

# Acarologia

A quarterly journal of acarology, since 1959  
Publishing on all aspects of the Acari

All information:

<http://www1.montpellier.inra.fr/CBGP/acarologia/>  
[acarologia-contact@supagro.fr](mailto:acarologia-contact@supagro.fr)



**Acarologia is proudly non-profit,  
with no page charges and free open access**

Please help us maintain this system by  
**encouraging your institutes to subscribe to the print version of the journal**  
and by sending us your high quality research on the Acari.

**Subscriptions: Year 2021 (Volume 61): 450 €**

<http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php>

Previous volumes (2010-2020): 250 € / year (4 issues)

Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d'avenir » programme (Labex Agro: ANR-10-LABX-0001-01)



Supporting agricultural research  
for sustainable development

**Acarologia** is under **free license** and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.

# *PSEUDOFELTRIA* (ACARIFORMES: PIONIDAE) IN EUROPE: THREE PREVIOUSLY DESCRIBED TAXA, A SPECIES NEW TO SCIENCE FROM THE NORTHERN APENNINES, AND A REDEFINITION OF FORELIINAE

Reinhard GERECKE

(Received 15 August 2013; accepted 30 November 2013; published online 28 March 2014)

Biesingerstr. 11, DE 72070 Tübingen, Germany; reinhard.gerecke@uni-tuebingen.de

**ABSTRACT** — The morphological variability of *Pseudofeltia scourfieldi* Soar, 1904, a water mite species known from scattered sites in Central and Northern Europe, is documented on the base of populations from the Bavarian Alps and bibliographic data; its diagnostic characters are discussed in comparison with *P. quadriscutata* Biesiadka, 1971 from Western Beskides (Poland) and *P. aemiliana* n. sp. from mountain springs in the Region of Emilia Romagna (Italy). *Pseudofeltia vanrensburgi* Bader, 1974 (Switzerland) is a junior synonym of *Forelia variegator* (Koch, 1837). A new diagnosis of the subfamily Foreliinae is given and discussed, including species of the genera *Pionacercopsis* (former subgenus of *Pionacercus*, here elevated to the genus rank) and *Pionacercus*.

**KEYWORDS** — water mites; new species; spring habitat; Northern Italy; systematics; Foreliinae

## INTRODUCTION

The genus *Pseudofeltia* was first described from England, with *P. scourfieldi* Soar, 1904 as type species. A second species, *P. scutigera* Walter, 1922, detected in the Swiss Alps and in the following decades recorded from several parts of Central and Northern Europe, was recognized as a junior synonym of *P. scourfieldi* by Gledhill (1960). In the second half of the past century, six further representatives of the genus were described from Northern America (*P. multipora* Cook, 1955: Michigan; *P. laversi* Cook, 1974: Wyoming; *P. jonfraseri* Habeeb, 1977 and *P. julia* Habeeb, 1977: California) and Europe (*P. quadriscutata* Biesiadka, 1971: Poland, *P. vanrensburgi* Bader, 1994: Switzerland). As far as information on habitat preference is available, most

*Pseudofeltia* species are bound to weakly seeping helocrenes which are often exposed to bright sunshine. Descriptions of the larval instar were published for *P. multipora* by Smith 1976 and *P. scourfieldi* by Martin (2000). Larvae of both species are abdominal parasites of Chironomid midges (Smith and Oliver 1986, Martin 2000).

During research on the biological diversity in springs of the Northern Apennines, Cantonati *et al.* (MTSN) detected in 2011 two populations of a species new to science. A definition of its diagnostic features required a revision of the previously described European taxa. In addition, some thought on the diagnostic features of *Pseudofeltia* induced me to reconsider also the global systematics of *Forelia*-like genera and to modify the diagnosis of the subfamily Foreliinae such that the genus *Pionacercus*

may be accommodated here as proposed as early as 1976 by Smith. The results of these studies are given in the present paper.

## MATERIALS AND METHODS

Zoobenthos material was collected in the Berchtesgaden National Park during field work for the long term monitoring of spring habitats (Gerecke and Franz 2006) and in the Northern Apennines in the course of the EBERs project (Exploring the Biodiversity of Emilia Romagna springs, 2011-2013, Cantonati *et al.*). Sorting of samples and species identification of water mites was done by the author. As far as necessary, specimens were dissected as described by Gerecke *et al.* (2007).

Material for comparison was given in loan by Museo Civico di Storia Naturale Verona (MC-SNV); Museo Tridentino di Storia Naturale Trento (MTSN); Netherlands Centre of Biodiversity Leiden (NCB); Naturhistorisches Museum Basel (NHMB), Senckenberg Museum Frankfurt (SMF) and Natural History Museum of Denmark Copenhagen (NMDC). The following further abbreviations are used: Ac = acetabulum, Ac-1-3 = first to third acetabula, I-L-6 = Leg I, sixth segment; P-1-5 = palp, first to fifth segment; Cx = coxa; Cx-I-IV = first to fourth coxae. All measurements are given in  $\mu\text{m}$ .

## RESULTS

### Family Pionidae, subfamily Foreliinae

Diagnosis — Integument of idiosoma from smooth to completely covered by dorsal and ventral shields, leaving only a narrow membranous dorsal furrow. Posteromedial apodemes of Cx-I varying from short to moderately long. Medial margins of Cx-IV often (in multiacetabulate species always) reduced to median angles. If medial margins of Cx-IV are developed, in females they form blunt or rounded, never sharp, posteromedial angles. Genital field occasionally with three, generally with numerous acetabula, in males along its whole anterior edge fused to Cx-IV. Posteromedial margin of gnathosoma with a short to moderately long anchoral process. P-4 with a peg-like distomedial seta. In males, IV-L-6 with a

dorsal concavity flanked by two to numerous peg-like setae, occasionally also IV-L-4 and III-L-6 modified for sperm transfer, but IV-L-5 simple.

Discussion — Separation of Tiphysinae from other pionids on the base of the presence of only three pairs of acetabula was never satisfactory – not only due to the presence, in the Nearctic, of a polyacetabulate *Tiphys* species, but mostly because the triacetabulate condition is a plesiomorphy (Cook 1974). In a cladistic analysis, Smith (1976) showed *Pionacercus* to be the outgroup of [*Forelia* and *Pseudofeltria*], but the necessary consequence, shifting the genus to Foreliinae, has not been taken so far. His interpretation is supported by the sexual modification of male legs for sperm transfer in representatives of all three genera: The deep dorsal incurvation of IV-L-6, flanked by peg-like setae (Figs. 1 D, 3 C-D, 4 A-D) is an obvious synapomorphy. As a consequence, the subfamily must be redefined as above, and we must assume that polyacetabulism evolved within this clade in parallel to Pioninae.

### Genus *Forelia* Haller, 1882

Diagnosis — Secondary sclerotization on dorsal surface may be developed (from small platelets to a large shield) or not. Coxae, genital sclerites and excretory pore separated by membranous interspace in both sexes. Medial margins of Cx-IV reduced to median angles. Legs with swimming setae. Male III-L-6 differing in proportions and shape of claws from I-/II-L-6. Genital field with 7 to more than 50 pairs of acetabula.

Discussion — Species of the genus are characterized by the combination of: (1) presence of swimming setae, (2) a reduced medial margin of Cx-IV, (3) modified claws on male IV-L, and (3) the number of acetabula > three pairs.

### *Forelia variegator* (Koch, 1837)

#### *Pseudofeltria vanrensburgi* Bader, 1994, nov. syn.

Material examined — Holotype male, NHMB 4458, "*Pseudofeltria vanrensburgi* ♂ Tessin 4.10.1968 Coll. Rensburg" "holotypus" "Naturhist. Museum Basel Prep. 88 4.10.1968 Maggia Delta 18 °C (COOK) Coll. 19"; Paratype male, NHMB 4459, same data as holotype, but "Prep. 88", "Para-Typus".

Discussion — In the original description of *Pseudofeltia vanrensburgi*, Bader (1994) wondered about the presence of swimming setae in an interstitial-dwelling species and considered that type of leg setation as diagnostic in comparison with all other species of the genus. The fact that representatives of the sister taxon *Forelia*, all characterized by this type of leg setation, are generally found in standing waters only, probably was the reason for Bader not to consider the possibility of a *Forelia*-species appearing in an interstitial sample. The two specimens clearly represent *Forelia variegator*, not showing any remarkable morphological deviation from that widely distributed species. As *F. variegator* not rarely appears in pool areas of running waters, an occasional detection of drifting specimens in a stream sediment sample (the indication "COOK" on the label refers probably to the kick sampling method) is not surprising.

#### Genus *Pionacercopsis* K. Viets, 1926

Diagnosis (after Cook 1974, modified) — Idiosoma soft in female, but with dorsal and ventral shields in male. Coxal plates in four groups in female, but Cx-I+II medially fused and Cx-III+IV closely in touch in male. Cx-I+II with short posterior apodemes, Cx-IV medial margin well developed in male, in females medial margin of Cx-III+IV mostly formed by Cx-III. Genital field with three pairs of large acetabula; in females genital plates triangular, with strongly reduced sclerotized surface, mostly covered by acetabula and with concave medial and lateral margins between anterior and posterior acetabula. Males without petiole. P-4 mediodistally with small peg-like seta. Male IV-L exhibiting sexual dimorphism: IV-L-4 with a spur-like extension covered by numerous peg-like setae, IV-L-6, which is bowed with 7-8 peg-like setae on concave margin.

Discussion — Up to date, *Pionacercopsis* was ranked as a subgenus of *Pionacercus*. However, distinct character states (a long and slender palp and rather large, circular acetabula in both sexes, in males the development of a dorsodistal spur on IV-L-4, in females the reduction of the sclerotized genital plate surface around the acetabula) suggest to consider this taxon as a separate genus.

#### *Pionacercopsis vatrax* (Koch, 1837) (Figure 1)

Material examined — SMF: Male, 46850, K. Viets, Holstein, Trammer See, 22.5.36 Meuche coll. 5516; female, 46851, same site and date 5517.

#### Genus *Pionacercus* Piersig, 1894

Diagnosis — Idiosoma soft in female, but with extensive sclerotizations in male, including dorsal and ventral shields. Medial margin of Cx-IV well developed in males, but more or less reduced in females. In males, Cx-III+IV fused medially and with genital plate, occasionally also with Cx-I+II to a ventral shield; in females, coxal plates in four groups. Male IV-L-4 dorsodistally with a group of strong setae, but not forming a spur. IV-L-6 bowed, with 5-10 peg-like setae on concave margin. Genital field with three pairs of acetabula, in females triangular genital plates flanking membranous gonopore with acetabula covering only restricted parts of the plate, medial and lateral margins between anterior and posterior acetabula straight or bowed. Males without petiole. P-4 mediodistally with small peg-like seta.

Discussion — Material of three species of the genus was taken in study in order to document both, the distinctive character states for separating it from *Pionacercopsis*, and the synapomorphies with *Pseudofeltia*.

#### *Pionacercus norvegicus* Thor, 1898

Material examined — SMF: Male, 46869, K. Viets, Königsberg i. Pr., Gr. Raum, 7.1899 2042; female, 46870, same site and date 2043; female, 54148, K.O. Viets [?], coll. site indication broken, probably Windgfällweiher (Black Forest). NCB: Male, The Netherlands, Utrecht, Rosweide, 02.09.1984 Smit. SNMD: Male and female, Groenland, Hangoq, 12.08.1970, Kap Farvel Expedition.

#### *Pionacercus uncinatus* (Koenike, 1885)

Material examined — SMF: Female, 54149, K.O. Viets, Schöh-See, Holstein, SO-Ufer, mittl. Insel, Scirpus-Phragm. (95149) 25.7.1949, 1322.

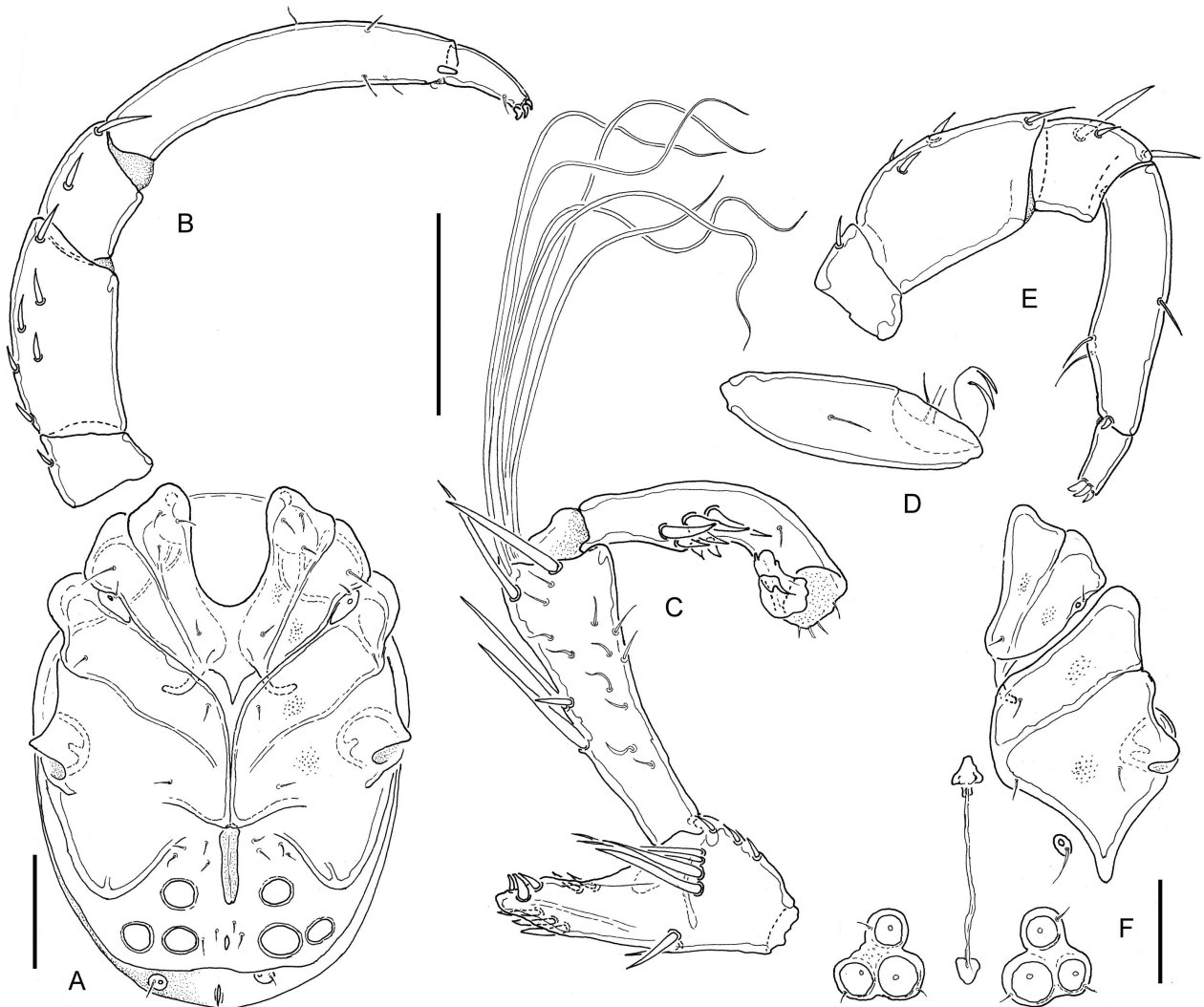


FIGURE 1: *Pionacercopsis vatrax* (Germany, SMF 46850): A-C male. A – venter; B – palp; C – IV-L-4-6; D-F, female. D – I-L-6; E – palp; F – venter partial view. Bars = 100 µm.

***Pionacercus leuckarti* Piersig, 1894  
(Figure 2)**

Material examined — Coll. Gerecke: Female, Brigach-Quellweiher o. Gasthof Engel, 03.08.1984  
Gerecke; MTSN: Male I 1293 Italy, Trentino, Tuenno (TN), Brenta, Lago di Tovel, 1178 m, 30.06.-04.07.2003 summer course.

**Genus *Pseudofeltria* Soar, 1904**

Diagnosis — Secondary sclerotization extended dorsally (with several plates or one large shield,

sexual dimorphism frequent) and ventrally (ventral shield including genital sclerites and excretory pore in males, occasionally also in females). Medial margins of Cx-IV reduced to median angles. Legs without swimming setae. III-L claws without sexual dimorphism, in shape similar to I-II-L claws. Male IV-L-5 dorsal and ventral margins distally diverging, with four to six large blade-like distoventral setae; IV-L-6 with large, unmodified claws and a strong dorsal concavity flanked by numerous peg-like setae (long and densely arranged on the proximal margin, short and more distanced from each



FIGURE 2: *Pionacercus leuckarti* (Italy, I 1293): A – male IV-L-4-6; B – male palp; C – female venter partial view; D – female I-L-6. Bars = 100 µm.

other on the distal margin). Genital field with 7-30 pairs of acetabula.

Discussion — Species of *Pseudofeltria* and *Pionacercus* agree, and differ from species of *Forelia*, in the plesiomorphic absence of a sexual dimorphism in III-L. They differ from *Pionacercus* and agree with *Forelia* in the apomorphic polyacetabulate condition of the genital field and differ from both genera in the absence of swimming setae and the presence of unmodified IV-L claws in males. Following a hypothesis of Cook (1974), ancestors of *Pseudofeltria* lost their swimming setae during the immigration into seepage. Further data is needed to decide if *Pseudofeltria* should be considered the sister group of *Forelia*, or the outgroup of [*Forelia* and *Pionacercus*].

***Pseudofeltria scourfieldi* Soar, 1904**  
**(Syn. *Pseudofeltria scutigera* Walter, 1922:**  
**Gledhill, 1960)**  
**(Figure 3)**

Material examined — Germany, Upper Bavaria, Berchtesgaden National Park, Sommerbichel, coll. Gerecke: D BGL 696, spring SW Herrenröint, 1300 m, 12°58'20" E, 47°34'40" N – 13.06.1994 (0/9/1); D BGL 312 spring complex Herrenröint, rheohelocrene, 1150 m, 12°58'30" E, 47°34'50" N – 10.06.1996 (3/2/0); 19.06.1998 (1/1/2); 24.06.2000 (0/1/0). Bulgaria BU flö117, Rila mountains, River Rila catchment, spring seep SW slopes of Popenmütz above Suchoto jezero, 2250 m, 01.08.1966 Flößner leg.

Diagnosis — Both sexes: Genital field with 9-12

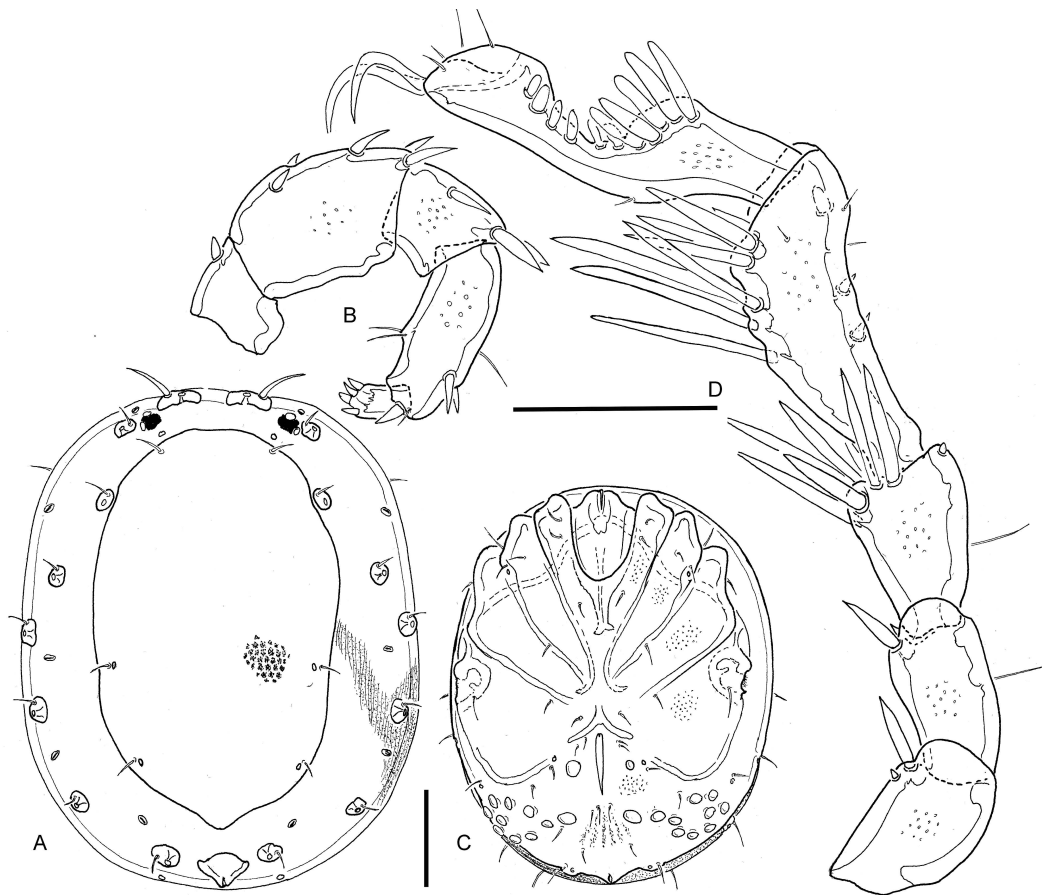


FIGURE 3: *Pseudofeltria scourfieldi* (D BGL 312): A-B female; A – dorsum; B – palp; C-D male; C – venter; D – IV-L-2-6. Bars = 100  $\mu$ m.

pairs of Ac, these often longish, maximum diameter of the largest 22 – 30  $\mu$ m. Male and female dorsum with one large shield including postocular setae at anterior margin, and posterolaterally two pairs of dorsoglandularia. P-4 with a pair of strong dorsal setae in distal third.

#### Description:

Both sexes — Colour yellow to brownish. Membranous parts of integument strongly striated, sclerites with a very fine porosity arranged in roundish or longish groups. Palp: P-1 with a stout dorsal seta, P-2 with 5 dorsal setae, ventral margin nearly straight, with a weakly developed projection in distal third; P-3 ventral margin concave, dorsal margin convex, one dorsomedial seta, a pair of stronger developed dorsodistal setae; P-4 robust, dorsally with three setae, one fine in centre, two strong in distal third, ventral margin with a pair of fine setae near a

small pointed projection in distal third, distal margin with a strong, pointed peg seta. P-5 stout, with 4 strong claws.

Males — Idiosoma length/width 450 – 515/370 – 395; dorsal shield length/width 390 – 430/260 – 290 (ratio 1.3 – 1.5); coxal shield length/width of Cx-III, 330 – 370/340 – 350 (ratio about 1.0); gonopore length 70 – 90. IV-L-3 and -4 shortened, distally enlarged, both with one small peg-like seta at dorsolateral margin; distal setae: IV-L-3 one pair, rather short, IV-L-4, 6-8, long. IV-L-5 proximally narrow, distally strongly enlarged, ventral margin convex, dorsal margin concave, with three stout dorsal setae and about 8 long, blade-like ventral setae, all inserted in distal half. IV-L-6 ventral margin in proximal part concave, distally rather straight, dorsal margin in centre with a deep inlet bordered by about ten densely arranged stout setae, these in

proximal part longer than in distal part. Claws long, simple sickle-shaped. Length/height IV-L-2, 58 – 98/50 – 75, ratio 1.1 – 1.3; IV-L-3, 73 – 83/48 – 55, ratio 1.4 – 1.7; IV-L-4, 85 – 95/56 – 61, ratio 1.4 – 1.6; IV-L-5, 153 – 175/65 – 71, ratio 2.2 – 2.5; IV-L-6, 175 – 188/basal 43 – 48, central 19 – 30, distal 40 – 45. Length ratio IV-L-4/5, 0.54 – 0.58; IV-L-4/6, 0.45 – 0.53; IV-L-5/6, 0.81 – 0.97. Gnathosoma length 160 – 175, chelicera length 180, basal segment/claw ratio 2.4, length/height 3.4. Palp total length 295 – 305; length/height (ratio, % total length) P-1, 36 – 38/40 – 41 (0.91 – 0.94, 12 – 13 %); P-2, 88 – 93/65 – 66 (1.32 – 1.42, 30 %); P-3, 50 – 51/44 – 48 (1.08 – 1.14, 16 – 17 %); P-4, 84 – 88/43 – 45 (1.94 – 1.97, 28 – 29 %); P-5, 35 – 38/18 – 20 (1.88 – 2.00, 12 %). Length ratio P-2/P-3, 1.71 – 1.85; P-2/P-4, 1.03 – 1.06; P-3/P-4, 0.57 – 0.60.

Females — Idiosoma length/width 570 – 590/460 – 490; dorsal shield length/width 440 – 470/285 – 310 (ratio 1.5 – 1.6); coxal shield length/width of Cx-III, 370 – 390/380 – 405 (ratio about 1.0); gonopore length 175 – 180. IV-L without particular characteristics. Gnathosoma length 150 – 175, chelicera length 168, basal segment/claw ratio 2.2, length/height 3.2. Palp total length 316 – 323, more slender than in males (in particular P-2 and P-4): length/height (ratio, % total length): P-1, 38 – 43/41 – 44 (0.91 – 0.97, 12 – 13 %); P-2, 93 – 98/58 – 60 (1.60 – 1.63, 29 – 30 %); P-3, 50 – 55/46 – 49 (1.03 – 1.14, 16 – 17 %); P-4, 94 – 95/38 – 40 (2.38 – 2.50, 29 – 30 %); P-5, 38 – 40/18 – 20 (1.87 – 2.00, 11 – 13 %). Length ratio P-2/P-3, 1.77 – 1.85; P-2/P-4, 0.99 – 1.04; P-3/P-4, 0.53 – 0.59.

Discussion — The idiosoma and palp measurements of the Bavarian populations lie within the size range given by Gledhill (1960) except for the, absolutely and relatively, slightly longer P-3. Furthermore, with an idiosoma length of 618 – 636  $\mu\text{m}$ , females from the English lake district are larger than both the holotype (560) and the Bavarian specimens, but Schwoerbel (1959) published intermediate size ranges (558 – 625  $\mu\text{m}$ ) from females collected in Alsace (France). The holotype male of *P. scutigera* is minor in size than the minima calculated for populations from Bavaria (see above) and from the English Lake district (Gledhill 1960), but

does not show remarkable differences in proportions. No data were previously published for single leg segments. The specimen from the Bulgarian Rila mountains agrees in number and shape of Ac, but differs in the presence of an additional small sclerite platelet in the posterior dorsal furrow.

#### *Pseudofeltria quadriscutata* Biesiadka, 1971

Diagnosis — Female (male unknown): Genital field with 17–18 pairs of Ac, maximum diameter of the largest > 20  $\mu\text{m}$ . Female dorsum with four plates: A pair of central plates between unpaired anterior and posterior plates – the latter including two pairs of glandularia. Calculating from figures in the original description, measurements of the dorsal plates are (length/width): Anterior plate 194/212 (ratio 0.9); lateral platelets 133 / 80 (ratio 1.7); posterior plate 309/265 (ratio 1.2). P-4 lacking strong dorsal setae in distal third.

Discussion — *Pseudofeltria quadriscutata* differs from the other European species in the high number of acetabula (following our experience a character state that should be similarly expressed also in the still unknown male). Females of the species are furthermore unique in the name giving presence of four dorsal plates and in the absence of strong dorsal setae on P-4.

From the measurements published by Biesiadka (1971) results that the species is larger than the maxima measured for females of *P. scourfieldi*: Idiosoma length/width 700/570; coxal field length/width 400/433; length/height P-1, 54/54; P-2, 120/75; P-3, 59/59; P-4, 110/46; P-5, 43/19. In general palp proportions, with rather slender P-2–4, *P. quadriscutata* is similar to *P. scourfieldi* females, but it differs in a relatively longer P-2 (relative length 31 %, P-2/3 length ratio 2.0).

#### *Pseudofeltria aemiliana* n. sp.

#### *Pseudofeltria* sp. Gerecke and Benfatti 2013 (Figure 4-5)

Type series — Holotype male, MTSN, in Koenike's fluid, undissected; Italy, Emilia Romagna, EBERs 15 Emilia Romagna, Corniglio (PA), Sorgente elocrena Lago Scuro; 1534 m, 10°2'56.534" E, 44°22'41.151



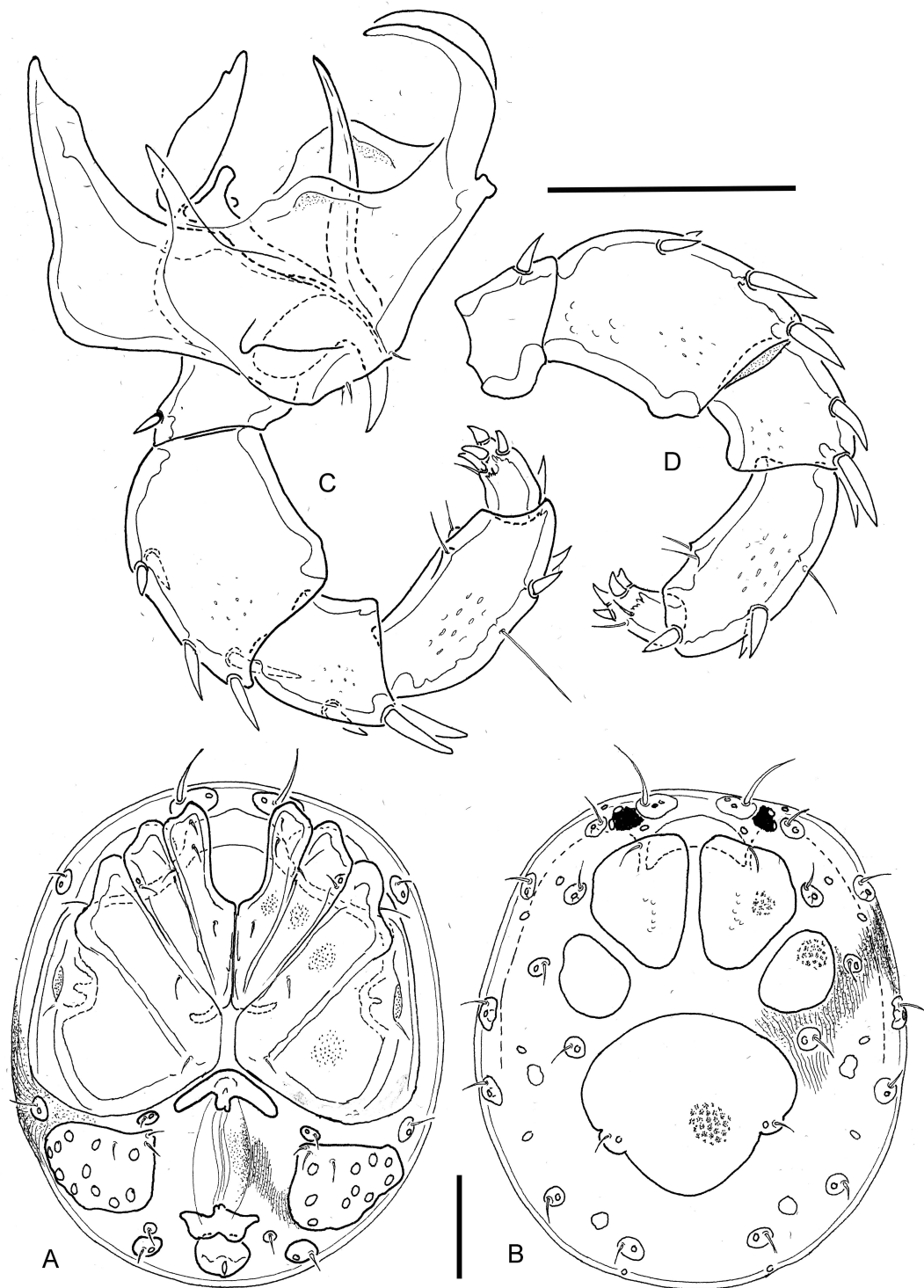


FIGURE 4: *Pseudofeltia aemiliana*, paratype female: A – venter; B – dorsum; C – gnathosoma and right palp medially; D – right palp laterally. Bars = 100 µm.

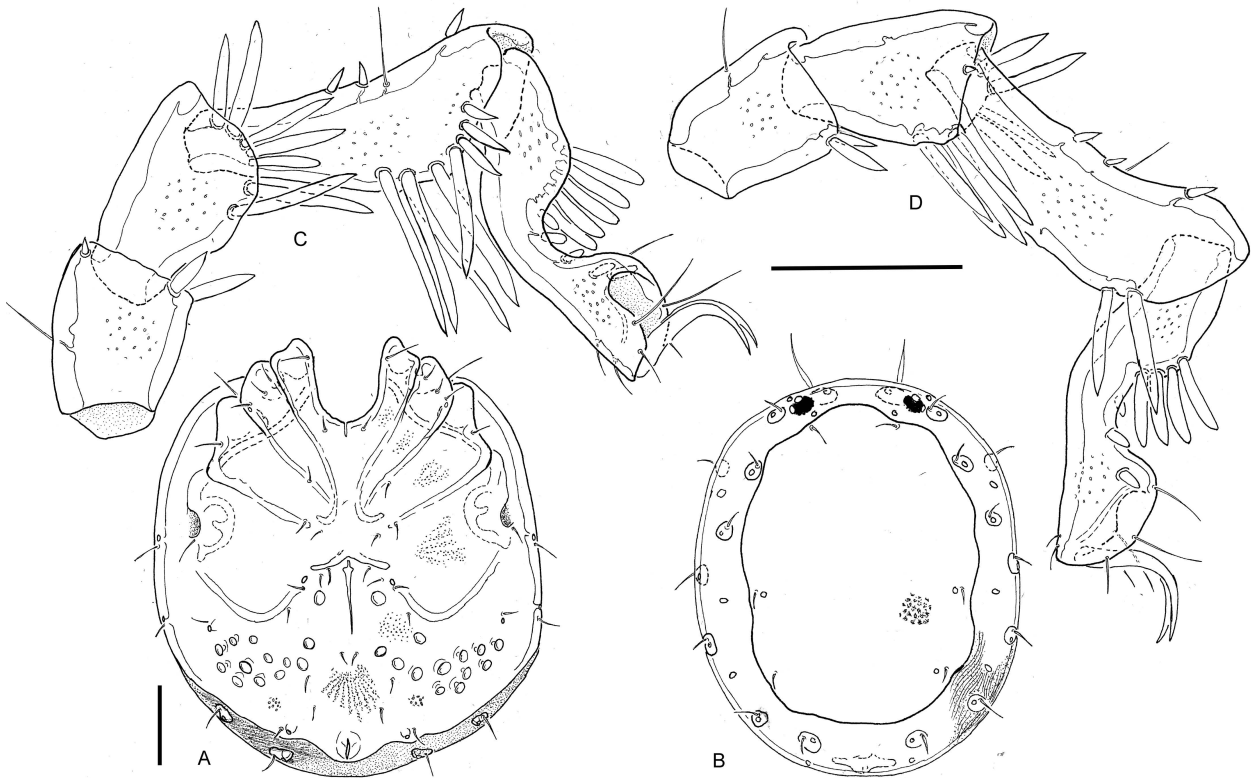


FIGURE 5: *Pseudofeltria aemiliana*, paratype male: A – venter; B – dorsum; C-D, IV-L-3-6; C – anterior; D – posterior view. Bars = 100  $\mu$ m.

N, 31.07.2011, Cantonati *et al.* leg.; paratypes: same dates as holotype, (3/4/0) in Koenike's fluid, (2/2/0), slide-mounted; EBERs 16, Emilia Romagna, Fornovo di Taro (PA), Sorgente Capanne Lago Scurio; 1547,5 m, 10°2'54.256" E, 44°22'40.381" N, 31.07.2011, Cantonati *et al.* leg. (0/1/0).

Material examined — MCSNV, coll. Benfatti: I benf 126, 15.04.1991, Passo del Cerreto (RE), ca. 150 m dalla sorgente, 1300 m, Benfatti leg. (1/2/0).

Diagnosis — Both sexes: Genital field with 9-13 pairs of Ac, these often round, maximum diameter 15 – 19  $\mu$ m. Male with one large dorsal shield, female dorsum with five plates - a pair of pentangular frontal plates including postocular setae, posterolaterally flanked by a pair of minor, roundish platelets, in posterior part an unpaired transverse plate bearing a pair of dorsoglandularia. P-4 with a pair of strong dorsal setae.

#### Description:

Both sexes — Integument structure, as well as

shape and setation of palps and legs (including male IV-L) as described for *P. scourfieldi*. Colour in preserved specimens brownish-yellow.

Males — Idiosoma length/width 465 – 550/470 – 500 (ratio 1.10 – 1.13); dorsal shield length/width 400 – 510/280 – 330 (ratio 1.4 – 1.5); coxal shield length/width of Cx-III, 350 – 392/365 – 405 (ratio about 0.9); gonopore length 80 – 90. Length/height IV-L-2, 75/58 – 63, ratio 1.2 – 1.3; IV-L-3, 90/58 – 64, ratio 1.4 – 1.6; IV-L-4, 100 – 108/63 – 68, ratio 1.6; IV-L-5, 173 – 178/73 – 78, ratio 2.2 – 2.5; IV-L-6, 185 – 190/basal 45 – 48, central 25, distal 45 – 48. Length ratio IV-L-4/5, 0.58 – 0.61; IV-L-4/6, 0.53 – 0.58; IV-L-5/6, 0.91 – 0.96. Gnathosoma length 170, chelicera length 193, basal segment/claw ratio 2.3, length/height 3.0. Palp total length 315 – 318; length/height (ratio, % total length) P-1, 40/41 – 43 (0.94 – 0.97, 13 %); P-2, 98 – 100/70 (1.39 – 1.43, 31 – 32 %); P-3, 50 – 53/49 – 50 (1.03 – 1.05, 16 – 17 %); P-4, 88 / 43 – 45 (1.84 – 1.94, 28 %); P-5, 38 – 40 / 21 – 25 (1.60 – 1.76, 12 – 13 %). Length ratio P-2/P-3, 1.

86 – 2.00; P-2/P-4, 1.11 – 1.14; P-3/P-4, 0.57 – 0.60.

Females — Idiosoma length/width 500 – 660/470 – 570 (ratio 1.06 – 1.22); dorsum with paired anterior plates (length/width 140 – 205/100 – 120, ratio 1.4 – 1.7), paired lateral platelets (length/width 85 – 120/65 – 85, ratio 1.3 – 1.6), and unpaired posterior plate (length/width 210 – 280/220 – 290, ratio 0.9 – 1.1); coxal shield length/width of Cx-III, 360 – 420/420 – 510 (ratio 0.82 – 0.90); gonopore length 140 – 200; genital plate length/width 80 – 110/140 – 160. IV-L without particular characteristics. Gnathosoma length 175 – 185, chelicera length 195, basal segment/claw ratio 2.1 – 2.3, length/height 3.0 – 3.3. Palp total length 336 – 338, more slender than in males (in particular P-4): length/height (ratio, % total length): P-1, 43 – 45/44 – 48 (0.89 – 1.03, 13 %); P-2, 98 – 100/65 – 68 (1.44 – 1.54, 29 – 30 %); P-3, 55 – 58/50 – 51 (1.07 – 1.15, 16 – 17 %); P-4, 98/45 – 48 (2.05 – 2.17, 29 %); P-5, 40 – 41/20 (2.00 – 2.06, 12 %). Length ratio P-2/P-3, 1.74 – 1.77; P-2/P-4, 1.00 – 1.03; P-3/P-4, 0.56 – 0.59.

Discussion — *Pseudofeltria aemiliana* agrees with *P. scourfieldi*, and differs from the third species known from Europe, *P. quadriscutata*, in a relatively low number of Ac and the presence of a pair of strong dorsal setae on P-4. Also shape and setation of the male IV-L, still unknown for *P. quadriscutata*, are in good agreement in *P. aemiliana* and *P. scourfieldi*. In addition to the presence of a dorsal shield instead of five separate dorsal plates in females, both sexes of *P. scourfieldi* differ from the new species in major-sized Ac (maximum diameter > 20 µm) and the generally more slender shape of idiosoma (length/width ratio 1.20 – 1.28) and coxal field (length/width ratio 0.95 – 1.03).

#### ACKNOWLEDGEMENTS

This study was induced by the possibility to cooperate in the interesting EBERs research project conducted by Marco Cantonati (MTSN). It found helpful support by loan of material for comparison from Julia Altmann and Peter Jäger (SMN), Leonardo Latella and Sandro Ruffo (MCSNV), Harry Smit (NCB), Urs Wüest and Ambros Hänggi (NHMB),

Nicolaj Scharff (SNMD), and by the gift of specimens from Bulgaria from Dietrich Flössner (Jena). I am particularly indebted to D.R. Cook (Paradise Valley) for his advice on a former draft of this manuscript.

#### REFERENCES

- Bader C. 1994 — Die Wassermilben des Schweizerischen Nationalparks, 4. Zweiter Nachtrag zum systematisch-faunistischen Teil — *Ergebn. wiss. Unt.* Schweizer. Nationalpark, 16 (83): 223-287.
- Biesiadka E. 1971 — Description de *Pseudofeltria quadriscutata* sp. n. (Hydrachnellae, Acari) — *Bull. Acad. Pol. Sci. Ser. Sci. Biol. Zool. Cl. VI.*, 19 (11): 715-719.
- Cantonati M., Gerecke R., Segadelli S., Angeli N., Spitale D., Rossetti G., Rosati M., Rott E., Stoch F., De Nardo M.T. 2013 — Exploring and understanding the Biodiversity of Emilia-Romagna Spring habitats (Northern Italy): The EBERs Project. — SIL, Congress Internat. Society Limnology, 2013 Budapest, Theme 2. Biodiversity in aquatic ecosystems. Book of Abstracts: 85.
- Cook, D.R., 1955 — Preliminary studies of the Hydracarina of Michigan: The subfamily Foreliinae VIETS (Acarina: Pionidae) — *Ann. Ent. Soc. Amer.*, 48 (4): 229-307.
- Cook D.R. 1974 — Water mite genera and subgenera — *Mem. Amer. Ent. Inst.*, 21: VII + 1-860.
- Gerecke R., Di Sabatino A. 2013 — The water mites (Hydrachnidia and Halacaridae) of the collection Daniele Benfatti at the Musei Civico di Storia Naturale Verona — *Boll. Mus. Civ. Stor. Nat. Verona* 37: 67-112.
- Gerecke R., Franz H. 2006 — Quellen als Gegenstand der Umweltbeobachtung in den Alpen. In: Gerecke, R., Franz, H. (eds): *Quellen im Nationalpark Berchtesgaden. Lebensgemeinschaften als Indikatoren des Klimawandels. Nationalpark Berchtesgaden, Forschungsbericht* 51: 11-16.
- Gerecke R., Weigmann G., Wohltmann A., Wurst E. 2007 — Order Acari - General introduction and key to major groups. pp. 14-37 in: Gerecke, R. (ed.): *Süßwasserfauna von Mitteleuropa*, Vol. 7, 2-1. Spektrum Elsevier.
- Gledhill T. 1960 — Some water-mites (Hydrachnellae) from seepage-water — *J. Quekett Microsc. Club*, (ser.4) 5 (11): 293-307.
- Habeeb H. 1977 — Twenty five year anniversary number — *Leaf. Acad. Biol.*, 70: 1-8.
- Martin P. 2000 — Larval morphology and host-parasite associations of some stream living water mites (Hydrachnidia, Acari) — *Archiv für Hydrobiologie/Supplement* 121: 269-320.

## COPYRIGHT

Smith I. M. 1976 — A study of the systematics of the water mite family Pionidae (Prostigmata: Parasitengona) — Mem. Ent. Soc. Can., 98: VI+1-249.

Smith I. M., Oliver D. R. 1986 — Review of parasitic associations of larval water mites (Acari: Parasitengona: Hydrachnida) with insect hosts — Can. Ent., 118: 407-472. [doi:10.4039/Ent118407-5](https://doi.org/10.4039/Ent118407-5)

Walter C. 1922 — Hydracarinen aus den Alpen — Rev. Suisse Zool., 29 (7): 227-411.



Gerecke R. Acarologia is under free license. This open-access article is distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.