), *acr* only minute posteriorly. Large marginal bristles in full number, including a distinct bristle on each side of pronotum, the inner pair of *sc* the longest, other setae about as long as ocellar setae.

Wings faintly brownish, veins blackish, stigma not very distinct because of the brownish colour of the wing; costal seta as long as last two pairs of long prescutellar *dc*; radial fork long and rather narrow. Squama blackish with black fringes, haltere uniformly black.

Legs uniformly black, very finely silvery-grey pollinose, rather short and stout, and covered mostly with fine, very short black pubescence; *f*₁ short pubescent even posteriorly, a few longer setae only anteroventrally before tip, similarly like *f*₃; only *f*₂ with the usual anterior row of long black setae; *t*₁ as in Fig 33, *bt*₁ very thickened and not much shorter than corresponding tibia, covered with short hairs only, following tarsomeres 2-4 very short, on both anterior two pairs as long as deep; tibiae with only a single dorsal preapical seta, otherwise finely short pubescent; *t*₃ dorsally with several longer, fine dorsal setae.

Abdomen dull black, somewhat subshining in dorsal view only, pubescence short, black, hind-marginal bristles fine and more distinct on posterior terga. Genitalia small, simple as in other species of the *H. andermattensis* group of species, but the narrower terminal part of hypandrium rather stout, and conspicuously polished black.



FIGS 33-35

Hilara parvimaior sp. n. ♂ (CH, VS: Lötschental, Fafleralp, holotype). (33) Fore leg in anterior view. ♀ (I, Aosta, St. Denis). (34) Hind leg in anterior view. (35) Hind tibia with basitarsus in dorsal view. Scale: 0.2 mm.

Length: body 2.8 mm, wing 3.2 mm (holotype).

Female. All main characters, including colouration and structure of head and thorax, the pattern of scutum, and bristling on head, thorax and legs, as in male; wings similarly distinctly brownish clouded. Legs with similar bristling and haring, fore tarsus unmodified, and tarsomeres 2-4 on anterior two pairs also very short as in male; t_3 (Figs 34-35) distinctly thickened, nearly as wide as corresponding femur, and distinctly curved. Abdomen more subshining black, pubescence sparse, indistinct, hind-marginal bristles not developed.

Length: body 2.3 – 2.8 mm, wing 2.7 – 3.2 mm.

DIFFERENTIAL DIAGNOSIS: This species resembles at first sight very small specimens of *H. maior*, differing chiefly besides the small size by the short labrum (as long as head is high in *H. maior*), the darker brownish wings, and by the thickened and curved t_3 in the female. In the key *H. parvimaior* leads close to *H. zermattensis*, the only species of this group with similarly thickened and curved female t_3 , but the latter has a quite different pattern on scutum, clear wings, whitish hairs at base of abdomen, and the fringes of wing squamae.

Holotype ♂: **Switzerland:** VS: Lötschental, Fafleralp: Uistertal 1900 m, 15.vii.2007, leg. J.-P. Haenni (MHNN).

Paratypes: **Switzerland:** GR: Strada, Muglin 1060 m, 13.vi.1980 1♀, leg. J.-P. Haenni (MHNN). **Italy:** AO: Aosta, St. Denis 880 m, 13.v.2006 4♀, leg. J.-P. Haenni (MHNN, 1♀ UMO).

DERIVATIO NOMINIS: A "small" (*parvus*) *H. maior*, a name emphasizing its close similarity (pattern of scutum, structure of legs) with the larger-sized *H. maior* Strobl.

DISTRIBUTION: Swiss and Italian Alps, from the middle of May to the middle of July.

84. *Hilara styriaca* Strobl, 1893

REFERENCES: Chvála (1999a: 45) – lectotype designation, description and illustration of male fore leg.

DISTRIBUTION: Austrian, Swiss and Italian Alps. A summer species, mainly in July and August. A characteristic Alpine species, occurring only rarely below 1000 m. According to Strobl (1893: 88) very common in the Styrian Scheibleggerhochalpe near Admont at high altitudes (5000-5500') in July and August.

MATERIAL EXAMINED: **Austria:** Styria: Scheibleggerhochalpe 27.vii.1891 5♂ 3♀ (syn-types, *Strobl*); Haller Mauern, Ardning, Ardningalm (1100 m) 27.vi.2002 1♂ 1♀; Grabneralm (1300 m) 8.viii.1998 6♀; Oberlaussa (900 m) 9.viii.1998 1♀ (all *Chvála*). **Switzerland:** VS: Visperterminen (1900-2200 m) 24.vii.1992 5♀ (*Merz*); Visperterminen, Bodma (1500 m) 4.viii.1998 1♂; Visperterminen, Rothorn-Giw (1900-2300 m) 30.vii.1998 2♀ (all *Merz & Bächli*). GR: Ftan, Clünas (2100 m) 1♀ (*Merz & Bächli*); Lenzerheide, Alp Sanaspans (2000 m) 7.viii.1998 1♀ (*Merz & Eggenberger*). **Italy:** Alpi Lepontine, V.S.Giacomo, Madésimo 30.vii.1910 2♂ (*Escher-Kündig*).

85. *Hilara merzi* Chvála, 1999

REFERENCES: Chvála (1999a: 41) – description and illustration of head, male fore leg, postabdomen and genitalia.

DISTRIBUTION: Austrian, Swiss and Italian Alps. A common species of the Alpine zone at altitudes above 2200 m. Mostly an early summer species, in July and in the beginning of August.

MATERIAL EXAMINED: **Austria:** Tyrol: Oetztal, Obergurgl, Gaisbergtal to Hohe Mut (2400-2600 m) 7.viii.1981 1♂ (*Pont*). **Switzerland:** GR: Lenzerheide, Piz Danis (2250-2490 m) 12.-19.vii.1996 13♂ 3♀ (*Merz*), same (2497 m) 17.vii.1998 14♂ 8♀ (*Merz & Botta*); Valbella, Stätzerhorn (2574 m) 30.vii.1999 2♂ 4♀ (*Merz*); V. Laschadurella (2200-2450 m) 20.vii.1921 3♀; Mot Mezdi (2350-2500 m) 25.vii.1932 4♂; Fuorecla, Sassalbé (2640 m) 29.vii.1932 6♂; Murtergrat (2550-2650 m) 21.vii.1929 5♂ 1♀; V. Laschadura, Stragliavita (2600 m) 27.vii.1930 1♀; V. Cluozza, Murtaröl (2400-2580 m) 19.vii.1929 2♀; V. Muraunza, Astas (2300-2700 m) 23.vii.1931 5♂ 1♀; V. Tantermozza (2400 m) 24.vii.1929 1♂; V. Dal Botsch, V. da Stabel chod (2300 m) 16.vii.1928 1♂ (all *Keiser*). **Italy:** BZ: Stelvio, 7.-11.viii.1909 3♂ 3♀; Stelvio, Pass (9,100 ft) viii.1910 1♂ 1♀ (all *Oldenberg*).

86. *Hilara zermattensis* Chvála, 1999

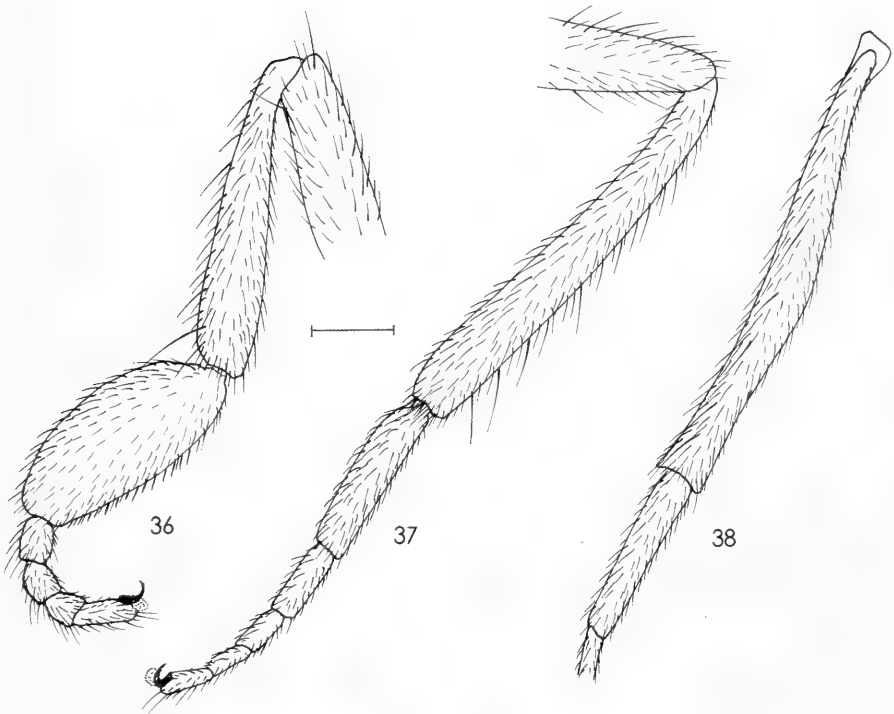
Figs 36-38

REFERENCES: Chvála (1999a: 48) – description of male.

DIAGNOSIS: Medium-sized species, body more than 3 mm long, with scutum and abdomen dull brownish, but thoracic pleura paler, striking bluish-grey. Scutum almost dull cupreous-brown with distinct shifting blackish stripes, *acr* 2-serial. The female remained unknown so far.

DESCRIPTION:

Female. Frons and face very broad, face dull grey as well as a small patch on frons just above antennae, otherwise frons, vertex and occiput uniformly dull velvety



FIGS 36-38

Hilara zermattensis Chvála ♂ (A, Styria: Styriae alp., paratype). (36) Fore leg in posterior view. ♀ (CH, AI: Appenzell, Seealp, S.Ombell). (37) Hind leg in posterior view. (38) Hind tibia with basitarsus in dorsal view. Scale: 0.2 mm.

black. All hairs and setae on head black, including fine setae on lower part of occiput below neck; ocellar and frontal setae fine and both equally long, longer than upper occipital bristling. Antennae, with a fairly long slender style, and palpi as in male.

Thorax light greyish on pleura, scutum with the characteristic black pattern on the cupreous-brown background as in male: when viewed from in front scutum with 2 black stripes between lines of bristles, in dorsal view whole scutum extensively blackish, and in posterior view with 3 distinct black stripes on lines of bristles, the space between 2-serial *acr* and 1-serial *dc* pale brownish. All setae on thorax as in male, prothoracic episterna with a tuft of fine black hairs, but prosternum between coxae covered with whitish hairs.

Wings clear with distinct dark brown veins and a distinct dark stigma, squamae dark brown, with whitish fringes. Haltere uniformly black.

Legs uniformly black, finely silvery-grey pollinose, and like in male covered with only short fine hairs, a few longer dorsal setae on t_1 and t_3 at most as long as corresponding tibiae are deep; tarsi slender but short, tarsomeres 2-4 on anterior two pairs only very slightly longer than deep; t_3 (Figs 37-38) very much as in *H. parvimaior*, distinctly thickened, nearly as wide as corresponding femur, and slightly curved.

Abdomen dull cupreous-brown like scutum, though in side view in some lights almost shining black; pubescence inconspicuous, very pale on basal segment, whitish to light brownish, darker on posterior segments.

Length: body about 3 mm (abdomen shrivelled), wing 3.3 mm.

DIFFERENTIAL DIAGNOSIS: The main distinctive key characters are the short labrum, the deep black frons and occiput, the short, uniformly black legs with short tarsi and a very stout bt_1 in ♂ (Fig. 36), and the distinctly thickened and curved t_3 in ♀ (Figs 37-38). In the original description (Chvála, 1999a: 48) the illustration of male fore leg was by mistake omitted. The female is described here for the first time, and also the ♂ fore leg (Fig. 36) is illustrated here for the first time.

DISTRIBUTION: Austrian and Swiss Alps, in July and August. The 4♂ from Austrian "Styriae alp." are very probably the specimens misidentified by Strobl (1910: 68) as var. *anderemattensis* from the Styrian Natterriegel of end of July (7♂ 1♀).

MATERIAL EXAMINED: **Austria:** Styria: Styriae alp. 4♂ (paratypes, *Strobl*). **Switzerland:** VS: Zermatt 4.viii. 1♂ (holotype, *Becker*). AI: Appenzell, Seealp, S. Ombell (1180 m) 22.vii.1985 1♀ (*Haenni*).

87. *Hilara anderemattensis* Strobl, 1892

REFERENCES: Chvála (1999a: 33) – description and illustration of head and male fore leg.

DISTRIBUTION: Swiss Alps. The species is still known only from the 4 syntype males collected by T. Becker in August at Andermatt. 2♂ are in ZMB, 2♀ in BSA collection.

MATERIAL EXAMINED: **Switzerland:** UR: Andermatt 8.viii. 4♂ (syntypes, *Becker*).

88. *Hilara simplicipes* Strobl, 1892

Fig. 59

REFERENCES: Chvála (1999a: 44) – diagnosis and lectotype designation.

DIAGNOSIS: A small, body about 2.0 – 2.5 mm long, dull velvety black species with black haltere and legs. All hairs and setae on body and legs black, *acr* widely 2-serial, and like uniserial *dc* long and bristle-like. Legs slender, male bt_1 unmodified, slender, and covered with fine short hairs, also t_3 in female long and slender.

REDESCRIPTION:

Male. Frons and face broad, dull velvety black to brownish black, also vertex and occiput dull black. All hairs and setae on head black, ocellar and frontal bristles equally very long and strong, about as long as antennal segment 3 with style, post-vertical and upper occipital bristles smaller but strong. Antennae black, segment 3 long triangular, and style rather stout, two-thirds length of segment 3. Palpi blackish, densely long black bristled beneath, 2 or 3 ventral setae conspicuously long and strong, at least as long as proboscis; labrum short, scarcely half as long as head is high.

Thorax uniformly dull velvety black to blackish-brown, also pleura extensively darkened, and all hairs and setae black. Scutum almost uniformly brownish-black when viewed from above, in frontal view there are 2 black stripes between lines of bristles on a lighter greyish background, when viewed from behind the black stripes

change to light greyish. Marginal setae very long and strong, especially last pair of *dc*, the inner pair of 4 *sc*, a *pa* seta, and one seta of 3 to 4 *ntpl*; *acr* widely 2-serial, the distance between the two rows equal to the distance between the rows of *acr* and *dc*, both fairly long and strong, longer than antennal style, and less numerous, less than 10 setae in one row.

Wings faintly brownish clouded, not clear, with distinct dark venation, a long radial fork, and very abbreviated anal vein; a long black costal bristle. Squamae blackish-brown with dark fringes, haltere uniformly black.

Legs rather slender, uniformly subshining blackish-brown, and densely covered with short fine dark pubescence, f_1 posteriorly and t_1 posterodorsally with hairs scarcely as long as corresponding legs are deep, the same applies to dorsal and ventral bristly hairs on f_3 ; only f_2 anteriorly with the usual long black setae. All tarsi slender and fairly long, covered with short hairs and unmodified, also bt_1 (Fig. 59) slender.

Abdomen dull blackish, densely short black pubescent, and all terga with distinct strong hind-marginal bristles. Genitalia were not dissected, but hypandrium is distinctly produced posteriorly, and lateral lamella, covered with sparse black hairs, seems to carry an indistinct apical process.

Length: body 2.2 – 2.6 mm, wing 2.8 – 3.3 mm.

Female. Very much like male in all details, only legs are covered with shorter hairs, and hind-marginal bristles on abdomen are less distinct. Legs quite simple and slender, even t_3 unmodified, long and slender.

Length: body 2.3 mm, wing 2.6 mm.

DIFFERENTIAL DIAGNOSIS: A species of the *H. andermattensis* group, which is easy to be recognized by its small size, the short pubescent slender and unmodified legs also in male, and by the other main key characters.

DISTRIBUTION: This species, the only representative of the *H. andermattensis* group with unmodified slender fore leg in male, is still known only from the syntypes collected by Prof. Tief in Austrian Carinthia.

MATERIAL EXAMINED: **Austria:** Carinthia: Paternion 12.v. 3♂ 1♀ (syntypes) (*Tief*).

Group 11 – *H. borealis*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 171, 2008a: 124).

89. *Hilara borealis* Oldenberg, 1916

REFERENCES: Chvála (2002a: 66) – description and illustration of antenna, palpus, male fore leg and genitalia.

DISTRIBUTION: Central European species, only locally in lowlands, more often in highlands and especially in mountains. Besides the Alps fairly common at altitudes above 800 m, for instance in the Czech Krkonoše Mts, the Slovak and Polish West Carpathians, in the Czech Šumava Mts and German Böhmerwald. A spring and rather early summer species, from the end of April to the beginning of August.

MATERIAL EXAMINED: **Austria:** Styria: Obertauern, Tweng, Taurbach (1200 m) 17.vi.2000 2♂; Schladminger Tauern, Schladming, Untertal (1000 m) 6.vii.2001 1♂ 1♀; Sölkpass, Innere Grosssolk (1300 m) 7.vii.2001 1♂ 1♀; Haller Mauern, Oberlaussa, Polzanbach (750-850 m) 24.v.2003 2♂, 18.vi.2000 4♂; Admont env. (640-700 m) 19.v.2003 1♂, 5.-9.vi.1996 3♂ 1♀; Weissenbach bei Liezen (700 m) 25.v.2003 common; Gesäuse, Johnsbach (1100 m) 6.-8.vi.1996 and 10.-15.vi.1997 swarms; Kaiserau (1100 m) 6.vi.1996 9♂ 7♀, 10.-15.vi.1997 swarms; St. Gallen, Buchaubach 9.vi.1996 2♂ (all *Chvála*). Salzburgland: Gastein 29.vi.1907 1♂, 1.vii.1907 1♀ (*Oldenberg*). Carinthia: Hermagor 25.-30.v.1928 4♂; Mauthen 5.vii.1928 1♀; Kl. Fleiss 14.viii.1907 2♂ (all *Oldenberg*). **Switzerland:** GR: Engiadina Bassa, Ramosch (1050 m) 11.vii.1961 1♂ (*Keiser*). ZH: Zürich, Katensee (440 m) 19.iv.1997 1♀ (*Merz*). VS: Visperterminen, Rothorn-Giw (1900-2300 m) 30.vii.1998 1♂ (*Merz & Bächli*). **Slovenia:** Julian Alps, Pohorje Mts 17.vi.2006 2♂ (*Plant*).

90. *Hilara medeteriformis* Collin, 1961

REFERENCES: Chvála (2005a: 173) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: From the North Sea and Baltic coast (British Isles, Netherlands, south Sweden, Bornholm) south to the Pyrenees and Romania. Widely distributed in temperate central parts of Europe both in lowlands and in mountains, as for instance in the Czech Šumava Mts and Slovak West Carpathians, in the Velká Fatra Mts, but never common. For a long period from May up to the beginning of September, though in temperate Europe rather an early summer species, most often in June and July.

MATERIAL EXAMINED: **Austria:** Styria: Admont, on window (640 m) 11.vii.2008 1♂ 2♀ (*Chvála*). **France:** Vosges, Quleux 2.-10.viii.1990 MT 3♂ 2♀ (*Pont*); Pyrenees, Ariège, Ax-les-Thermes (750 m) 8.vii.1990 1♂ (*Barták*).

91. *Hilara calinota* Collin, 1969

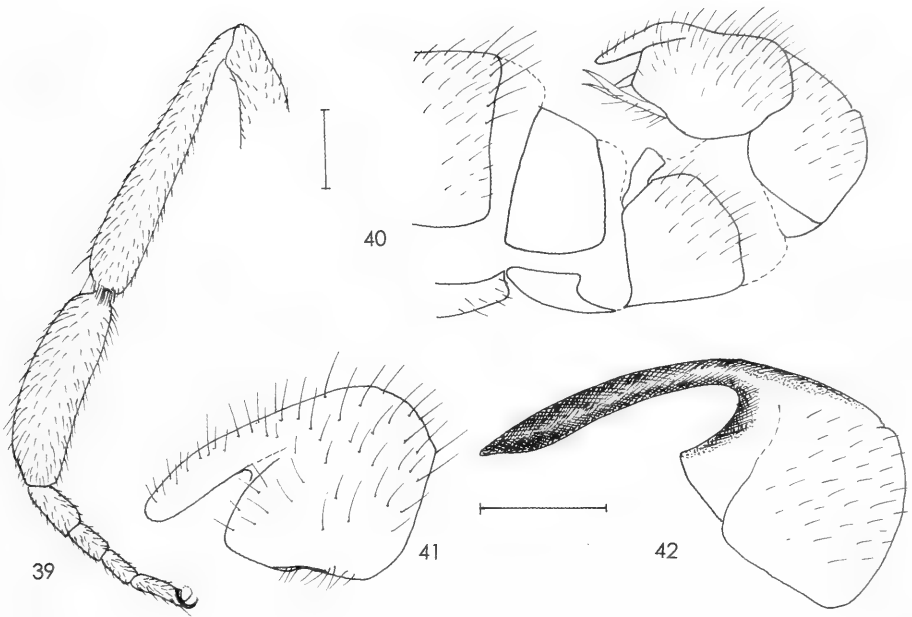
Figs 39-42

DIAGNOSIS: Medium-sized (body about 3-3.5 mm long), rather dull light grey dusted species with contrasting velvety black head, scutum with small numerous 4-serial *acr* on a broad reddish-brown median stripe. All bristles small and fine, legs blackish and practically without distinct setae, ♂ *bt*₁ long ovate and only slightly thickened, ♀ *t*₃ very slender, unmodified. Wings clear, haltere blackish, and abdominal pubescence pale.

REDESCRIPTION:

Male. Head with a very wide frons and face, the latter light dull grey, frons, including vertex and occiput contrasting velvety black; sometimes frons right above antennae translucent greyish. Ocellar and frontal bristles equally long and fine, about as long as antennal segment 3 without style, vertical and occipital bristling much shorter. Antennae black, segment 3 fairly long, style much shorter, slightly thickened, of half-length. Palpi black, densely greyish dusted, ventrally with numerous, equally long, fine black bristly hairs. Labrum shorter than head is high, about three-quarters of its height.

Thorax uniformly densely light grey dusted both on pleura and scutum, with 4-serial *acr* and widely separated 1-serial *dc* very small and fine, both numerous, about 18-20 setae in one row; *acr* lying on a reddish-brown median stripe, which is widening when viewed from above, and then *dc* lying on narrow blackish lateral lines. All



FIGS 39-42

Hilara calinota Collin ♂ (F. Drôme, Col de Tourniol). (39) Fore leg in anterior view. (40) Postabdomen (macerated). (41) Lateral genital lamella. (42) Hypandrium. Scale: 0.2 mm.

thoracic setae black, including small hairs in notopleural depression, marginal setae (1 *ph*, 3 *ntpl*, 1 *sa* and *pa*, 2 prescutellar pairs of *dc*, and 2 or 3 pairs of *sc*) small and fine; *h* and *ih* setae inconspicuous. A long black seta on each side of pronotum.

Wings clear, with a whitish tinge in some lights especially in living specimens, veins blackish-brown, distinct; wing stigma rather faint, a long radial fork, and costal seta small and fine. Squamae whitish-grey with whitish to light brownish fringes, haltere blackish, base of stem more brownish.

Legs uniformly blackish, sometimes with a tendency to be more blackish-brown in ground colour, femora more or less finely silvery pilose beneath; they are generally short and strong, covered with only short indistinct hairs, no distinct setae except for a rather short black anterior setae on f_2 , an unusual conspicuously long ventral seta at base of f_2 , and 1 or 2 longer anteroventral setae on f_3 before tip; t_3 with only 2 longer dorsal setae (at middle and before tip) at most as long as tibia is deep; t_1 and bt_1 (Fig. 39) covered with short hairs only, bt_1 long uniformly oval, long, at least three-quarters length of corresponding tibia; all tarsomeres slightly longer than deep, and covered with only minute hairs.

Abdomen dull grey, covered with short, fine whitish hairs, hind-marginal bristles inconspicuous, only on posterior terga longer and almost blackish. Genitalia (Figs 40-42) rather small, not wider than abdomen at tip; hypandrium greyish pollinose, apical half heavily sclerotized and uniformly stout; lateral lamella subshining, terminal process also rather evenly stout and blunt-tipped.

Length: body 3.1 – 3.5 mm, wing 4.0 – 4.1 mm.

Female. Very much like male in all details, only legs unmodified, fairly long and slender, t_3 also simple and very slender, and legs practically without longer setae, f_2 anteriorly short pubescent, and the long basal ventralsetae of male absent. Abdominal pubescence darker, some hairs on basal terga almost blackish.

Length: body 2.8 – 4.0 mm, wing 3.3 – 3.8 mm.

DIFFERENTIAL DIAGNOSIS: Considering its general structure and the main features of the *H. borealis*-group, *H. calinota* needs comparison especially with *H. pruinosa* and *H. medeteriformis*. The former is a larger species (body 4-5 mm long), with similarly short antennal style, but the frons is dull grey, the frontal setae are absent, *dc* are 2- to 3-serial, legs are densely golden-yellow pubescent, and wings are brownish. *H. medeteriformis* is a somewhat larger-sized species with a dull grey frons, and further it differs from *H. calinota* by the characteristically brownish scutum with a bluish-grey pattern, and the antennal style is long, as long as segment 3.

DISTRIBUTION: Described by Collin (1969) from the Swiss Alps, and later found also in other mountains in central temperate Europe. A fairly common species for instance in the Czech Šumava and Jeseníky Mts, the Slovak Malá Fatra Mts of West Carpathians, and also in the German Bayerischer Wald, often in mountains above 1000 m. A typical spring species, only in May and June.

MATERIAL EXAMINED: **Austria:** Styria: Gesäuse, Johnsbach (1000 m) 15.v.2000 1♂; Ennstal, Frauenberg, Edelgraben (680 m) 23.v.2003 4♂ 1♀; Radmer near Hieflau, Weissenbach (650 m) 24.v.2003 1♂ 1♀; Weissenbach bei Liezen (700 m) 25.v.2003 1♂; Haller Mauern, Ziernitz (700 m) 9.vi.1996 1♂ 2♀; Gesäuse, Kaiserau (1100 m) 6.vi.1996 1♂ 1♀, 11.vi.1997 2♂ 1♀; Kalblingbach (1400 m) 15.vi.1997 2♂; Kalbling, Flizenbach (1500 m) 15.vi.1997 swarms (all *Chvála*). **France:** Drôme, Col de Tourniol (1050 m) 26.v.2006 1♂ 1♀ (*Barták*). **Switzerland:** GL: Linthal 7.vi.1913 1♂ (holotype), 1♀ (paratype) (both *Oldenberg*). GR: Arosa (1700 m) 30.vi.1955 1♂ 1♀ (paratypes) (*Ringdahl*). VS: Jeitzinen/Untere Fäsälalp (2000 m) 3.vii.2001 1♂ (*Merz*). **Slovenia:** Julian Alps, Triglav, Aljažev dom (1100 m) 3.vii.1973 1♀ (*Chvála*); Bistrica, Slap Peričnik (775 m) 19.vi.2006 2♂ 1♀; Lepena (530 m) 19.vi.2006 1♂ 2♀; River Kolpa (310 m) 2♂ 1♀; River Čabranca (280 m) 9♂ 5♀, both 15.vi.2006; Pohorje Mts (1300 m) 17.vi.2006 21♂; River Soča, Vršnik (485 m) 19.vi.2006 2♀ (all *Plant*).

REMARK: Detailed information about the types are found in Pont (1995).

92. *Hilara lacteipennis* Strobl, 1892

DIAGNOSIS: ♀: body about 2.7 - 4 mm long, rather light grey dusted species, only frons and occiput partly velvety dark brown in some views. Abdomen, prothorax and fore coxae with whitish hairs, *acr* 2-serial on a brownish median stripe, t_3 evenly dilated and distinctly curved. Wings milky-white, veins indistinct, haltere yellowish-brown.

REDESCRIPTION:

Male unknown.

Female. Frons and face of usual width, face dull light grey, frons with a similar grey patch above antennae, otherwise velvety dark brown; also vertex dark brown, and upper part of occiput when viewed from above; seen from behind occiput quite grey. Upper row of postocular occipital bristles and ocellar bristles black, slightly longer than antennal style; frontal setae slightly smaller, as long as antennal style. Antennae

black, style half as long as 3rd segment, latter long and triangular-shaped (basal segments rather dark brownish). Palpi brown in ground colour, silvery-grey pollinose, finely light brownish (almost pale) pubescent, with 2 (or 1) fine pale ventral bristles. Proboscis very short, labium densely pale pubescent beneath.

Thorax uniformly densely rather light grey dusted, only spiracles contrasting dark, prothoracic spiracles almost blackish; *acr* and *dc* black, fine and small, half length of antennal style; *acr* rather narrowly 2-serial on a brown median stripe, *dc* 1-serial, lying on a very indistinct brownish line, becoming longer posteriorly, and ending in 2 long black prescutellar pairs. 1 black *h* bristle (as long and fine as a pair of ocellar bristles) and with several fine pale hairs anteriorly on humeri; 1 equally long *ph* and *ih* bristle, 3 *npl*, the median one the strongest, 1 *sa*, 1 stronger *pa*, and 2 pairs of *sc*; inner pair longer than the *pa* bristle, outer pair of 3/4 length. Notopleural depression with fine whitish hairs anteriorly, prosternum and prothoracic episterna indistinctly whitish pubescent, but pronotum with a fine, white bristly hair on each side about as long as frontal bristles (the bristle is dark brown in 1 ♀ “Ran, Südsteiermark, Strobl”, “lact. ♀” of the Nachtrag Collection).

Wings milky-white, veins whitish (yellowish in the “Ran” specimen), inconspicuous, only bases of veins R and Cu yellowish, vein C (except for base) and apical section of R1 (distally of the junction of the complete Sc with C) dark brown. Anal vein distinct, although small (as long as antennal style), a black costal bristle. Squamae light brownish with white fringes, haltere uniformly yellowish-brown.

Legs blackish in ground colour, finely greyish pollinose, as well on tibiae, all coxae somewhat brownish (definitely paler than remaining legs), and “knees” narrowly yellowish. Pubescence mainly pale, all hairs and bristles only small and fine; f_1 with a row of very fine, dark posteroventral hairs not much shorter than femur is deep when viewed from above, ventrally femora almost bare; f_2 slightly narrower, posteriorly and anteroventrally finely short pale pubescent, anteriorly on basal half with 2 long black bristly hairs, shorter and more numerous bristles present on apical half; f_3 the stoutest, covered with fine short pale hairs, only anteroventrally before tip with 2 long blackish bristly hairs. Tibiae covered with short hairs; t_1 dorsally with a row of darker bristly hairs, 1 bristle in basal third above nearly as long as tibia is deep; t_2 with only 2 minute black anteroventral bristles in apical half; t_3 distinctly laterally flattened (not much narrower than femur) and curved, only dorsally short black bristled. Tarsi simple, covered with short hairs, only bt_3 stouter than following tarsomeres, and as long as rest of tarsus; all tarsi with tarsomeres 2-4 distinctly longer than deep.

Abdomen somewhat brownish in ground colour, densely greyish dusted, and finely whitish pubescent. Sides of anterior 3 terga with longer and denser white pubescence, hind-marginal bristles fine, present only at sides of terga 2-4, and darker than other pubescence. Cerci missing (broken).

Length: body 2.7 mm (without cerci, and with abdomen slightly curved), wing 3.1 mm (holotype of Melk); other specimens: body 2.7 – 4 mm, wing 3.1 – 3.6 mm.

DIFFERENTIAL DIAGNOSIS: Differing from *H. albitarsis* by the following characters: (1) frons except for a small grey triangle above antennae dull velvety black, but occiput (viewed from behind) grey; (2) *acr* 2-serial, *dc* 1-serial; (3) scutum with only one darker central stripe (on *acr*), lateral stripes very indistinct; (4) haltere light brown,

knob not darker; (5) abdomen much longer and whitish pubescent; (6) tibiae somewhat stouter, ♀ t_3 compressed and bent; (7) legs quite blackish-brown, only "knees" yellowish (not tarsi). *H. lacteipennis* resembles also *H. calinota*, but it differs by the well developed distinct black *h*, *ph* and *ih* bristles, the whitish wings with pale yellowish veins, and ♀ t_3 is thickened and curved; finally, *acr* are in *H. lacteipennis* 2-serial (although on a similar reddish-brown central stripe), only rarely they are anteriorly more numerous. *H. lacteipennis* needs comparison also with *H. pseudosartrix* Strobl.

DISTRIBUTION: Only a little known species, described by Strobl (1892a: 137) from Melk in Lower Austria, later recorded by Strobl (1910: 70) also from the valley of the River Enns in the Styrian Alps (Admont), and from Slovenia, from the vicinity of Sevnica (Lichtenwald) on the River Sava; for details, see Chvála (2004: 129). Further data are not available.

MATERIAL EXAMINED: **Austria:** Lower Austria: Melk (on window) 30.v. 1♀ (type). Styria: Admont 4.vii. 1♀ (all Strobl). **Slovenia:** "Ran, Süd-Steiermark", i.e. Brežice on the River Sava, 1♀ (Strobl).

93. *Hilara pruinosa* Wiedemann in Meigen, 1822

Figs 43-46

DIAGNOSIS: Large, dull grey dusted species, body about 4 – 5 mm long, with a wide greyish frons, and dull black vertex and occiput; antennal style very short. Scutum with dark lines on the narrowly 4-serial *acr* and 2- to 3-serial *dc*, haltere and legs blackish, and both legs and abdomen short, but densely almost golden-yellow pubescent.

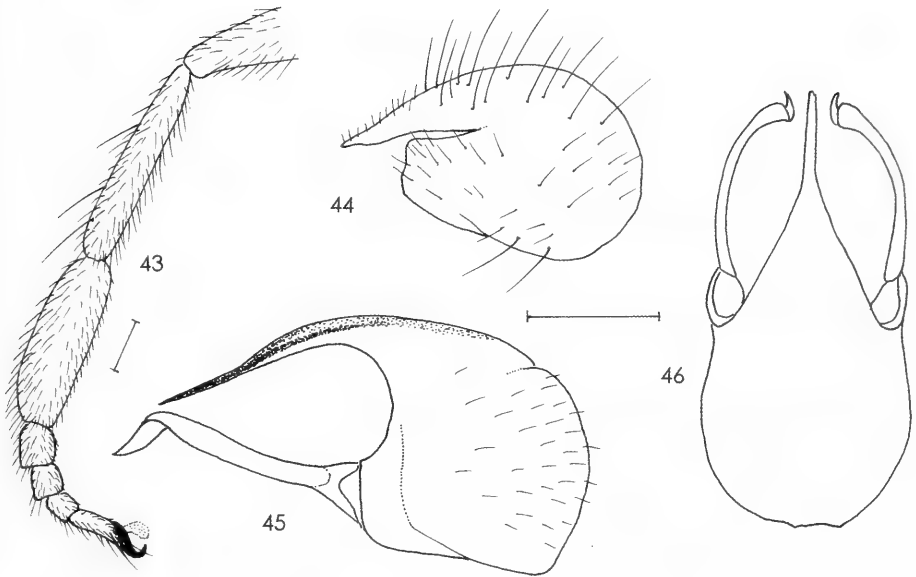
REDESCRIPTION:

Male. Frons and face very wide, both dull grey, vertex and occiput dull velvety black. Black ocellar setae small and fine, frontal setae quite absent, upper occipital bristly hairs rather small black, those on lower part of occiput below neck longer and pale, almost golden-yellow in colour. Antennae black, segment 3 very long, style short scarcely of half-length. Labrum fairly long, not much shorter than the height of head. Palpi black, silvery-grey pollinose, translucent brownish at tip, and ventrally densely clothed with long pale, almost whitish-yellow bristly hairs.

Thorax uniformly dull grey on pleura and scutum, all hairs and setae very small and fine: *acr* very narrowly nearly 2-serial anteriorly, posteriorly 4-serial, diverging, *dc* irregularly narrowly 2- to 3-serial; all these setae rather light brownish, lying on bronze to brownish narrow stripes; the stripes widened in dorsal view, and when viewed from behind two light grey stripes between the lines of bristles clearly visible, *acr* lay on a black central stripe (rarely indistinct), and sides of scutum laterally of *dc* largely uniformly velvety black. Large marginal setae inconspicuous except for 2 or 3 *ntpl*, a *sa* and *pa*, and 2 pairs of *sc*; *h*, *ph* and *ih* bristles practically absent. Pronotum with a rather strong light brownish seta on each side, slightly longer than the similarly coloured fine bristly hairs on prothoracic episterna and on humeri (postpronotum) at sides.

Wings not quite clear, slightly brownish clouded, with very strong blackish veins, a distinct dark brown stigma, and a fairly long, black costal bristle. Squamae whitish with concolorous fringes, haltere blackish, or uniformly blackish-brown.

Legs uniformly blackish, only "knees" narrowly brownish, and all parts of legs covered with pale hairs and bristles, though only the bristly hairs on coxae, posteriorly



Figs 43-46

Hilara pruinosa Wiedemann ♂ (CZ, Moravia, Podyjí). (43) Fore leg in posterior view. (44) Lateral genital lamella. (45) Hypandrium with postgonite in lateral view. (46) The same, in dorsal view (schematically). Scale: 0.2 mm.

on f_1 , and dorsally on t_1 (Fig. 43) towards tip longer; all femora clearly silvery-grey pollinose, especially beneath, and the ventral hairing on tibiae and tarsi almost golden-yellow. Fore leg as in Fig 43, bt_1 oval, evenly thickened and not much shorter than corresponding tibia, dorsally with longer hairs, and following tarsomeres 2-4 short and stout, not longer than deep; also tarsi on posterior two pairs short, especially on tarsomeres 3-4.

Abdomen uniformly contrasting light grey to silvery-grey dusted, leaving hind margins of terga very pale; pubescence almost whitish, short and fine, longer hairs at sides of basal 2 or 3 terga, and hind-marginal bristles absent. Genitalia (Figs 44-46) contrasting subshining dark brown, small; lateral lamella apically with very pointing, long terminal process; hypandrium unusually long and thin on apical half, heavily sclerotized towards tip.

Length: body 4.5 – 5.0 mm, wing 4.0 – 4.5 mm.

Female. Very much like the male in all details, only abdomen dull brownish-grey when viewed from above. Wings perhaps more brownish clouded, and abdomen covered with only short pale hairing. Legs with simple fore legs, fore tarsomeres 2-4 also nearly only as long as deep, and t_3 uniformly long and slender, unmodified, not curved, perhaps only indistinctly widening towards tip, and covered with short hairs only.

Length: body 3.6 – 4.3 mm, wing 3.5 – 4.5 mm.

DIFFERENTIAL DIAGNOSIS: A very characteristic species, with the very small and fine pale irregularly 4-serial *acr* and 2- to 3-serial *dc* on the reddish-brown stripes,

turning to black in posterior view. The small setae are unusually numerous, in one row at least 20 small setae of both *acr* and *dc*. For the distinguishing characters see the key, and the differential diagnosis of *H. calinota*.

DISTRIBUTION: A south European species, distributed north from the Mediterranean to the Alpine region, and to warm lowlands of central parts of Europe (Czech Republic, Slovakia, Poland and Hungary). Absent in high mountains. Early spring species in temperate Europe, in April and May. Strobl (1893: 90) recorded it from Austrian Carinthia as a not rare species.

MATERIAL EXAMINED: **Austria:** Carinthia: Villach 1♂; Rennstein 9.v. 2♂ 1♀; Bleiröhrenfabrik bei Villach 1.v. 1♀ (all *Tief*). **Switzerland:** TI: Gordola, Gaggiolo (250 m) 2.iv.2007 1♂ 1♀; Mte. S. Giorgio, Meride-Cassina (580-900 m) 17.v.2006 3♀ (all *Merz*); Ascona 15.iv.1946 1♂ (*Ghica*); Besazio (490 m) 4.v.1979 1♀; Mendrisio 5.v.1979 1♀ (all *Haenni*); Davesco, Navre (520 m) 2.v.1996 1♀ (*Pollini*); Novaggio 10.v.1916 1♂ (*Escher-Kündig*). GR: Castagnola 29.iv.1910 3♂ 1♀. **Italy:** Pallanza 1.v.1900 2♂ (all *Escher-Kündig*).

Group 12 – *H. chorica*-group

For a characterization of this group, and a revision and keys of the European species, see Chvála (1997b, 1999b, 2005a: 177 and 2008a: 127).

94. *Hilara brevistyla* Collin, 1927

REFERENCES: Collin (1961: 635), Chvála (2005a: 179) – description and illustration of antenna, male fore leg, and genitalia.

DISTRIBUTION: From the British Isles and the south of Fennoscandia through temperate Europe to the Alpine region and Romania. One of the earliest spring species, in lowlands of central parts of Europe common in April and May. In mountains mainly at lower altitudes, in the Swiss Alps common approximately up to 700 m, in the Styrian Alps up to 900 m; on dates ranging from 29 March to 4 June, though mainly in April. Strobl (1892a: 115) recorded this species in Austria under the name *H. pinetorum* Zetterstedt (the latter is a younger synonym of *H. clypeata*, which was misidentified by Strobl as *H. clypeata* var. *brevifurca* Strobl).

MATERIAL EXAMINED: **Austria:** Styria: Admont (640 m) 28.iv.-7.v.2008 1♂ 5♀, 7.v.2009 1♂; Gesäuse Eingang, River Enns (620 m) 4.v.2008 and 10.v.2007 common, 18.-22.v.2003 2♀; Gesäuse, Johnsbach (860 m) 10.v.2009 2♂; Ennstal, Seebacher near Ardnning (640 m), willows 3.v.2004 3♂ 9♀; Haller Mauern, Buchauer Sattel (850 m) 9.v.2008 common; Mühlau, Esslingbach (800 m) 18.v.2003 1♂; Hieflau, Waaggraben (600 m) 24.v.2003 6♂ (all *Chvála*). **Switzerland:** GE: Chancy, La Laire (350 m) 9.iv.2007 3♂ 3♀, 18.iv.2003 3♂; Bernex, Signal (500 m) 27.iv.2007 1♂; Cartigny, Moulin de Vert (350 m) 22.iv.2000 7♂ 6♀, 29.iv.-1.v.1999 2♀ (all *Merz*); Avusy, Moulin de la Grave (370 m) 1.v.1999 6♂ 2♀ (*Merz* & *Dirickx*). TI: Biasca, Loderio (350 m) 29.iii.1994 1♀, 16.v.2006 1♂ 1♀; Magadino, Quartino (205 m) 2.iv.2007 common; Cadenazzo, Demanio (210 m) 2.iv.2007 4♂; Gordola, Verzasca-Ufer (205 m) 1.iv.2007 1♂ 1♀ (all *Merz*); Prosito, Moleno (250 m) 3.v.1979 1♂ (*Haenni*). VS: Leuk, Pfywald (630 m) 21.iv.1998 1♂ (*Merz* & *Botta*), 24.iv.1888 1♂ 1♀ (*Huguenin*). AG: Würenlingen, Bärengraben (450 m) 13.v.1998 4♀. ZH: Dietikon, Hardwald (400 m) 15.v.1995 3♂ 1♀; Embrach, Haumüli (400 m) 30.iv.1998 1♂ (all *Merz*), 30.iv.-4.vi.1998 common (*Wolf* & *Merz*); Zürich, Allmend (450 m) 23.iv.1994 1♀, 1.-8.v.1995-1998 common; Zürich, Waldgarten (500 m) 5.-24.v.1995-1998 common; Zürich, Zürichberg (450-670 m) 27.iv.-18.v.1995-1998 common; Zürich, Ziegelhütte (460 m) 13.iv.-11.v.1997-1998 1♂ 5♀; Zürich, Katensee (440 m) 19.iv.-25.v.1996-1998 common (all *Merz*).

95. *Hilara longivittata* Zetterstedt, 1842

REFERENCES: Collin (1961: 636), Chvála (2005a: 181) – description and illustration of male fore leg and genitalia.

DISTRIBUTION: A widely distributed species in Europe, throughout Fennoscandia including Lapland, south to the Alpine region and central parts of European Russia. Flight period from May to August. Not correctly recognized by Strobl (1892 – 1910) in the Styrian Alps, described as a new species, *H. bivittata* (Strobl, 1892a), and most of the Alpine forms or varieties of his “*H. longevittata*” [sic] represent several distinct high mountain species belonging now to the *H. andermattensis* group. In the Alps uncommon, always only single specimens, and only at altitudes between 600 and 1600 m.

MATERIAL EXAMINED: **Austria:** Vorarlberg: Bregenz v.1913 1♂, 1♀ (*Oldenberg*). Styria: Admont, Saugraben (700 m) 12.v.2007 1♂ 1♀, 19.v.2003 1♂; Hiefiau, Waaggraben (600 m) 24.v.2003 1♂; Haller Mauern, Oberlaussa, Polzalmbach (700 m) 24.v.2003 1♂; Buchauer Sattel, Grossbuchau (850 m) 31.v.2009 1♂ 1♀ (in copula); Ardning, Ardningalm (1100 m) 27.vi.2002 1♂ 1♀ (all *Chvála*). **Switzerland:** GR: Ftan (1600 m) 19.vii.1994 1♂ 2♀; Lenzerheide, Sundroina (1520 m) 10.vii.1998 1♂ 1♀; Valbella, Casoja (1550 m) 13.vii.1996 1♀ (all *Merz*). BE: Hasliberg vii.1891 1♀ (*Escher-Kündig*). SH: Merishausen, Osterberg (770 m) 30.v.1996 4♂ 2♀. VS: Eggerberg (750-850 m) 23.v.1998 1♀ (all *Merz*); Jeitzinen (1550 m) 26.vi.1999 1♀ (*Merz & Eggenberger*). **Italy:** Tschamintal 17.vi.1914 (*Oldenberg*); Aosta, St. Denis (880 m) 13.v.2006 1♀ (*Haenni*).

96. *Hilara pseudochorica* Strobl, 1892

REFERENCES: Collin (1961: 638, as *H. woodi* Collin), Chvála (2005a: 183) – description and illustration of male fore leg and hind basitarsus, female hind tibia, and male genitalia.

DISTRIBUTION: Everywhere uncommon, but a widely distributed species throughout Fennoscandia, in temperate Europe south to the Alpine region, where it occurs mainly in lowlands, as in other parts of central Europe. It was found, however, in the Czech Krkonoše Mts (Riesengebirge) at altitudes of about 1250 m. For a long period from May to August, but most records from the Alps are from June. Strobl (1893: 90 and 1910: 67) recorded only several specimens in the valley of the River Enns in the Styrian Alps in the vicinity of Admont, although some of them belong to a different species, *H. biseta* Collin. Collin (1927) described it from England and Scotland as *Hilara woodi*.

MATERIAL EXAMINED: **Austria:** Styria: Admont, Krumau 26.vi. 4♂; Admont 12.viii.1892 1♂ (all *Strobl*); Admont, Stift pond (640 m) 8.vi.1996 1♀ (*Chvála*). **Switzerland:** GE: Chancy, Vers Vaux (335 m) 1.vi.2002 2♂; Dardagny, Le Moulin (360 m) 30.vi.2001 1♀ (all *Merz*). TI: Gordola, Bolle (220 m) 19.vi.1995 3♂ 3♀ (*Merz & Bächli*).

97. *Hilara chorica* (Fallén, 1816)

REFERENCES: Collin (1961: 643), Chvála (2005a: 186) – description and illustration of male fore leg, female fore leg and hind tibia, and male genitalia.

DISTRIBUTION: One of the most common *Hilara* species in Europe, from the extreme north including the Faroe Islands south to the Mediterranean. For a long period

from June to September, in lowlands of Switzerland already in the middle of May. In temperate Europe, and in the Alpine region commoner at higher altitudes, in central European mountains at altitudes to around 1500 m, often in large swarms above mountain streams and rivers.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Totes Gebirge, Wurzeralm, Teichlbach (1400 m) 30.vi.2002 1♂ 1♀. Styria: Admont, River Enns (640 m) 13.-16.vi.2000 swarms, 2.vii.2001 4♂ 3♀; Admont, Saugraben (750 m) 9.vii.2008 1♂ (all *Chvála*). **Switzerland:** SG: Wattwil (610 m) 11.vii.1997 1♀ (*Merz*). AG: Aarau 20.vi.1926 1♂ (*Zürcher*). TI: Biasca, Loderio (350 m) 18.vi.1995 1♂; Tenero, Lido (205 m) 15.v.2006 1♀; Gordola, Bolle de Magadino (205 m) 6.vii.2000 1♀ (all *Merz*); Gordola, Bolle (220 m) 17.-20.vi.1995 8♂ 6♀ (*Merz & Bächli*). **France:** Gard, Dourbies, 1.7 km S, rive du Crouzoulous 15.vii.2009 1♀ (*Haenni*).

98. *Hilara aartseni* Chvála, 1997

REFERENCES: Chvála (2005a: 188) – description and illustration of male fore leg, male hind coxa with trochanter, female hind tibia, and male genitalia.

DISTRIBUTION: A widely distributed species, although often misidentified as *H. chorica*. From the British Isles and coast of the North Sea (Netherlands, Denmark) south through temperate Europe to French Provence and Corsica, but not yet recorded from Austria. A summer species, for a long period from the end of June to August. Mainly in lowlands, in mountains at low altitudes only.

MATERIAL EXAMINED: **Switzerland:** GE: Chancy, La Laire (350 m) 25.vii.2004 1♂. ZH: Embrach, Haumüli (400 m) 10.vii.1997 1♀ (all *Merz*), same 29.vi.1998 1♂ (*Wolf*).

99. *Hilara biseta* Collin, 1927

REFERENCES: Collin (1961: 639), Chvála (2005a: 190) – description and illustration of male fore leg, female hind tibia, and male genitalia.

DISTRIBUTION: From the British Isles and southern Fennoscandia, including Russian Karelia, through central parts of Europe to the Alpine region and Bulgaria. Mainly in lowlands, rather a late summer species, most records are from July and August, in England until the beginning of October.

MATERIAL EXAMINED: **Austria:** Styria: Admont (640 m) 12.viii.1892 1♂ (*Strobl*). Carinthia: Villach, Hermagor 1♂ (*Tief*) (all *H. pseudochorica*, det. Strobl). **Switzerland:** GR: Grono, Moesa (330 m) 31.viii.2006 3♂ 1♀ (*Merz*). ZH: Embrach, Haumüli (400 m) 23.vi.1998 1♂ (*Wolf*).

100. *Hilara triseta* Chvála, 2005

REFERENCES: Chvála (2005b: 104) – description and illustration of antenna, male fore leg, and male postabdomen.

DISTRIBUTION: A mountain species known so far from the Switzerland and the Slovenian Alps, and from the Bulgarian Stara Planina Mts. A species of early summer, from the middle of June to the beginning of August. In mountains at lower altitudes, from 400 to 700 m.

MATERIAL EXAMINED: **Switzerland**: VS: Leuk, Platten (623 m) 1.-3.viii.1998 2♀ (*Merz & Bächli*); Leuk, Rotafen (620 m) 10.viii.1997 2♀ (*Merz*). ZH: Embrach, Haumüli (400 m) 29.vi.1998 1♂ 1♀ (*Wolf*), 19.vi.1998 1♀, 3.vii.1996 1♂ (all *Merz*); Zürich, Ziegelhütte (460 m) 29.vi.-13.vii.1997 1♂ 8♀ (*Merz*). **Slovenia**: Gasparči, River Kolpa (310 m) 15.vi.2006 2♂ (*Plant*).

101. *Hilara pectinipes* Strobl, 1892

Fig. 47

REFERENCES: Chvála (1997b: 110) – diagnosis and illustration of male fore leg.

DIAGNOSIS: Medium-sized, body about 3 mm long, black species with subshining scutum, uniformly black haltere and legs, wings brownish. Legs short, t_1 in ♂ with several very long setae dorsally, bt_1 very thickened but covered with short hairs only, and t_3 in ♀ unusually strongly thickened at middle.

REDESCRIPTION:

Male. Head dull black on the wide frons, vertex and occiput, only face with a greyish tinge. All hairs and setae on head black and very long, the equally strong ocellar and frontal setae as long as antennal segment 3 with style and upper postvertical setae shorter. Antennae black, style rather slender and nearly as long as segment 3. Palpi blackish-grey, long black bristled beneath, labrum very short, scarcely half as long as head is high.

Thorax subshining black on scutum, pleura dull dark greyish; scutum when viewed from in front finely blackish-brown pollinose with duller black stripes between rows of bristles, in dorsal view scutum more subshining black, with duller grey prescutellar depression and between the rows of bristles. All thoracic setae long, black; *acr* rather narrowly 2-serial, *dc* 1-serial, all rather long and strong, as long as antennal style, and less numerous, about 10 setae in one row. Marginal setae are in full number, all very long and strong, only *h* and *ih* setae finer and smaller.

Wings brownish, a large costal stigma very dark brown, veins blackish, with radial fork long and almost parallel; a long black costal bristle. Squamae blackish with concolorous fringes, haltere uniformly black.

Legs black, rather short and strong, indistinctly finely silvery pollinose, and all hairs and setae black; f_1 with a very long anteroventral seta at tip, otherwise with only a row of posterior bristles not longer than femur is deep, also f_2 with the usual anterior bristles not conspicuously long, there are only several long anteroventral setae on apical third of f_3 ; fore leg as in Fig. 47, tibia with several (6-8) very strong, long setae dorsally, otherwise short pubescent, also the very stout bt_1 with only short hairs except for two small fine setae dorsally before tip, and all tarsomeres short and stout; posterior four tibiae, in addition to preapical bristles, mostly short pubescent, t_2 with several short spine-like bristles anteroventrally towards tip, and t_3 dorsally and ventrally with about 4 thin setae clearly longer than tibia is deep. Hind trochanter very much like as in *H. aartseni* with a characteristic spur-like anterior projection, and bt_2 posteriorly at base with a distinct brush of spine-like bristles.

Abdomen dull velvety black, densely short black pubescent, all terga with long hind-marginal setae. Genitalia small and closed, concolorous with abdomen, hypandrium small, lateral lamella with a small terminal process.

Length: body 2.8 – 3.2 mm, wing 2.6 – 3.0 mm

Female. The main differential features as in male, scutum perhaps more uniformly subshining black, and wings paler, almost clear. Legs simple, but t_3 very strongly thickened at middle, tips narrowed, and tibia at middle as deep as one-third of its length.

Length: body 3.0 – 3.2 mm, wing 2.8 mm.

DIFFERENTIAL DIAGNOSIS: This species belongs to a complex of species within the *H. chorica*-group which is characterized by a strongly long bristled fore leg in male, and strongly dilated, rather spindle-shaped t_3 in female as in *H. pseudochorica*. The other species of this complex have a clearly shining black scutum. The male of *H. barbipes* has also fore tarsus long bristled. *H. hystrix* carries, in addition to a vestigial frontal pair of setae, distinctly dilated t_2 which are covered with long, strong setae.

DISTRIBUTION: *H. pectinipes* is known up to now with certainty only from Austria, Germany and from the Czech Republic. A typical species of both lowlands and highlands, not a real mountain species, occurring in spring or early in summer, and all records from the Alpine region are from June. Strobl (1893: 88) recorded it also from Austrian Carinthia, but these specimens could not be traced in Strobl's Admont Collection, whereas all other specimens from the vicinity of Admont, recorded later by Strobl (1898: 205; 1910: 68), could be found in his collection. Very rare species, surprisingly not collected in Austrian Styria "after" Strobl.

MATERIAL EXAMINED: **Austria.** Lower Austria: Seitenstetten 12.vi. 2♂; Melk 12.vi. 4♀. Styria: Admont (640 m) 25.vi. 1♀; Admont, Krumau (640 m) 10.vi. 1893 2♀ (all Strobl).

102. *Hilara barbipes* Frey, 1908

REFERENCES: Chvála (2005a: 194) – description and illustration of male fore leg, female hind leg, and male genitalia.

DISTRIBUTION: Described from Finland, and known up to now throughout Fennoscandia though everywhere uncommon and at scattered sites only. Further records are available from Scotland, and from mountains of central parts of temperate Europe (Czech Republic, Germany, Poland, Romania, Switzerland), always only single records. This species needs to be compared especially with *Hilara nadolna* Niesiolowski, 1986, known so far with certainty from Poland only.

MATERIAL EXAMINED: **Czech Republic:** Šumava Mts, Nová Hůrka (800 m) 24.vi.-28.vii.2000 MT, 1♂ (*Barták*). **Switzerland:** ZH: Embrach, Haumüli (400 m) 19.vi.1998 1♂ (*Merz*).

REMARK: This species is here recorded for the first time from Switzerland.

103. *Hilara hystrix* Strobl, 1892

Figs 48-50

DIAGNOSIS: A small, shining black species, body about 2.5 mm long, with all hairs and bristles black, brown wings, and black haltere. Thorax almost uniformly shining, *acr* very narrowly 2-serial and diverging, frontal setae vestigial. Legs short, t_1 and t_2 in male thickened and long bristled, t_3 in female very thickened at middle.

REDESCRIPTION:

Male. Frons and face not very wide, frons, vertex and occiput dull black, face more greyish, but covered by the very large, shining black clypeus. All setae on head

black but fine, ocellar setae as long as antennal segment 3 without style, frontal setae absent or very small. Antennae black, small, style clearly shorter than segment 3. Palpi black, ventrally with small black hairing, and with an unusually long, but thin, pre-apical seta. Labrum shorter than head is high, about two-thirds of its height.

Thorax almost uniformly shining black, pleura scarcely duller greyish, all hairs and setae black: *acr* very narrowly 2-serial and distinctly diverging, *dc* 1-serial, all small and fine, shorter than antennal style, and numerous, more than 10 setae in one row. Large marginal bristles long though fine, including the long *h* and *ph* setae, the inner pair of *sc* the longest, and pronotum with an unusually long and strong (!) seta on each side.

Wings conspicuously brown, with blackish veins, the dark stigma not very distinct on the brown wings; squamae with fringes, and haltere uniformly black.

Legs black, rather slender and subshining, with the exception of anterior four tibiae which are covered with short, black hairs, even the usual row of anterior strong bristles on f_2 is replaced by fine bristly hairs; t_1 (Fig. 48) with 6-8 very long setae dorsally, though they are clearly thin and fine, not as strong as in *H. pectinipes*, and tarsi covered with only short hairs (as in the latter species); t_2 (Fig. 49) is dilated in *H. hystrix* as on fore leg, but it bears dorsally two equal rows and ventrally one row, of unusually long and strong setae.

Abdomen dull black, slightly subshining in some lights, covered with very fine, short black hairs, and also the tergal hind-marginal bristles are very indistinct. Genitalia large, especially hypandrium produced posteriorly, in general very similar to that of *H. cornicula*.

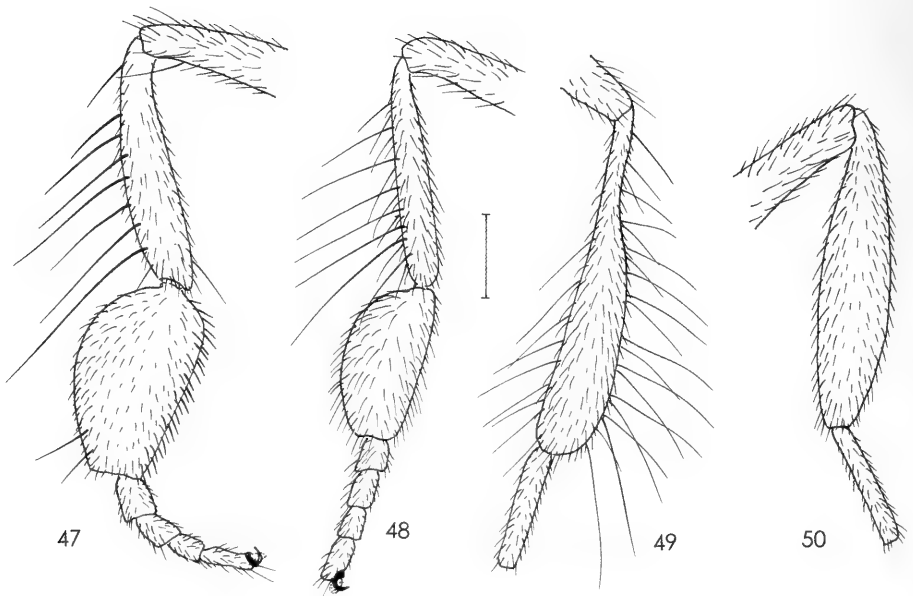
Length: body 2.5 – 2.8 mm, wing 2.8 – 3.0 mm.

Female. With the exception of the legs very much like the male, wings uniformly brownish as well, and all hairs and setae on scutum as in male. Legs uniformly subshining black, rather slender, t_1 unmodified and dorsally with several fine setae about as long as tibia is deep, t_2 also slender and covered with only short inconspicuous black hairs, whereas t_3 (Fig. 50) very thickened, but also only short pubescent; tarsomeres 2-4 on all pairs slender, slightly longer than deep, and covered with short hairs. Abdomen uniformly subshining, or nearly shining black, and covered with only minute, sparse black hairs.

Length: body 2.3- 2.5 mm, wing 2.5 – 2.6 mm.

DIFFERENTIAL DIAGNOSIS: *H. hystrix* is a smaller-sized species. As *H. barbipes* it is characterized by an almost shining black scutum. It can easily be distinguished by the very small and fine *acr* and *dc* setae on scutum, by the absence of frontal bristles, by the short pubescent fore tarsi in male, and especially by the very thickened and long, strongly bristled ♂ t_2 (Fig. 49) which is a unique character in this group of species. Females have similarly very strongly thickened t_3 (Fig. 50) as in *H. pectinipes*, *H. barbipes* and also as in *H. pseudochorica*.

DISTRIBUTION: A mountain species, described from the Austrian Alps, but later found besides the Alps as well in other parts of Central Europe, in the Czech Krkonoše Mts (Riesengebirge) and in the Polish West Carpathians. In the Alps for a long period from the end of May to August, at altitudes between 400 and 1100 m. Strobl (1893: 88;



FIGS 47-50

Hilara pectinipes Strobl ♂ (CZ, Bohemia, P edhradí, River Korunka). (47) Fore leg in posterior view. - *Hilara hystrix* Strobl (A, Styria, Kaiserau). (48) Male fore leg in posterior view. (49) Male mid tibia with basitarsus in anterior view. (50) Female hind tibia with basitarsus in anterior view. Scale: 0.2 mm.

1910; 68) recorded it in the Styrian Admont region as a common species in June and July. For further data on the syntypic series in Admont, see Chvála (2004: 129).

MATERIAL EXAMINED: **Austria:** Oberösterreich: St. Pankraz, River Steyer (490 m) 24.vi.2002 1♀, 29.vii.1997 1♂; Totes Gebirge, Hinterstoder, River Steyer (700 m) 8.vii.2001 1♂; Rossleithen, River Piessling (650 m) 8.vii.2001 2♂ 1♀ (all *Chvála*). Styria: Gesäuse Eingang (620 m) 16.vii.1891 1♀; Gesäuse 3.vi. 2♀, 18.vii. 1♀ and 6.viii.1898 1♀ (all *Strobl*), 25.vi.1891 1♀ (*Becker*); Admont, River Enns (620 m) 25.v.2003 1♂; Kaiserau, Kalblingbach (1100 m) 1.vii.2002 1♂; Haller Mauern, Esslingbach (900 m) 3.vii.2002 1♀; Mühlauerbach (1000 m) 25.-28.viii.1999 3♂ 3♀; Ennstaler Alpen, Oberlaussa (800 m) 9.viii.1998 1♀ (all *Chvála*). **Switzerland:** ZH: Embrach, Haumüli (400 m) 28.v.1997 1♂, 19.vi.1998 3♀ (*Merz*), same 27.v.-29.vi.1998 2♂ 3♀ (*Wolf*). **Slovenia:** Julian Alps, Gaspar i, River Kolpa (310 m) 15.vi.2006 1♂ (*Plant*).

Group 13 – *H. maura*-group

For a characterization of this group, and a revision of the European species, see Chvála (1997a, 2005a: 196, and 2008a: 131 for the descriptions of further new taxa).

104. *Hilara maura* (Fabricius, 1776)

REFERENCES: Collin (1961: 578), Chvála (2005a: 196) – description and illustration of male fore leg, hind femur, female hind leg, and male genitalia.

DISTRIBUTION: A widely distributed species in Europe, from the southern parts of Scandinavia and the Baltic coast of Finland to the Mediterranean region, where it is,

however, a rare species. Recorded also from mountains of Morocco in North Africa (Ifrane, Ghabat al Behar 1650-1700 m, 8.v.1981 1♂ leg. S. C. Sherman). In central parts of Europe one of the most common species from lowlands to mountains over 1000 m, often in large swarms of hundreds of individuals above water; in mountains of southern Europe frequently at altitudes around 1700 m. Mainly in early spring (May and June) rarely possibly with a second summer generation in August and even September. Strobl (1898: 205) surprisingly mentioned in the Styrian Alps only 2♀ of *H. maura* taken at Krumau near Admont, but the common occurrence of *H. diversipes* mentioned by Strobl on the same page, refers after examination of his specimens by the first author actually partly to *H. maura*, partly to *H. hybrida*.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Steyer River N of Hinterstoder (500 m) 24.v.2009 2♂ (*Chvála*). Styria: Admont (640 m) 11.-19.v.2003-2008 7♂ 2♀; Admont, River Enns (620-640 m) 18.-25.v.2003 common; Frauenberg near Admont (680 m) 12.v.2008 1♂; Admont, Saugraben (700 m) 19.v.2003 1♂; Weissenbach bei Liezen (700 m) 25.v.2003 4♂; Haller Mauern, Oberlaussa, Polzalmbach (750 m) 24.v.2003 2♂ (all *Chvála*). Salzburgland: Salzburg, 10 km SE, River Almbach (565 m) 17.v.2003 common; River Lammer (800 m) 17.v.2003 common (all *Chvála*). **Switzerland:** GE: Chancy, La Laire (350 m) 18.-24.iv.2003 1♂ 1♀ (*Merz & Amiet*); Versoix 18.v.1930 6♂ 3♀, 27.v.1928 1♀ (*Naville*). SG: Betlis, Walensee (450-520 m) 24.-25.vi.1995 1♂ 4♀ (*Merz & Eggenberger*). ZH: Embrach, Haumüli (400 m) 28.v.1997 1♂ 1♀, 9.v.1998 2♀ (all *Merz*), 30.iv.-5.v.1998 3♂ 1♀ (*Wolf*), 9.v.1998 1♂ (*Bächli*), 28.v.1997 1♀ (*Ruckstuhl*). AG: Aarau env. 11.v.1910 1♂, 20.v.1926 1♀ (*Zürcher*). **Slovenia:** Julian Alps, Pohorje Mts (1300 m) 17.vi.2006 1♂ (*Plant*).

105. *Hilara diversipes* Strobl, 1892

REFERENCES: Collin (1961: 576, as *H. germanica* Engel), Chvála (2005a: 198) – description and illustration of male fore leg, hind femur, female hind leg, and male genitalia.

DISTRIBUTION: A boreomontane species, widely distributed throughout Fennoscandia and Scotland, but then only in mountains of central Europe, south to the Alps where it occurs basically between 900 and 1900 m. Clearly a summer species, mainly from the end of June to August, replacing at many sites the early spring species *H. maura* and *H. hybrida*. Most of the spring records of Strobl (1898: 205) from the Styrian Alps actually refer to the following *H. hybrida* and partly also to *H. maura*.

MATERIAL EXAMINED: **Austria:** Oberösterreich: Totes Gebirge, Wurzeralm (1400 m) 30.vi.2002 1♂ 2♀ (*Chvála*). Styria: Kaiserau (1100 m) 7.viii.1891 2♂ 4♀ (*Strobl*); Admont, Kematengraben (1000 m) 26.vi.2002 2♂ 1♀, 9.vii.2001 1♂; Ardning, Ardningalm (1100 m) 27.vi.2002 8♂ 1♀; Gesäuse, Johnsbach (900 m) 5.vii.2002 1♂ 2♀; Kaiserau, Kalblingbach (1100 m) 1.vii.2002 common; Schladminger Tauern, Sölkpass, Innere Grösssolk (1300 m) 7.vii.2001 2♀; Schladming, Untertal (1000 m) 6.vii.2002 2♂ 6♀; Rottenmanner Tauern, Bösenstein, Scheibelsee (1750 m) 6.vii.2002 9♀ (all *Chvála*). **Switzerland:** GR: Valbella, Casoja (1500-1550 m) 10.-24.vii.1996-1999 14♂ 9♀ (*Merz*); Ftan 12.-14.viii.1978 3♂ (*Bächli*); Zerneß, Gondas (1480 m) 14.viii.1996 1♂ 1♀ (*Merz & Bächli*); Zuoz (1800 m) 19.vii.1972 1♂, 20.-22.vii.1971 1♂ 1♀; Samedan (1710 m) 17.vii.1985 1♂ (all *Sauter*); Engiadana Bassa, Ramosch (1050 m) 10.vii.1961 1♂ (*Keiser*); Tschiers 15.vi.1986 1♂; Sur, Alp Flix, Son Roc (1965 m) 1.viii.2004 1♀ (all *Haenni*).

106. *Hilara hybrida* Collin, 1961

REFERENCES: Collin (1961: 575 ♀) – description and illustration of female hind leg; Chvála (2005a: 200) – description and illustration of male fore leg, hind femur, female hind leg, and male genitalia.

DISTRIBUTION: Described from females only which were collected in Scotland, Norway and Germany. It is a species with a similar type of boreomontane distribution as *H. diversipes*. Both species occur in the same mountain biotopes in central Europe, but *H. hybrida* is a typical spring species, often collected together with *H. maura*, another spring species. Compared with these two related species of the *H. maura* complex (as defined by Chvála, 2005a: 196) *H. hybrida* is especially abundant in northern Europe as far north as Lapland. However, compared with *H. diversipes* it may be found in mountains of central Europe with preference at lower altitudes (500 to 800 m) rarely above 1000 m. Mainly in May, often in small swarms above streams and rivers.

MATERIAL EXAMINED: **Austria:** Oberösterreich: St. Pankraz, River Steyer (490 m) 12.v.2003 common. Styria: Admont (640 m) 3.v.2008 1 ♀, 12.v.2003 1 ♂; Gesäuse Eingang, Enns River (620 m) 18.-25.v.2003 swarms; Haller Mauern, Buchauer Sattel, Grossbuchau (850 m) 9.-13.v.2008 2 ♀; Mühlau, Esslingbach (750-900 m) 18.v.2003 swarms; Ziernitz, Mühlauerbach (900 m) swarms; Ennstal, Frauenberg, Edelgraben (680 m) swarms; Hieflau, Waaggraben (600 m) 24.v.2003 common; Weissenbach bei Liezen (700 m) 25.v.2003 swarms; Haller Mauern, Oberlaussa, Polzalmbach (750 m) 24.v.2003 swarms; Schaldminger Tauern, Untertal (1000 m) 6.vii.2001 1 ♀. Salzburgland: Salzburg, 10 km SE, River Almbach (565 m) 17.v.2003 3 ♂; River Lammer (800 m) 17.v.2003 swarms (all Chvála). **Switzerland:** BE: Lenk, Simmenfälle (1430 m) 31.v.2003 1 ♂ (Merz & Eggenberger). VS: Leuk, Platten (625 m) 30.v.2002 1 ♂; Leuk, Bahnhof (625 m) 15.v.2000 3 ♀ (all Merz). GL: Glaris, Linthal 1 ♀ (Oldenberg).

107. *Hilara nitidula* Zetterstedt, 1838

REFERENCES: Collin (1961: 572), Chvála (2005a: 202) – description and illustration of male fore leg, hind femur, female hind leg, and male genitalia.

DISTRIBUTION: A widely distributed species from Fennoscandia in the north, including Lapland and Kola Peninsula, south through temperate central Europe to the Alpine region and East Carpathians; rare in the Mediterranean, for instance in Croatia. In the Alps at altitudes usually up to 800 m only. Strobl (1893: 88) recorded it only from the Styrian Alps from the vicinity of Admont, but most of his records refer in fact to the following species, *H. nitidorella*, which occurs later in summer, and often at higher altitudes. In spring a very common species at lower altitudes in the Alps, forming swarms above rivers and streams. In warm Swiss lowlands already in April. It is replaced later in summer by a similarly common *H. nitidorella*.

MATERIAL EXAMINED: **Austria:** Oberösterreich (Totes Gebirge, St. Pankraz, River Steyer); Styria (Ardning, Admont, Gesäuse Eingang, River Enns, Johnsbach, Haller Mauern, Buchauer Sattel, Mühlau, Oberlaussa, Frauenberg, Weissenbach bei Liezen); Salzburgland (Salzburg, River Almbach, River Lammer); 3.v.-25.v. (620-880 m). **Switzerland:** GR (Roveredo, Trii, S. Vittore, Castagnola, Susch /1420 m/); SG (Wattwil); VS (Baltschieder, Leuk, Noes); ZH (Zürich, Embrach); AG (Villnachern, Würenlingen); TI (Biasca, Tenero); 8.iv.-26.v. (205-650 m). **Italy:** AO: Aosta, St Vincent (880-1080 m) 13.-14.v.2006 4 ♂ 2 ♀ (Haenni). **Slovenia:** Julian Alps, River Bistrica (775 m) 19.vi.2006 1 ♂ (Plant).

108. *Hilara nitidorella* Chvála, 1997

REFERENCES: Chvála (2005a: 204) – description and illustration of male fore leg, hind femur, female hind leg, and male genitalia.

DISTRIBUTION: From the British Isles and the Baltic coast (Denmark, south Sweden) through the central parts of Europe south to the Alpine region. Common in lowlands but, in comparison with *H. nitidula*, often at high altitudes in the Czech mountains (Krkonoše Mts, Šumava Mts) and in the West Carpathians (Fatra Mts, Tatra Mts). Usually at altitudes above 1100 m. In the Alps locally very common, forming small swarms above mountain streams, not rare very high in mountains above 2000 m. A typical summer species, from June to August.

MATERIAL EXAMINED: **Austria:** Oberösterreich (Totes Gebirge, St. Pankraz, Hinterstoder, Rossleithen); Styria (Admont, Hieflau, Mühlau, Haller Mauern, Pyhrnpass, Kalkoffen, Ardnung, Gesäuse, Liezen, Frauenberg, Kaiserau, Johnsbach, Schladminger Tauern, Sölkpass, Schladming, Rottenmanner Tauern, Hohetauern); 17.vi.-9.vii. (490-1300 m). **Switzerland:** GR (Ftan, Clünas; Ausserferrera; Valbella, Casoja; Engiadina Bassa, Ramosch); GL (Klöntal, Richisau); TI (Biasca, Loderio); ZH (Embrach, Haumüli; Zürich); BE (Weissenburg im Simmental); 2.vi.-28.viii. (350-2100 m). **Italy:** South Tyrol: Sankt Valentin auf der Haide env., 11.vii.2007 4♂ (*Heřman*). **France:** Gard, Dourbies, La Rouvière, Crouzoulous (970 m) 15.vii.2005 1♂, Dourbies, 2 km SSE, rive du Crouzoulous (855 m) 21.vii.2009 1♂ 1♀, Dourbies, 1.7 km S, rive du Crouzoulous (960 m) 15.vii.2009 1♂ (all *Haenni*). **Slovenia:** Julian Alps, Vrtnik, River Lepena, River Bistrica (500-775 m) 19.vi.2006 (*Plant*).

109. *Hilara femorella* Zetterstedt, 1842

REFERENCES: Chvála (2005a: 205) – description and illustration of head, male fore leg and hind femur, and male genitalia.

DISTRIBUTION: A boreomontane, or rather a boreoalpine species in Fennoscandia common mainly in the north (Finmark, Lapland), and then only in high mountains of central Europe, at altitudes from 800 to 2200 m. It is one of the most common species of the genus above the timberline. In the north from July to the beginning of September, in the Alps up to the middle of September, although really common in July and August.

MATERIAL EXAMINED: **Austria:** Styria: Rottenmanner Tauern, Bösenstein, Scheibelsee (1750 m) 6.vii.-18.ix.2002-2007 swarms; Schladminger Tauern, Sölkpass (1900 m) 24.viii.2001 2♂ 4♀ (all *Chvála*); Donnersbachwald (1600 m) viii.1999 1♂ (*Barták*). Salzburgland: Obertauern, Grünwaldkopf (2000 m) 26.viii.1999 swarms (*Chvála*). Tyrol: Grossglockner (2200 m) 31.vii.1988 common. Carinthia: N of Gmund 31.vii.1999 1♂ (all *Barták*). **Switzerland:** GR: Ausserferrera (1600-2000 m) 1.-2.viii.1999 7♂ 12♀; Juf (2130 m) 3.viii.1999 7♂ 11♀; Lenzerheide, Sanaspans (2150 m) 14.vii.1996 1♂; Lenzerheide (2000 m) MT pasture 14.-31.vii.2000 5♂; Valbella, Casoja (1550 m) 13.vii.1996 1♀; Valbella, Lavoz (1600-1900 m) 19.vii.1996 1♂ (all *Merz*); Ftan, Clünas (2200 m) 5.viii.1996 3♂ 3♀; Zuoz, Nüd (1700 m) 7.viii.1996 common; Zernez, Gondas (1480 m) 4.viii.1996 common (*Merz & Bächli*); Samedan (1720 m) 20.vii.1987 2♀; Zuoz (1670 m) 21.vii.1971 1♂ (all *Sauter*); Cresta 26.-31.vii.1916 3♂ 3♀ (*Escher-Kündig*); St. Moritz 14.vii.1906 1♂ (*Oldenberg*); Sur, Caddotsch (2145 m) 3.viii.2004 2♂ 2♀; Sur, Malpass (2370 m) 3.viii.2004 1♂; Poschiavo, Li Curt (1010 m) 2.vii.2004 2♂ (all *Haenni*). **VS:** Oberwald 13.-15.viii.1975 1♂ (*Bächli*); Visperterminen (1900-2200 m) 24.vii.1992 2♂ (*Merz*). **SZ:** Unteriberg, Biet (1900 m) 24.-26.vii.2001 2♀ (ETH students). **Italy:** Passo Rolle (1900 m); Madésimo (*Chvála* 1997a: 280); Madésimo 30.-31.vii.1910 10♂ 19♀ (*Escher-Kündig*). **France:** Haute-Savoie, Pormenaz (1700-2200 m) 8.-31.vii.2003 MT 3♂ 6♀ (*Castella & Speight*). Gard, Forêt de l'Aigoual, Ginestous (1240 m) 22.vii.2004 1♂ 1♀ (*Haenni*). **Slovenia:** Julian Alps, Triglav, Aljažev dom (1100 m) 31.vii.1988 common (*Chvála*).

110. *Hilara sulcitaris* Strobl, 1892

REFERENCES: Chvála (1997a: 281) – description and illustration of head, male fore and hind leg, and male postabdomen with genitalia.

DISTRIBUTION: An endemic Alpine species, known from the Austrian, Swiss and Italian Alps only. An Alpine species known at altitudes above 1000 m, in July and August.

MATERIAL EXAMINED: **Austria:** Styria: Scheibleggerhochalpe near Admont, 27.vii. 2♂ 1♀; Rottenmanner Tauern, Scheiplsee (1750 m) 30.vii.1891 2♂ 4♀ (all syntypes) (all *Strobl*); Schladminger Tauern, Donnersbachwald (1600 m) viii.1999 MT 1♂ 1♀ (*Barták*); Gesäuse, Johnsbach (1050 m) 5.vii.2002 1♀; Kalbling (1500 m) 27.vii.1997 1♂ (all *Chvála*). Tyrol: Grossglockner (1700 m) 31.vii.1988 1♂ (*Barták*). **Switzerland:** VS: Visperterminen (1900-2200 m) 24.vii.1992 1♂ (*Merz*). **Italy:** Passo Rolle (1900-2000 m) 8.viii.1988 3♂ 5♀; Passo Sella (2100 m) 8.viii.1988 1♂ (all *Barták*).

111. *Hilara clypeata* Meigen, 1822

REFERENCES: Collin (1961: 581), Chvála (2005a: 207) – description and illustration of the wing radial fork, and male fore leg and genitalia.

DISTRIBUTION: A widely distributed species in Europe, from the British Isles and south of Fennoscandia to Spain, France, Romania and south of European Russia but nowhere common. It occurs at scattered sites often far away from water. Strobl (1892a) recorded it from Styria as a new variety *brevifurca* of *H. pinetorum* Zetterstedt, but the Zetterstedt's species is a junior synonym of *H. clypeata*, whereas *H. pinetorum* of Strobl is a mixture of several species, especially *H. brevistyla* Collin. In central Europe a spring species, mainly in May and June. Very rare in the Alpine region. This species is listed from Switzerland by Chvála & Wagner (1989) but we are unable to retrace the source of this record.

MATERIAL EXAMINED: **Austria:** Lower Austria: Gutensteiner Alpen, Gutenstein 1.vi., No.23187 1♂ (*Becker*). Styria: Admont, meadows (640 m) 17.vi.2007 1♂ (*Chvála*).

112. *Hilara tyrolensis* Strobl, 1892

SYNONYM: *Hilara miriptera* Straka, 1976, **syn. n.**

REFERENCES: Chvála (1997a: 285) – description and illustration of the wing radial fork, and male fore leg.

DISTRIBUTION: An endemic species of the Alps which was described from South Tyrol, and known so far from the Austrian, Slovenian and Italian Alps. In June and July, at altitudes above 1000 m.

MATERIAL EXAMINED: **Austria:** Styria: Scheibleggerhochalpe, Kaiserau (1100 m), Kalbling 17.vi. 2♂ 7♀ (*Strobl*); Kaiserau, Kalblingbach (1400 m) 15.vi.1997 1♂ 1♀ (*Chvála*). **Italy:** South Tyrol, Lusier Pass 19.vi.1890 1♂ (*Becker*); San Martino di Castrozza 24.vii.1914 1♂ 1♀ (*Oldenberg*). **Slovenia:** Julian Alps, Triglav, Aljažev dom (1100 m) 3.vii.1973 1♂ (holotype of *H. miriptera*) (*Chvála*).

NOTES ON ITS SYNONYMY: *Hilara miriptera*, described by Straka (1976) from a single holotype ♂ from the Slovenian Julian Alps, is proposed here as a new synonym of *H. tyrolensis*. The detailed description clearly shows in all details that *H. miriptera*

is conspecific with *H. tyrolensis*, including the illustration of the characteristic wing radial fork. According to Straka (1976: 13) the holotype should have been deposited in the Collection Chvála in the Prague Charles University (now in University Oxford), but it was very probably kept by V. Straka in the Collection of the Museum of Andrej Kmet' at Martin in Slovakia.

113. *Hilara discalis* Chvála, 1997

REFERENCES: Chvála (2005a: 213) – description and illustration of the wing radial fork, male fore leg, postabdomen, and genitalia.

DISTRIBUTION: A continental species of temperate central parts of Europe. Only 3♂ are known from the extreme south of Sweden (Skåne). Southwards it is distributed in central parts of Europe to Switzerland and Slovenia. Usually an uncommon lowland species, in the Alpine region up to 400 m only. In May and June, in the Carpathians up to July. Surprisingly not yet found in Austria, for instance in the Styrian Alps, although this part of the Alps is undoubtedly the best investigated.

MATERIAL EXAMINED: **Switzerland:** GR: S. Vittore, Monticello (280 m) 2.vi.1997 1♀ (*Merz*). AG: Villnachernm, Auwald (340 m) 10.vi.1986 1♂ (*Meier*). GE: Moulin de Veigy, source (410 m) 22.vi.2006 15♂ 1♀ (*Stucki*); Chancy, Vers Vaux (335 m) 1.vi.2002 1♂ (*Merz*). TI: Gordola (210 m) 17.v.2000 1♂ (*Merz & Ulrich*); Biasca, Loderio (350 m) 2.vi. 4♂ 2♀, 8.vii.1997 1♂ 1♀ (both *Merz*); Gordola, Verzasca-Ufer (205 m) 15.-19.v.2006 13♂ 4♀; Gordola, Bolle di Magadino (200 m) 19.v.2006 1♂ 2♀ (all *Merz*). ZH: Embrach, Haumüli (400 m) 19.v.-2.vi.1998 5♂ 3♀ (*Wolf*). **Slovenia:** River Čabranica (330 m) 15.vi.2006 2♂; Dsilnica, River Kolpa (240 m) 15.vi.2006 1♂ 1♀ (*Plant*).

114. *Hilara discoidalis* Lundbeck, 1910

REFERENCES: Collin (1961: 580), Chvála (2005a: 211) – description and illustration of male fore leg, female hind leg, and male genitalia.

DISTRIBUTION: Uncommon, but widely distributed in Fennoscandia including Russian Karelia, on the British Isles, and south to Hungary and the Alpine region. Mostly in lowlands, but sometimes in mountains, as for instance in the Šumava Mts (Böhmerwald), up to 1000 m; in the Alps at most at altitudes of about 350 m. It occurs for a long period from May to August. As for the preceding *H. discalis* records are still missing from Austrian Alps.

MATERIAL EXAMINED: **Switzerland:** GE: Cartigny, Moulin de Vert (350 m) 24.v.1999 1♂ (*Merz & Müller*). GR: S. Vittore, Rebberg (290 m) 2.vi.1997 1♀ 8.vii.1997 1♀ (*Merz*). TI: Biasca, Loderio, (350 m) 2.vi.1997 2♂, 28.vi.1992 1♀, 4.viii.1997 1♂, same (300 m) 16.v.2006 2♀ (all *Merz*); Novaggio (Strasse Magliasino) 19.v.1916 1♂ (*Escher-Kündig*); Gordola, Verzasca-Ufer (205 m) 15.v.2006 1♂ (*Merz*).

115. *Hilara media* Collin, 1927

REFERENCES: Collin (1961: 583), Chvála (2005a: 214) – description and illustration of the wing radial fork, male fore leg, and male postabdomen and genitalia.

DISTRIBUTION: A widely distributed species, from England including Wales, the Netherlands and Poland, through central parts of Europe south to France, Romania and Bulgaria. In temperate Europe at higher altitudes and in mountains, in the Moravian

Beskydy Mts, east to West Carpathians (Slovak Velká Fatra Mts, Bukovecké hory Mts) and to the Bulgarian Rhodope Mts (as *H. bechevi* Dzhambazov); fairly common in south-west Europe, for instance in the Pyrenees. Here recorded for the first time from Switzerland, but not yet found in Austria, although it should occur there as well. For a long period from May to August.

MATERIAL EXAMINED: **Czech Republic:** Beskydy Mts, Horní Lomná (520 m) 20.vi.1968 1♂ (*Barták*). **Slovakia:** Velká Fatra Mts, Gaderská dolina 28.vii.1970 1♂; Blatnická dolina 28.vii.1970 3♂ 2♀ (all *Straka*); Poloninské Karpaty Mts, Stučica 16.vii.1963 2♂ (*Chvála*). **Bulgaria:** Rhodope Mts, Hrabrino, S of Plovdiv (Dzhambazov, 1998: 327). **France:** Gard, 2 km W Dourbies, Le Mouner (750-820 m) 5.vii.1991 1♂ 2♀; Gard, Dourbies, La Rouvière, Crouzoulous (970 m) 15.-23.vii.2005 8♂ 9♀; Dourbies, 2 km SSE, rive du Crouzoulous (855 m) 21.vii.2009 1♀ (all *Haenni*); Var, Gorges du Verdon, Pont de l'Artuby (730 m) 17.-19.v.2003 2♀ (*Castella & Speight*). Pyrenees, Fabian (1100 m) 9.vii.1990 1♂ (*Barták*); Pyrenees-Or., Col de Palomère, La Bastide (1100 m) 13.vi.2007 1♂ (*Merz*). **Switzerland:** SH: Rüdlingen, Heimstätte (380 m) 4.vii.1998 1♂ (*Merz & Eggenberger*).

Group 14 – *H. albitarsis*-group

For a characterization of this group, and a revision of the European species, see Chvála (2005a: 216 and 2008a: 133).

116. *Hilara albitarsis* von Roser, 1840

REFERENCES: Collin (1961: 570), Chvála (2005a: 216) – description and illustration of the wing radial fork, male fore and hind leg, and genitalia.

DISTRIBUTION: From the British Isles and southern parts of Fennoscandia south through central parts of Europe to the Alpine region. A spring species, everywhere uncommon. More often found in lowlands. In the Alps from April to June, towards north in Europe until July. Strobl (1892a) described this species from Lower Austria (Seitenstetten) twice, the males as *H. braueri*, and the females as *H. argyrosoma*. In the Alps sometimes at higher altitudes, generally up to 900 m, though even at 1550 m. Strobl (1898: 206) recorded it in the Styrian Alps at Kaiserau (1100 m) and Kalbling (about 1400 m) as *H. niveipennis* Zetterstedt var. *a* and *b* (the var. *c* was *H. albipennis* von Roser). Later, Strobl (1910: 70) recorded *H. albitarsis* (again as *H. niveipennis*) also from the vicinity of Admont (640 m) and from Hohentauern in the Rottenmanner Tauern (1300 m).

MATERIAL EXAMINED: **Austria:** Styria: Kaiserau (1100 m) 17.vi.1896 2♂ (*Strobl*); Radmer, 6 km S of Hieflau, Weissenbach – Radmerbach (650 m) 24.v.2003 3♂; Haller Mauern, Buchauer Sattel, Grossbuchau (850 m) 31.v.2009 1♀ (all *Chvála*). **Switzerland:** GE: Cartigny, Moulin de Vert (350 m) 29.iv.1999 1♂ 1♀ (*Merz*). VS: Jeitzinen (1550 m) 26.vi.1999 1♂ (*Merz & Eggenberger*); Leuk, Brentjong (900 m) 17.-18.v.1996 3♀ (*Merz & Bächli*); Leuk, Pfywald (630 m) 23.iv.1998 1♀ (*Merz & Botta*). GR: Arosa (1800 m) 28.vi.1955 (*Ringdahl*). ZH: Zürich, Zürichberg (650 m) 18.v.1998 1♀ (*Merz*).

117. *Hilara bohemia* Straka, 1976

REFERENCES: Chvála (1997c: 297) – description and illustration of male fore leg and genitalia.

DIAGNOSIS: A medium-sized species (body about 2.5 – 3.5 mm long) of the *H. albitarsis*-group. Body and legs uniformly black and without distinct bristles, scutum

finely silvery-grey dusted with 3 indistinct dark stripes, and irregular 2- to 4-serial *acr*; haltere black. Pubescence on abdomen and legs pale, legs almost shining black, with all femora and tibiae distinctly silvery pilose beneath; ♂ f_3 slightly swollen and finely spinose beneath, and bt_1 rather long and slender, as deep as corresponding tibia at tip; abdomen in ♀ uniformly contrasting silvery-grey dusted, t_3 unmodified, long and slender. For a full redescription with illustrations, and its synonymy with *Hilara baehrmanni* Straka, 1985, see Chvála (1997c).

DISTRIBUTION: Central European species. Besides the Alpine region known only in lowlands of Germany, Czech Republic and Poland, although for instance in the Krkonoše Mts (Riesengebirge) at altitudes above 1300 m. In Switzerland a widely distributed but everywhere an uncommon spring species, mainly in May, rarely to the beginning of July; surprisingly not yet found in Austria. In the Alps mainly at lower altitudes up to 800 m, rarely at 1550 m (VS, Jeitzinen).

MATERIAL EXAMINED: **Switzerland:** NE: St. Blaise, Les Riedes (470 m) 19.v.2001 1♂. GR: S. Vittore, Rebberg (290 m) 8.vii.1997 1♂ (all *Merz*). GE: Cartigny, Moulin de Vert (350 m) 4.v.2003 1♂ (*Merz & Eggenberger*), same (360 m) 1.v.1999 1♀ (*Merz*). VS: Leuk, Pfywald (600 m) 6.vi.2001 1♀ (*Merz & Landry*); Leuk, Brentjong (900 m) 19.v.1996 1♂ (*Merz & Bächli*); Eggerberg (750-850 m) 23.v.1998 1♀; Baltschieder, Chumme (650 m) 23.v.1998 1♂ (all *Merz*); Jeitzinen (1550 m) 26.vi.1999 1♂ (*Merz & Eggenberger*). SH: Hemmental, Möslì (830 m) 30.v.1996 1♂; Merishausen, Osterberg (770 m) 30.v.1996 1♀; Sieblingen, Randenhäus (830 m) 30.v.1966 1♂ (all *Merz*); Merishausen, Gräte (520-720 m) 1.vi.1996 1♀ (*Merz & Eggenberger*). TI: Gordola, Verzasca-Ufer (205 m) 15.v.2006 1♀; Mte. S.Giorgio, Meride ob Dorf (580 m) 18.v.2006 3♀ (all *Merz*). SO: Hausenstein, Ifenthal, 10 km W of Olten) 24.v.2001 1♀ (*Artmann*). JU: Delémont, Fin de Bâle, Birse (420 m) 17.v.1989 1♂ (*Gonseth*). **France:** Drôme, Col de Tourniol (1050 m) 26.v.2006 16♂ 18♀; Grand Bois, 30 km S of Lyon (440 m) 21.v.2006 1♂ (all *Barták*). **Italy:** AO: Aosta, St. Vincent, Salirod (1080 m) 14.v.2006 1♂ (*Haenni*).

ADDITIONAL SPECIES

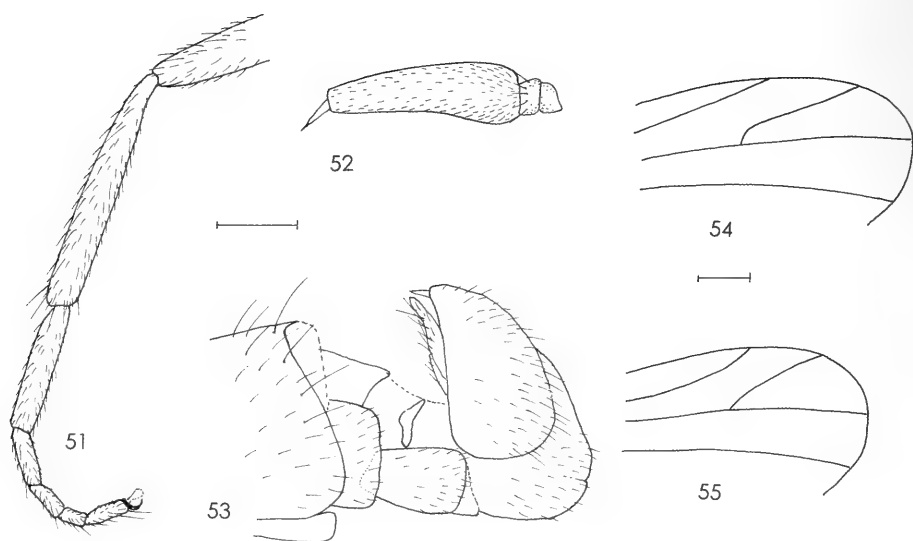
Hilara longicornis Strobl, 1894

Figs 51-58

DIAGNOSIS: A small dull dark grey dusted species about 2 – 3 mm long, with unusually long antennae, very short labrum, and both fore leg in male and hind tibia in female long and slender, unmodified. Frons and occiput dull black, *acr* small and numerous, 4-serial at middle, nearly 2-serial anteriorly and posteriorly. Abdominal pubescence pale.

REDESCRIPTION:

Male. Frons very wide, as wide below as antennal segment 3 at base, very triangularly widening above, about twice as wide at level of upper ocelli; face as wide as frons below, silvery-grey dusted with clypeus narrowly shining black; frons, vertex and occiput dull velvety black to blackish-brown, occiput with a greyish tomentum visible in some lights. All hairs and setae on head blackish, ocellar setae short and fine, about as long as third tarsomere on fore leg, postvertical bristles of the same length, but frontal setae very small and fine, or quite absent. Antennae (Fig. 52) with an unusually long segment 3, style very short. Palpi blackish-grey, small, ventrally before tip with 2 or 3 short black bristly-hairs. Labrum very short, shorter than half-length of head height.



FIGS 51-55

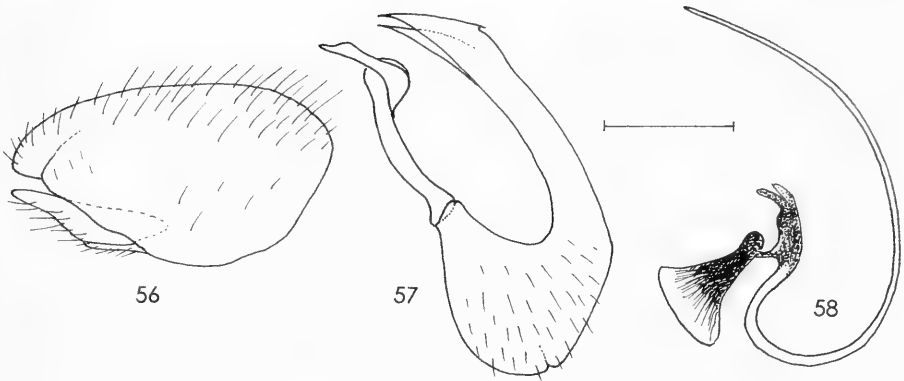
Hilara longicornis Strobl (H. Hajós, syntypes). (51) Male fore leg in posterior view. (52) Male antenna. (53) Male postabdomen (macerated). (54) Radial fork of male wing. (55) The same in female. Scale: 0.2 mm.

Thorax uniformly dull greyish both on scutum and pleura, the latter in some lights with a tendency to be translucent brownish, and scutum with a slight indication of two darkenings between lines of bristles; *acr* and *dc* blackish, small and numerous, more than 10 setae in one row; *dc* uniserial, *acr* clearly 2-serial anteriorly and posteriorly, 4-serial at middle; marginal bristles in full number but rather short and fine, including 2 pairs of *sc*, outer pair as long as last pair of *dc*, and inner pair not much longer. Pronotum with a small seta on each side, all hairs and setae on thorax blackish.

Wings almost clear, with a tendency to be faintly yellowish-brown infuscated, veins dark brown, radial fork (Fig. 54) with upper vein rather short and straight, not of the usual "hilarine"-type, and anal vein is abbreviated. Squamae brownish with whitish fringes, haltere uniformly blackish.

Legs uniformly blackish, slender and unmodified, covered with short blackish or nearly brownish hairs, strong black bristles confined to the usual row of about 5 strong bristles on f_2 anteriorly, some slightly longer black setae also on f_1 posteriorly, but f_3 and t_3 with only fine short bristly hairs; coxae with short black bristles. Fore leg (Fig. 51) unusually long and slender, also bt_1 unmodified, not swollen, and all tibiae with only a small ring of preapical bristles.

Abdomen dull blackish-brown, finely silvery-grey pollinose, with very pale, light brownish short fine pubescence, but the rather small hind-marginal bristles on the terga clearly black. Genitalia (Figs 53, 56-58) with a distinct produced hypandrium, which is apically broad and deeply bifid at tip, lateral lamella is long ovate, clothed with short fine pubescence only, and the broad apical process is only indistinctly separated.



FIGS 56-58

Hilara longicornis Strobl ♂ (H. Hajós, syntype). (56) Lateral genital lamella with cercus. (57) Hypandrium with postgonite. (58) Aedeagus with aedeagal apodeme. Scale: 0.2 mm.

Length: body 2.5 – 3.0 mm, wing 2.5 – 2.7 mm.

Female. Very much like male in all details including the structure and bristling of legs. However, antennal segment 3 seems to be obviously narrower, and abdomen is without the black hind-marginal bristles on terga. The only real distinction seems to be the shape of the radial fork of the wing which is in female clearly “oreogetonine”-like (Fig. 55), and the whole wing is shorter.

Length: body 2.0 – 2.8 mm, wing 2.3 – 2.5 mm.

DIFFERENTIAL DIAGNOSIS: This species can be easily recognized by its unusually long antennae, in combination with unmodified slender legs in both sexes. All the main differential features (light grey dusted and finely bristled species, legs long and slender with long tarsomeres and practically devoid of distinct bristles, *acr* and *dc* small and fine, hair-like and numerous, female *t*₃ slender) clearly show that *H. longicornis* belongs to the *Hilara litorea* group of species as defined by Chvála (2005a: 89).

DISTRIBUTION: Still known only from the lowlands of Hungary, from the “type” locality Hajós, a small village on the left side of the River Danube near Kalocsa.

MATERIAL EXAMINED: **Hungary:** Hajós, riverside of the Danube, 1.v.1893 3♂ 2♀ (syntypes) (*Thalhammer*) (BSA).

REMARKS: Although Becker (1894) saw a pair of *H. longicornis*, sent to him for study by Strobl, he erroneously identified this species in the oreogetonine genus *Iteaphila* Zetterstedt (as *Steleochaeta* Becker). Becker considered the structure of the long antennae to be identical with species of the genera *Iteaphila* and *Anthepiscopus*. He supported this argument also by the structure of the head (frons, palpus and labrum), and the “open”, oreogetonine type of radial fork on wing. It is clear, however, that *H. longicornis* is a species of the genus *Hilara*. The details of male genitalia as shown in Figs 56-58 unambiguously support such a classification.

Hilara flavocoxa Straka, 1976

Figs 60-61

DIAGNOSIS: A small subshining black species about 2 – 3 mm long, with legs brownish-yellow but at least fore leg yellowish at base, occiput dull black, haltere black, and wings very dark brown. All hairs and bristles black, antennal style long, bt_3 with distinct black anterodorsal setae as in *H. merula* Collin.

REDESCRIPTION:

Male. Head dull black on frons, vertex and occiput, face with a slight grey tomentum. Frons wide, distinctly widening above, face narrower; all hairs and setae on head black, the ocellar bristles long and strong, frontal setae slightly shorter and finer, upper postvertical setae much smaller. Antennae black, segment 3 small, about twice as long as deep, style long and rather stout, longer than segment 3. Palpi blackish, with a strong black preapical seta beneath; proboscis small, scarcely half as long as head is high.

Thorax black, scutum clearly subshining, pleura finely dark grey pollinose. All hairs and bristles black, marginal bristles, including *h*, *ih* and *ph* long and strong; *acr* rather narrowly 2-serial and almost straight, *dc* 1-serial, strong, nearly as long as antennal segment 3 without style, and all scanty, at most 10 setae in a row. A pair of long inner *sc* setae, outer pair very small. Pronotum with a strong seta on each side.

Wings very dark brown, veins black, a long black costal bristle, and radial fork long and narrow; anal vein practically absent. Squama blackish with dark fringes, haltere black, base of stalk scarcely brownish.

Legs long and slender, almost uniformly dark brownish-yellow, leaving only tarsi blackish, sometimes legs very darkened, but cx_1 and base of f_1 always yellow. All hairs small and fine, black, only tibiae with longer preapical bristles; f_2 with a few short anterior bristles, and bt_3 (Fig. 61) with 1 or 2 distinct anterodorsal setae before tip; fore leg (Fig. 60) with tibia distinctly widening towards tip, bt_1 uniformly stout, characteristically produced at tip, which bears several short but strong black bristles. Tarsomeres on all pairs longer than deep including on fore leg (Fig. 60).

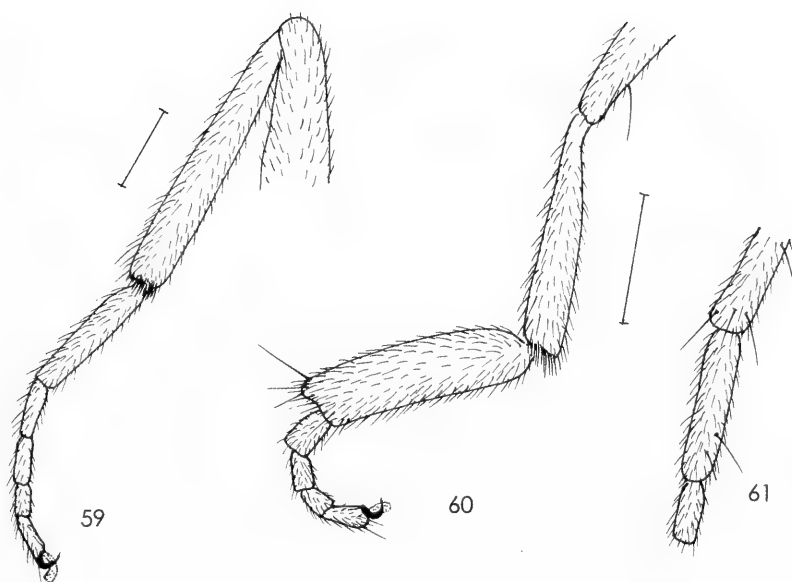
Abdomen rather dull black, scarcely subshining in some lights, and basal sterna with a tendency to be yellowish; pubescence short and fine, blackish, hind-marginal bristles fine and small. Genitalia (illustrated by Straka, 1976: 13, Figs 13 and 14 a-e) with a large, laterally compressed circular hypandrium, pubescence short and fine, black.

Length: body 2.7 mm, wing 3.0 mm; according to Straka (1976) body 2.8 – 3.0 mm, wing 2.7 – 3.0 mm.

Female. Very much like male in all details, only fore leg simple, and t_3 although slender, slightly widening towards tip, and when viewed from behind scarcely curved; bt_3 with the same distinct anterodorsal bristle before tip.

Length: body 2.1 mm, wing 2.6 mm; according to Straka (1976) body 2.3 – 2.5 mm, wing 2.7 – 2.9 mm.

DIFFERENTIAL DIAGNOSIS: A species of the *Hilara canescens* group, very similar in the main diagnostical features as *H. merula* Collin, differing from this species immediately by the 2-serial *acr* setae, and by the less bristled legs, with male bt_1 dorsally produced at tip.



FIGS 59-61

Hilara simplicipes Strobl ♂ (A, Carinthia, Paternion, syntype). (59) Fore leg in anterior view. - *Hilara flavocoxa* Straka ♂ (SK, Slovakia centr., Kremnické vrchy, Turček, paratype). (60) Fore leg in anterior view. (61) Hind basitarsus in dorsal view. Scale: 0.2 mm.

DISTRIBUTION: This species is still known only from the type series of 2♂ and 3♀ collected by V. Straka at Turček in the Kremnické vrchy (Kremnicke hills) of western Slovak Carpathians.

MATERIAL EXAMINED: **Slovakia:** Slovakia centr, Turček 3.viii.1971 1♂, 9.viii.1970 1♀ (paratypes) (Straka) (UMO).

ACKNOWLEDGEMENTS

The authors are greatly indebted first to the authorities of the Benediktinerstift in Admont, for enabling to study the Gabriel Strobl Diptera Collection housed in the Styrian monastery. For the loan or donation of *Hilara* specimens for study, we are greatly indebted to the following colleagues (in alphabetical order): D. M. Ackland (Oxford), G. Artmann-Graf (Olten), G. Bächli (Zürich), M. Barták (Praha), E. Castella (Geneva), J.-P. Haenni (Neuchâtel), P. Heřman (Praha), K. Grimm (Ermatingen), A. R. Plant (Cardiff), A. C. Pont (Oxford), H. Schumann (Berlin), Z. Simmons (Oxford), M. C. D. Speight (Dublin), G. Unterberger (Admont) and J. Wiede ska (Łodz). Further, we want to express our gratitude to the curators of the collections mentioned in the "Material and methods" chapter for allowing us to study the specimens under their care. A. Stark (Halle/Saale), G. Bächli and J. P. Haenni are acknowledged for their information about some identifications.

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The numbers **in bold** refer to the number where the species is listed in the taxonomic treatment. The letter "A" refers to the species treated under "additional species" at the end of the chapter. The numbers in normal text indicate the couplet(s) where the species is keyed or mentioned in the key.

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