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THREE NEW SPECIES OF TETRANYCHIDAE (ACARI, PROSTIGMATA) FROM THE FRENCH ALPS (SOUTH-EASTERN FRANCE)

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ABSTRACT — Collection efforts in the framework of the European All Taxa Biodiversity Inventory conducted in the Mercantour national Park located in the Alps mountain range of southern France disclosed three new species of Tetranychid mites. The species described in the current paper are: *Bryobia cinereae* **n. sp.**, *Bryobia mercantourensis* **n. sp.** and *Eotetranychus quercicola* **n. sp.**. Both *Bryobia* species were collected on *Genista cinerea* and *E. quercicola* on *Quercus pubescens*. A new combination is also proposed for *Bryobia longisetis*, previously placed in *Pseudobryobia* by Wainstein (1960).

KEYWORDS — Acari; Tetranychidae; *Bryobia cinereae* **n. sp.**; *Bryobia mercantourensis* **n. sp.**; *Eotetranychus quercicola* **n. sp.**; *Bryobia longisetis* comb. nov.; ATBI; France

INTRODUCTION

All Taxa Biodiversity Inventories (ATBIs) are promoted to increase the knowledge about the biodiversity of particular areas. Samplings are carried out to achieve a baseline biodiversity assessment of fauna and flora and to provide ecological information on the distribution, abundance and biology of the species recorded. Within the framework of the second ATBI Mercantour-Alpi marittime (De Biaggi *et al.*, 2010), promoted by the European Distributed Institute of Taxonomy (EDIT), the Mercantour National Park and the Muséum National d'Histoire Naturelle (MNHN), that took place in the Mercantour National Park located in the French Alps, in south-east of France, we have collected three new species of tetranychid mites. Among the forty-four species of Tetranychidae recorded from France only 6 are endemic from this country (Migeon and Dorkeld, 2006-2013). Four of them belong to the genus *Bryobia* Koch, 1836, one to the genus *Schizonobia* Womersley, 1940 and one to the genus *Eoetranychus* Oudemans, 1931. In the present work we report the description of two new species of *Bryobia* and a new *Eotetranychus*. According to the examination of morphological key-characters, *Bryobia longisetis* Reck, 1947 is a new combination provided for the taxon previously known as *Pseudobryobia longisetis*.

MATERIALS AND METHODS

Mites were collected directly from field samples in 70 % ethyl alcohol. Following clearing in lactic acid (50 %) for 24 to 48 hours they were mounted in Hoyer's medium. The specimens were examined using a Leica DMLB phase contrast microscope and

illustrated with the aid of a *camera lucida*. Measurements were performed using the imaging software Perfect Image® (Clara Vision) coupled with Progres® Capture Pro 2.6 software for image acquisition. The setal nomenclature used in the description follows Lindquist (1985). Legs setal count is given in the order: coxa, trochanter, femur, genu, tibia and tarsus. Numbers of setae refer to tactile setae, solenidia are given in parentheses and alternative counts are given in brackets. All measurements are given in micrometers and correspond to the holotype followed, in parentheses, by minimum and maximum values from paratypes. Setae are measured from theirs bases to their tips.

TAXONOMY

Family Tetranychidae Donnadieu, 1875

Subfamily Bryobiinae Berlese, 1913

Tribe Bryobiini Reck, 1952

Genus *Bryobia* Koch, 1836

Bryobia Koch, 1836:8-9; Pritchard and Baker, 1955:14; Wainstein, 1960:94; Tuttle and Baker, 1968: 4; Meyer, 1974:13.
Type-species: *Bryobia praetiosa* Koch.

Bryobia longisetis Reck, 1947, comb. nov.

Bryobia longisetis Reck, 1947, *Soobshcheniya Akademii Nauk Gruzinskoi SSR*, 8: 655

Type-species: female, Georgia (Gruziya), from *Salvia nemorosa* and *Salvia* sp. (Labiatae).
Pseudobryobia longisetis (Reck, 1947), new combination. Wainstein, 1960, *Trudy Nauchno-Issled. Inst. Zashchita Rastenii Kazakh.*, 5: 113

Since the reinstatement of the genus *Pseudobryobia* by Livshits and Mitrofanov (1972) and by Baker and Tuttle (1972), the main diagnostic characters that are listed in the diagnosis of this genus are the following: i) prodorsum without anterior projections over gnathosoma, ii) hysterosomal dorsocentral setae in the normal longitudinal dorsal position (f_1 setae in normal position, more or less aligned with first 3 pairs, not marginal), iii) coxal setal formula: 2-2-1-1.

According to the literature compiled we came to the conclusion that this species should not belong to the genus *Pseudobryobia*. First, the absence of prodorsal lobe over the gnathosoma can be questioned. In its original description, Reck (1947) reported that the outer prodorsal lobes are small but inners are cone-shaped almost fully fused. In the drawings of this species by Bagdasarian (1957), Reck (1959), Wainstein (1960) and Livshits and Mitrofanov (1966), inner and outer prodorsal lobes are similar to those previously described by Reck (1947): outer lobes are actually reduced to small tubercles but inner ones are coalescent into a tall cone with a small incision at the apex. Second, the dorsal pattern observed in this species does not correspond to that typical of the genus. Members of the fourth pair of hysterosomal dorsocentral setae (f_1) are never more or less in line with other dorsocentral setae. In the drawings of Bagdasarian (1957) and Reck (1959), f_1 setae are clearly located in marginal position, close (but not contiguous) to f_2. In Wainstein (1960) and Livshits and Mitrofanov (1971), f_1 setae are almost in marginal position, they are not in the normal longitudinal dorsal position and the distance between them is superior to that between f_2 setae. Finally, the coxal chaetotaxy does not fit with that of species belonging to the genus *Pseudobryobia*. In the descriptions of this species given by Wainstein (1960) and by Livshits and Mitrofanov (1971), only one setae is present on the coxa II (coxal formula 2-1-1-1). Thus it is different to that of the genus *Pseudobryobia* and corresponds to that observed in the genus *Bryobia*. Although we did not had an opportunity to examine the holotype (or types), given the morphological characters cited above we consider that this species belongs to the genus *Bryobia*.

Bryobia cinereae n. sp. (Figures 1-3)

Type-specimens — Holotype (female), 3 female paratypes on 4 microscopic preparations from *Genista cinerea* (Vill.) DC. (Leguminosae), cime de Braus (43.875°N 7.394°E, alt. 1040 m), Lucéram,

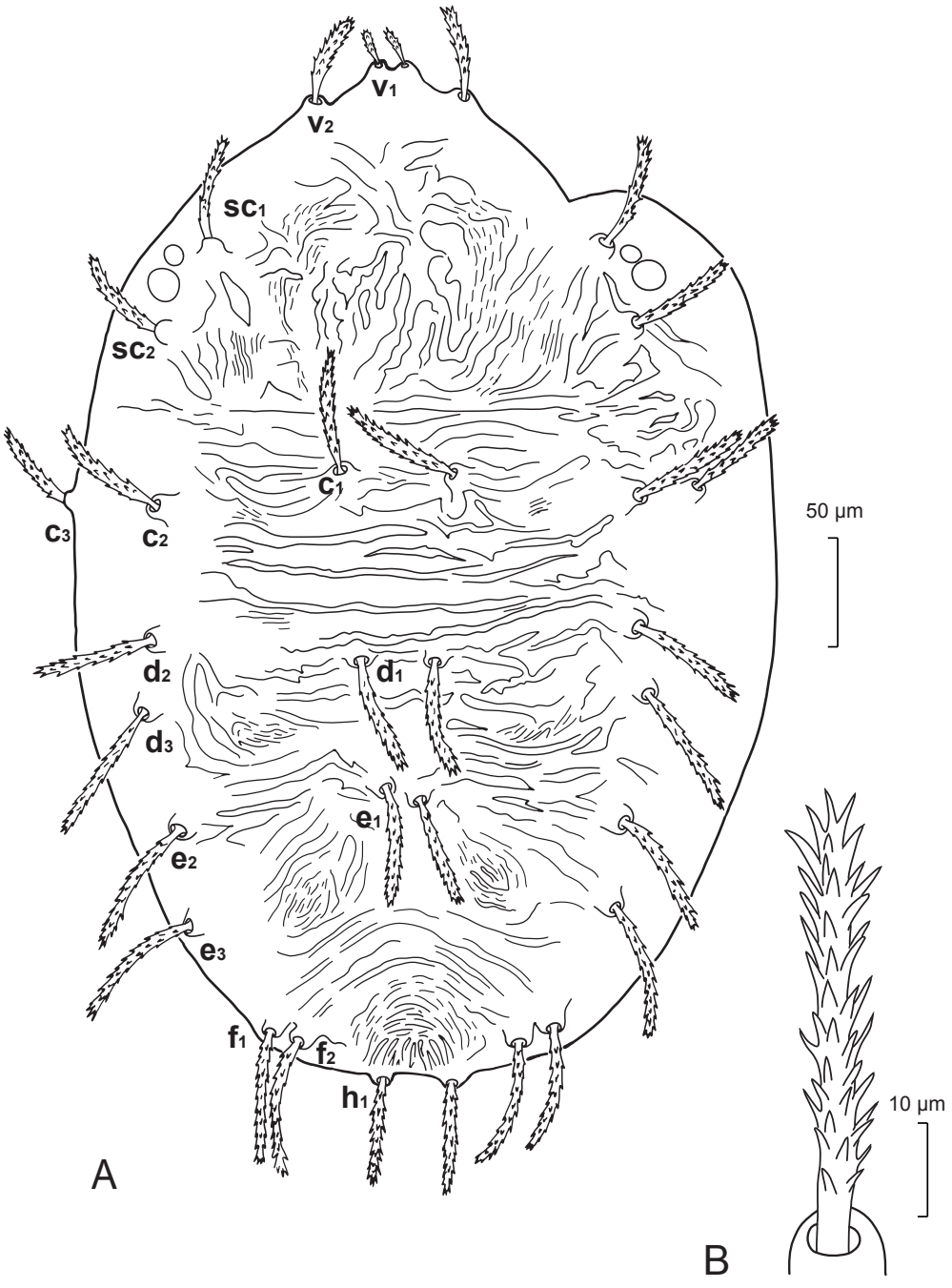


FIGURE 1: *Bryobia cinereae* **n. sp.**, female: A – dorsal aspect; B – dorsal h_1 seta.

France, 23-VII-2009, leg. P. Auger. All the material housed in the Institut National de la Recherche Agronomique (INRA) collection of the Centre de Biologie et de Gestion des Populations (CBGP), coll. Auger-Migeon N° 1754 for holotype and 1755-1757 for paratypes, 34988 Montferrier-sur-Lez, France.

Diagnosis — Limited anterior dorsal propodosomal projections over the gnathosoma, prodorsal lobes scarcely developed, vertical setae (v_1 and v_2) inserted in tubercle-like structures. Dorsal setae elongated, quite stout, serrate, inserted on tubercles and subequal in length on hysterosoma. Empodia provided with two rows of tenent hairs.

Description:
Female: Holotype 495 μm long (excluding gnathosoma) gnathosoma 94 μm long (measured to the tip of palps), width 315 μm. Three paratypes measured, 452 – 498 μm long, gnathosoma 94 μm long, width 305 μm.

Dorsum — Prodorsum with four pairs of setae and with weakly developed anterior lobes (Figs. 1A, 3A). Outer propodosomal lobes small, about 10 μm, more or less similar in length to dorsal tubercles; inner lobes smaller about 5 μm (measured from the bottom of the incision between the inner lobes). Propodosomal lobes with basal width about 67 μm, distance between v_1 setae insertions about 13 μm. Incision between median lobes shallow. First pair of propodosomal setae (v_1) less than half the size of the second pair (v_2). A horizontal line joining tip of v_1 setae located on the inner lobes crosses v_2 setae about their three-quarters. Dorsal body setae not spatulate, elongated, moderately stout, serrate, inserted on tubercles, subequal in length with the exception of v_1 setae far smaller (Figs. 1A, 1B). Dorsocentral setae (c_1, d_1 and e_1) shorter than distances between consecutive setae (length of holotype and variations of three paratypes): v_1 17 (14 – 15); v_2 40 (38 – 42); sc_1 50 (48 – 52); sc_2 50 (50 – 58); c_1 53 (56 – 58); c_2 51 (53 – 54); c_3 46 (47 – 51); d_1 50 (51 – 55); d_2 58 (61 – 63); d_3 64 (63 – 71); e_1 50 (54 – 58); e_2 61 (60 – 71); e_3 63 (64 – 67); f_1 60 (63 – 66); f_2 61 (58 – 66); h_1 47 (53 – 55). Distances between setae: c_1-c_1 52 (54 – 55), d_1-d_1 33 (31 – 32), e_1-e_1 17 (20 – 24), c_1-d_1 85 (87 – 99), d_1-e_1 60 (64 – 66). Sacral setae (f_1 and f_2) in marginal position and contiguous. Dorsal surface wrinkled, on propodosoma irregular medially and mostly longitudinal laterally, transverse on hysterosoma, more or less arched in the distal part comprised between e_3 and h_1 setae. Area immediately anterior to h_1 setae with fine arched longitudinal reticulation.

Gnathosoma — Stylophore rounded, slightly indented (slightly emarginate anteriorly), longer than wide. Tibial claw of palpus bidentate (Fig 3B). Palp-tarsus slightly elongated, about 18.5 (19.2) long with six setae and one solenidion. Eupathidia *ul'ζ*, *ul"ζ* slightly shorter than *suζ*, solenidion short. Peritreme anastomosed distally in a relatively long and slender enlargement: length 33 (26 – 28), width 8.5 (9 – 10) (Fig. 3C).

Venter — Striation transverse between 1st (*1a*) and 2nd (*3a*) pairs of setae becoming irregularly longitudinal (broken medially) between 2nd and 3rd (*4a*) pairs of setae and transverse between 3rd and aggenital (*ag*) pairs of setae. Area immediately anterior to genital flap with irregular longitudinal striation, V-shaped between *ag* setae (Fig. 3D). Sacculus of spermatheca oblong (shape variations due to mounting) (Fig. 3E). Three anal and two para-anal setae.

Legs — Length inferior to body length. Leg I 308 (299 – 312) μm long (length of holotype and variations of three paratypes, measured from trochanter to tarsus), leg II 222 (220 – 227), leg III 219 (212 – 219), leg IV 250 (240 – 250). Length of segments of leg I as follows: trochanter 21 (22 – 24), femur 99 (90 – 96), genu 49 (49 – 53), tibia 61 (62 – 66), tarsus 75 (75 – 79). Leg setal count as follows (Figs. 2A-D):
I 2 - 1 - 8 [9] - 4 - 8 [7] + (1) - 17[16] + (2) + 2 duplexes;
II 1 - 1 - 5 - 4 - 3 [5] - 14[13] + (2) + 1 duplex;
III 1 - 1 - 4[3] - 2 [3] - 4[5] - 12[11] + 1 duplex;
IV 1 - 1 - 4 [3]- 2 - 4 [3-5] - 13[12-14] + (1).
Tarsus III associated setae serrate and approximate with solenidion forming duplex, the tactile member slightly longer and proximal (Fig. 2E); tarsus IV with solenidion well-separated from tactile, proximal, about one third the length of tactile (Fig. 2F). True claws uncinate, with one pair of tenent hairs, empodial pads each bearing two rows of tenent hairs (Fig. 2G).

Male: Unknown

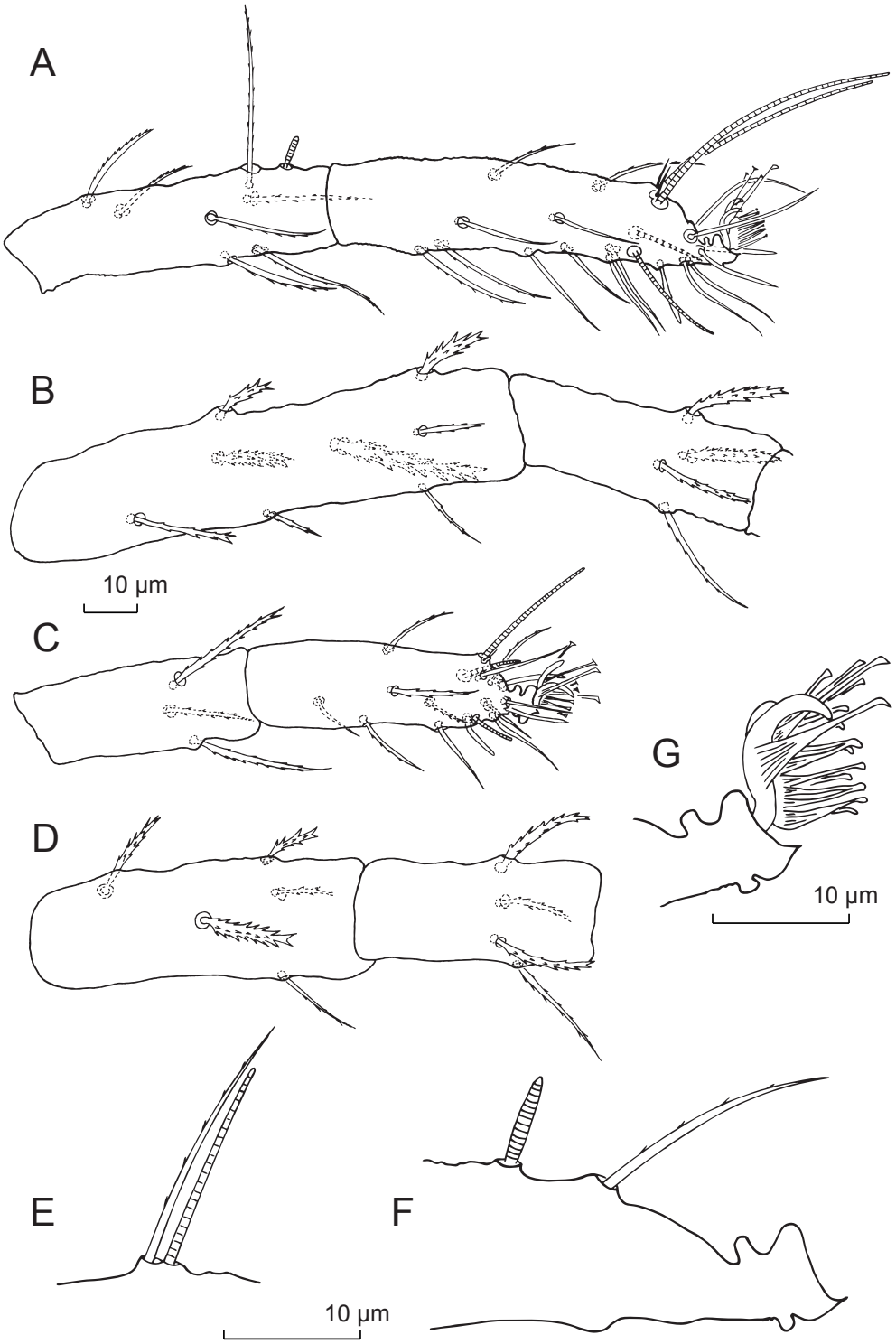


FIGURE 2: *Bryobia cinereae* **n. sp.**, female: A – tarsus and tibia I; B – genu and femur I; C – tarsus and tibia II; D – genu and femur II; E – duplex setae on tarsus III; F – solenidion and associated tactile seta on tarsus IV; G – empodia I-IV.

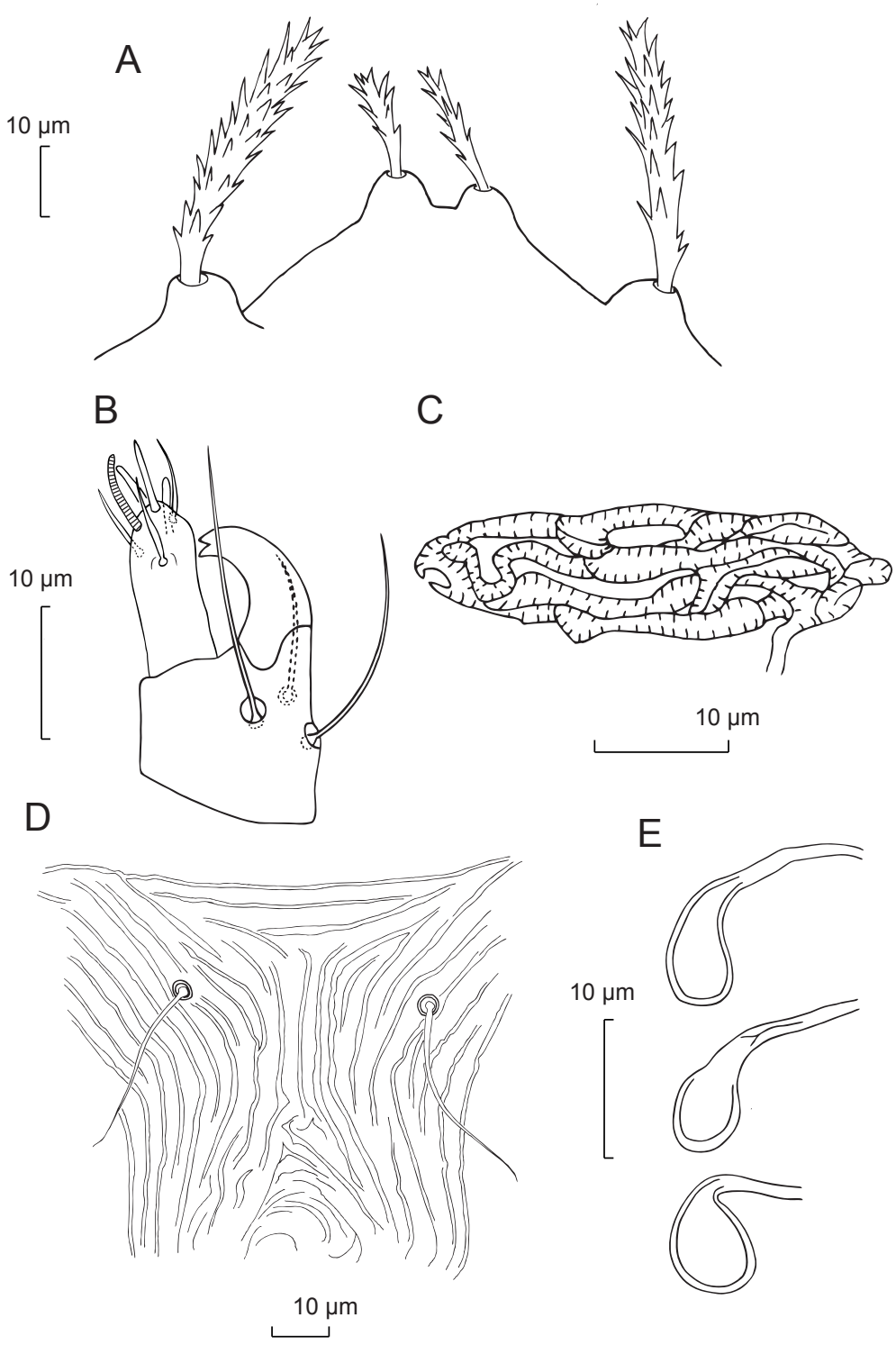


FIGURE 3: *Bryobia cinereae* **n. sp.**, female: A – prodorsal lobes; B – Palpal tibia and tarsus; C – peritremal distal anastomosis; D – anterogenital striation; E – spermatheca (variations between preparations).

Etymology — The specific epithet *cinereae* refers to the species name of the host plant on which mites were collected.

Remarks — The combination of prodorsal lobes poorly developed and dorsal setae not spatulate but elongate with dorsocentral setae inferior in length to the distance between consecutive setae brings this species close to *B. sarothamni* Geijskes, (1939), *B. longisetis* Reck, (1947), *B. artemisiae* Bagdasarian (1951), *B. variabilis* Manson, (1967) and *B. serifiotica* Hatzinikolis, Papadoulis and Kapaxidi (2007). It can be distinguished from *B. sarothamni* by the dorsal hysterosomal setae which are lanceolate, shorter, variable in length (h_1 the largest) *versus* elongate and subequal in length in *B. cinereae*. *Bryobia longisetis* can be separated from *B. cinereae* by the propodosomal inner projection which is more developed, by medial lobes which are almost fused, by f_1 and f_2 dorsal setae which are not contiguous and by a different leg chaetotaxy. In *B. variabilis* (the form bearing long, slender and serrate dorsal setae) the leg setal formula is different and dorsal setae are slender, variable in length (c_2, c_3, d_1 and d_2 being much smaller) whereas quite stout and subequal in length in *B. cinereae*. *Bryobia serifiotica* differs from *B. cinereae* by the dorso hysterosomal setae larger in the latter, by the difference in size of the vertical setae (v_1 slightly inferior to v_2 in *B. serifiotica vs*. v_1 up to three times smaller than v_2 in *B. cinereae*), by the position of f_1 setae (more or less in normal position and well separated in *B. serifiotica* whereas f_1 and f_2 are in marginal position and contiguous in *B. cinereae*) and by the solenidion of the tarsus IV (associated with a tactile setae but well separated and proximal in *B. serifiotica* and *B. cinereae* respectively). Depending on the literature referred, *B. artemisiae* is more or less close to *B. cinereae*. In the original description by Bagdasarian (1951), prodorsal lobes are similar in the two species but vertical setae (v_1 and v_2) are subspatulate to spatulate (elongate in *B. cinereae*) and dorsal hysterosomal setae are short and fan-shaped (elongate in *B. cinereae*). According to Reck (1959), dorsal setae of *B. artemisiae* vary from short spatulate to slightly elongate and, in his drawing, v_1 and v_2 setae are elongate and lanceolate (only elongate in *B. cinereae*). Wainstein (1960) mentions that dorsal setae are narrowly spatulate and almost elongated. In Livshitz and Mitofanov (1971) and Mitrofanov *et al*. (1987) the drawing of *B. artemisiae in habitus* resembles to *B. cinereae*: prodorsal lobes are small, v_2 are longer than v_1, dorso hysterosomal setae are elongate and inserted on tubercles. However, v_1 and v_2 setae are spatulate and subspatulate (narrow in *B. cinereae*), dorso central setae ($c1$, d_1, e_1) are longer to dorso lateral (similar in length in *B. cinereae*) and the leg setal count is different.

Bryobia mercantourensis n. sp. (Figures 4-7)

Type-specimens — Holotype (female), 15 female 7 deutonymhs, 4 protonymphs and 7 larvae paratypes on 30 microscopic preparations from *Genista cinerea* (Vill.) DC. (Leguminosae), cime de Braus (43.875°N 7.394°E, alt. 1040 m), Lucéram, France, 23-VII-2009, leg. P. Auger. All the material deposited in the INRA collection of the CBGP, coll. Auger-Migeon N° 1758 for holotype, 1759-1787 for paratypes.

Other material examined — Ten females on 8 microscopic preparations from *G. cinerea*, Pont du commun (43.985°N 7.547°E, alt. 450 m), Saorge, France, 21-VII-2009, leg. P. Auger, coll. Auger-Migeon N° 1700-1707.

Diagnosis — With four long setae present on the interior dorsal row of femur I this species belongs to the *berlesei*-group (Eyndhoven, 1957; Eyndhoven and Vacante, 1985). Empodial pad of leg I with a pair of tenent hairs others with two rows of tenent hairs, inner propodosomal lobes are well separated and more or less cone-shaped with large fused base, outer lobes smaller and cone shaped, dorsal setae inserted in small tubercles, spatulate with sacral and clunal setae slightly longer.

Description:

Female: Holotype 600 μm long (excluding gnathosoma, from the tip of v_1 to the tip of h_1), width 350 μm. Ten paratypes measured, 540 – 595 μm long, width 310 – 360 μm.

Dorsum — Prodorsum with four pairs of setae and with developed anterior lobes (Figs. 4A, 6A). Outer propodosomal lobes rather low, conical, not extending beyond medial of inner lobes.

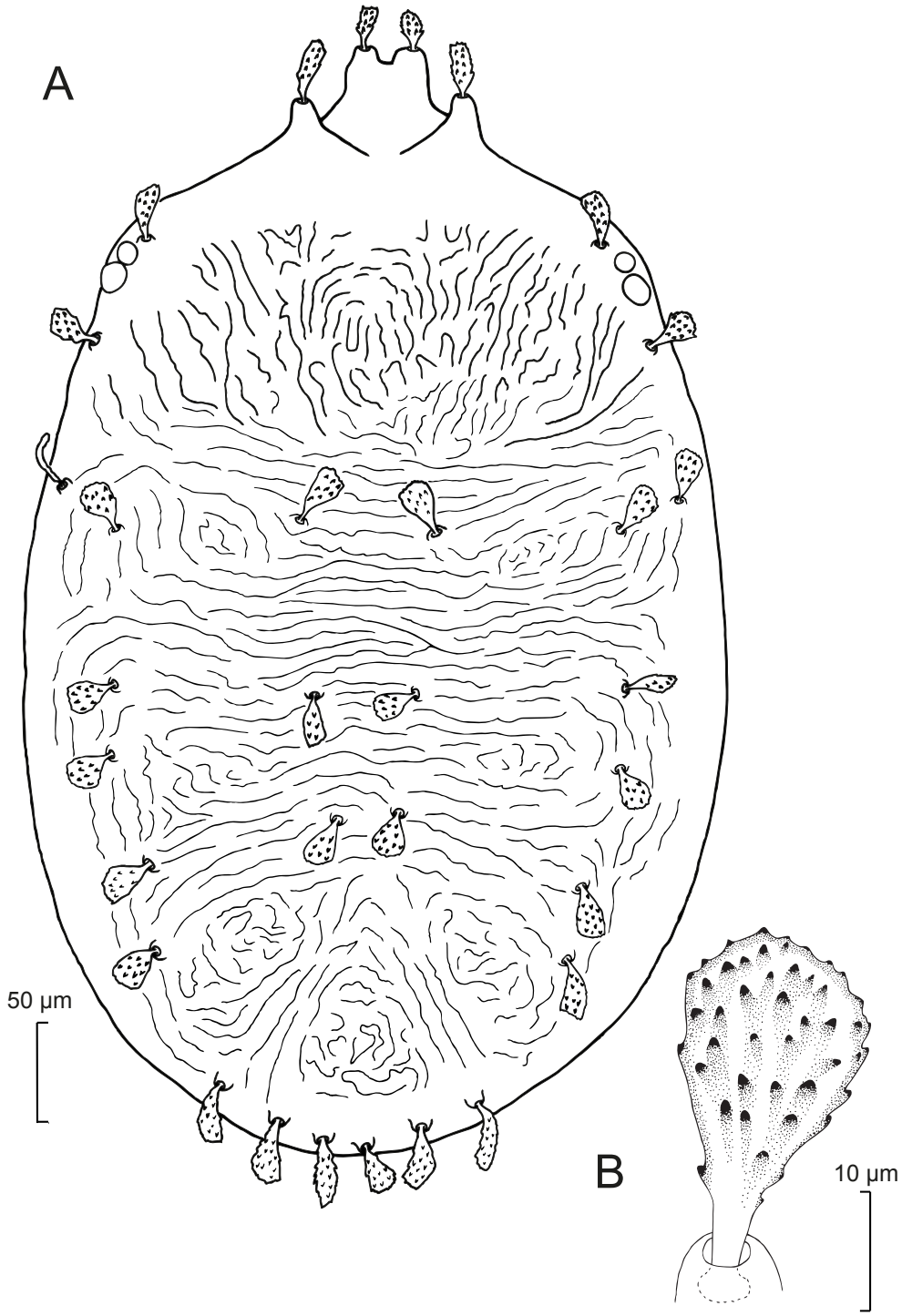


FIGURE 4: *Bryobia mercantourensis* **n. sp.**, female: A – dorsal aspect; B – dorsal c_1 seta.

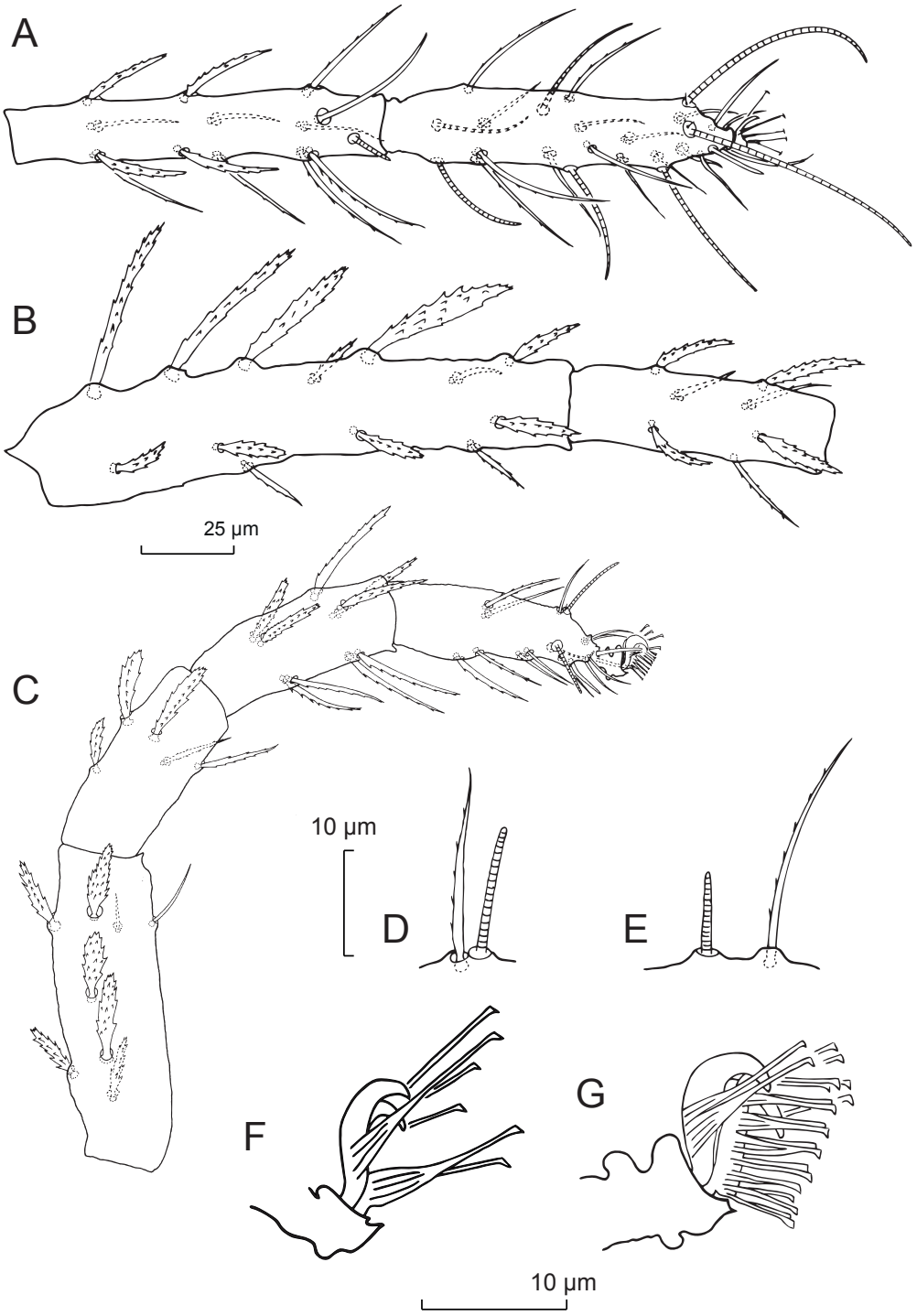


FIGURE 5: *Bryobia mercantourensis* **n. sp.**, female: A – tarsus and tibia I; B – genu and femur I; C – tarsus, tibia, genu and femur II; D – duplex setae on tarsus III; E – solenidion and associated tactile seta on tarsus IV; F – empodium I; G – empodia II-IV.

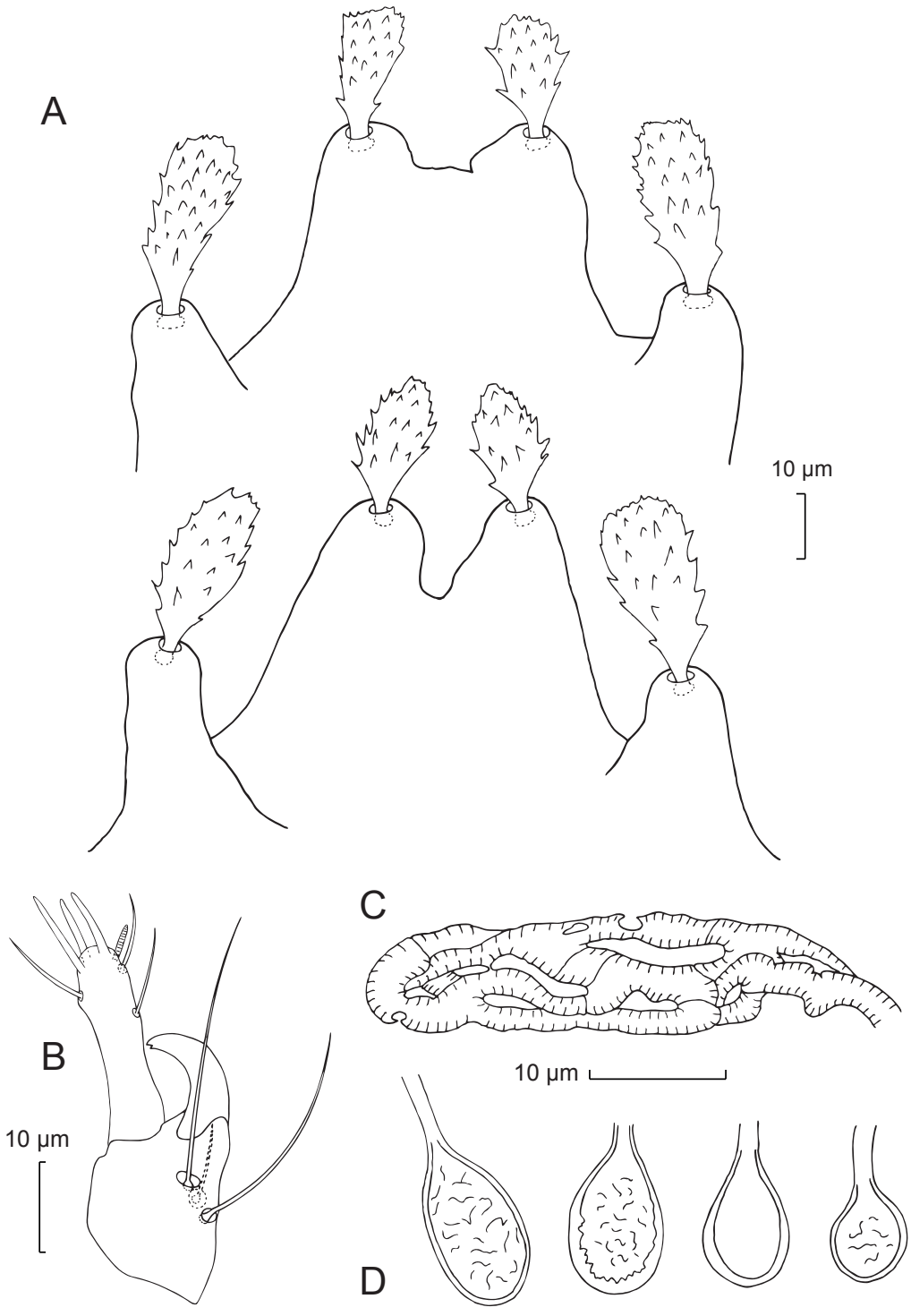


FIGURE 6: *Bryobia mercantourensis* **n. sp.**, female: A – variations in prodorsal lobes; B – Palpal tibia and tarsus; C – peritremal enlargement; D – spermatheca (variations between preparations).

Medial projection well expanded, inner lobes well separated in their distal part with variable obvious incision, 13 (7 – 13) μm in depth (measured from the bottom of the incision between the inner lobes). A horizontal line joining tip of v_2 setae located on the outer lobes crosses v_1 setae about their base, v_1 about two-thirds the size of v_2. Dorsal body setae spatulate, inserted on tubercles, subequal in length with the exception of v_1 setae far smaller, sacrals (f_1, f_2) and clunals (h_1) somewhat longer (Figs. 4A, B). Dorsocentral setae (c_1, d_1 and e_1) shorter than distances between consecutive setae (length of holotype and variations of ten paratypes): v_1 22 (18 – 21); v_2 33 (29 – 32); sc_1 32 (26 – 31); sc_2 26 (22 – 27); c_1 30 (25 – 31); c_2 30 (23 – 29); c_3 27 (22 – 28); d_1 26 (22 – 27); d_2 28 (21 – 28); d_3 26 (23 – 30); e_1 25 (21 – 27); e_2 29 (25 – 29); e_3 34 (25 – 31); f_1 37 (25 – 37); f_2 40 (29 – 41); h_1 36 (27 – 40). Distances between setae: c_1- c_1 62 (58 – 66), d_1- d_1 48 (47 – 52), e_1- e_1 31 (24 – 34), c_1- d_1 85 (81 – 97), d_1- e_1 72 (62 – 70). Sacral setae (f_1 and f_2) in marginal position. Dorsal integument on propodosoma with irregular reticulated granulated pattern medially, folds more or less inclined laterally. Large transverse folds with fibrous appearance on hysterosoma, more or less arched in the distal part comprised between e_3 and h_1 setae. Three pairs of oval-shaped areas present between c_1- c_2, d_1- d_3, and e_1- e_3 setae and a triangularly rounded one present posteriorly.

Gnathosoma — Stylophore longer than wide. Tibial claw of palpus bidentate. Palptarsus elongated, about 24 (20.5 – 25) long with three tactile setae, three eupathidia and one solenidion (Fig. 6B). Eupathidia *ul'ζ*, *ul"ζ* slightly inferior to *suζ* in length, solenidion shorter. Peritreme anastomosed distally in a relatively long and slender enlargement (Fig. 6C): length 33 (31 – 40), width 8 (6.5 – 8.5).

Venter — Striation transverse between 1st (*1a*) and 2nd (*3a*) pairs of setae, absent (rare irregularly folds may be present) between 2nd and 3rd (*4a*), longitudinal between members of *4a* setae and transverse between 3rd and aggenital (*ag*) pairs of setae. Area immediately anterior to genital flap with irregular longitudinal striation. Sacculus of spermatheca oval shaped (Fig. 6D). Three anal and two para-anal setae present.

Legs — Length (femur-genu-tibia-tarsus) inferior to body length, leg I 419 (390 – 410) μm long and (length of holotype and variations of ten paratypes), leg II 235 (215 – 230), leg III 240 (220 – 240), leg IV 260 (250 – 280). Length of segments of leg I as follows: femur 155 (135 – 150), genu 70 (65 – 70), tibia 100 (84 – 105), tarsus 93 (85 – 99). Leg setal count as follows (Figs. 5A, B, C):
I 2 - 1 - 14[13] - 8[7] - 13 + (1) - 19 + (5) + 2 duplexes;
II 1 - 1 - 9[8] - 5 - 9 - 15 + (2) + 1 duplex;
III 1 - 1 - 7[6] - 7[6] - 9 - 13 + 1 duplex;
IV 1 - 1 - 5 - 6 - 9 - 14 + (1).
Internal dorsal row on femur I with four long setae (from proximal to distal setae) and one normal setae: 43 (41 – 47), 51 (47 – 53), 41 (39 – 46) and 42 (38 – 41) μm in length. Tarsus III associated setae serrate and approximate with solenidion forming duplex, the tactile member longer and proximal (Fig. 5D) – length of solenidion 14 (12.5 – 15), length of tactile 20 (16 – 20); tarsus IV with solenidion well-separated from tactile, short and proximal (Fig. 5E) – length of solenidion 9 (8 – 9.5), distance between solenidion and tactile 6.5 (4.5 – 6.5). True claws uncinate, claw and empodium I with one pair of tenent hairs, other claws with two pairs and other empodial pads each provided with two rows of tenent hairs (Figs. 5F, G).

Deutonymph (Figs. 7A, B):
Dorsum — Prodorsal lobes developed, conical in shape, inner lobes less separated as in female, prodorsal setae v_1 and v_2 spatulate and serrate, v_2 the largest almost twice the length of v_1 setae; a horizontal line joining the tips of v_2 setae also nearly passes the tips of v_1 setae. Dorsal body setae inserted on tubercles (stronger in posterior area), spatulate excepted the third pair of dorsolateral setae (e_3), sacrals (f_1, f_2) and clunals (h_1), gradually longer, narrower and pectinate. Dorsocentral setae, c_1, d_1 and e_1, shorter than distances between consecutive setae. Lengths of dorsal setae (variations of 3 deutonymphs): v_1 15 – 17; v_2 25 – 29; sc_1 26 – 31; sc_2 21.5 – 23; c_1 22 – 25; c_2 23 – 24.5; c_3 23 – 24.5; d_1 21.5 – 22.5; d_2 20 – 22; d_3 23.5 – 24; e_1 21 – 21.5; e_2 26.5 – 30; e_3 32 – 34.5; f_1 36.5 – 40; f_2 39 – 40; h_1 35 – 38. Setae f_1 and f_2 in marginal position.

Legs — Length inferior to body length. Internal

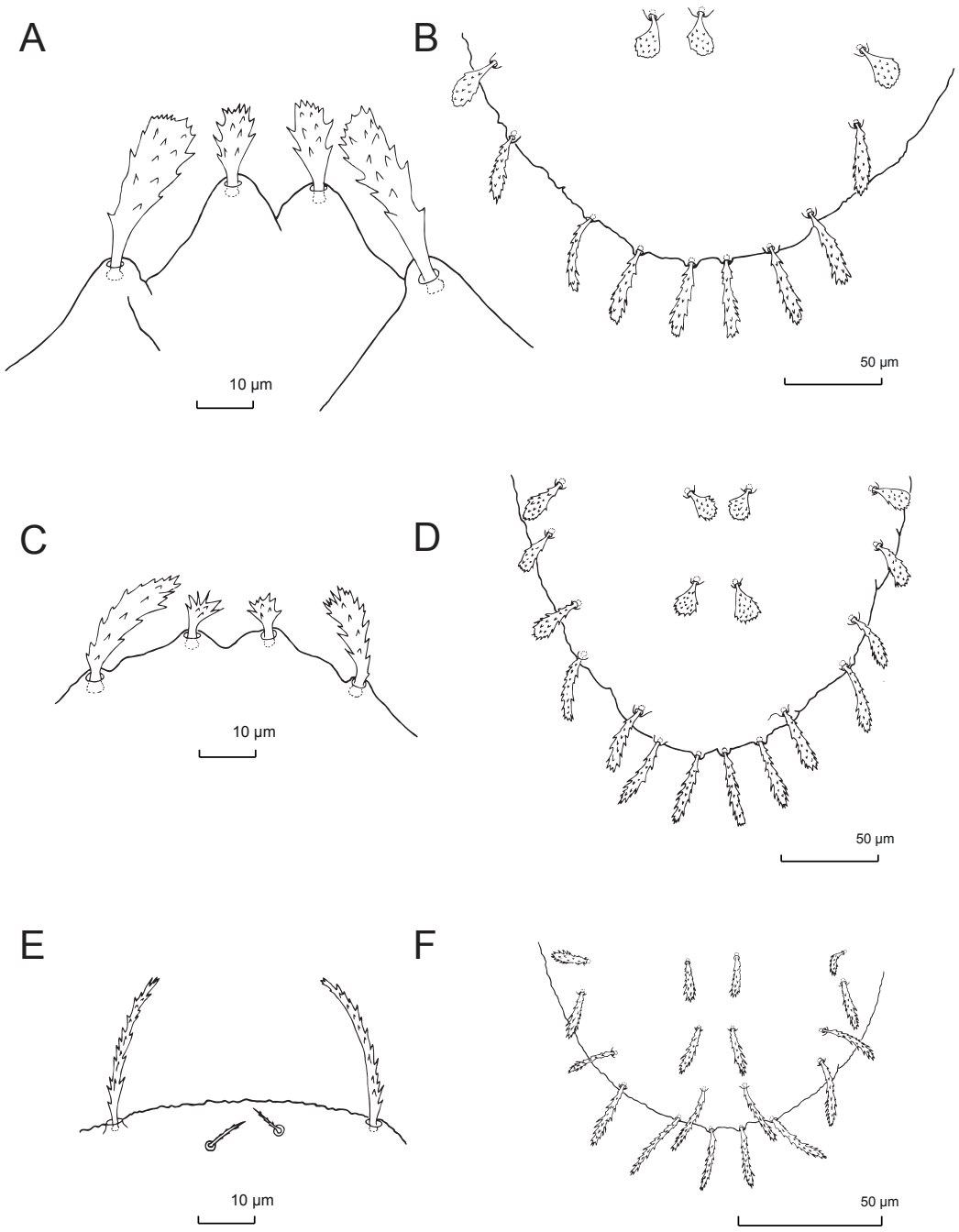


FIGURE 7: *Bryobia mercantourensis* **n. sp.**: A – deutonymphal prodorsal lobes; B – deutonymphal dorsal hysterosomal distal part; C – protonymphal prodorsal lobes; D – protonymphal dorsal hysterosomal distal part; E – larval prodorsal anterior part; F – larval dorsal hysterosomal distal part.

dorsal row on femur I with two long setae and one normal seta. Leg setal count as follows:
I 2 - 1 - 8 - 4 - 9 + (1) - 14 + (1) + 2 duplexes;
II 1 - 1 - 6 [5] - 4 - 5 - 11 + 1 duplex;
III 1 - 1 - 2 - 3 - 5 - 10 + (1);
IV 1 - 0 - 2 - 3 - 5 - 10.
True claws uncinate with one pair of tenent hairs, empodia provided with two rows of tenent hairs, empodial pad of empodium I shorter.

Protonymph (Figs. 7C, D):
Dorsum — Prodorsal lobes weakly developed, tubercle like, v_1 very short, spatulate and serrate with spiky appearance, v_2 larger, spatulate and serrate. Other dorsal body setae spatulate with the exception of e_2 sub-spatulate and the following (e_3, f_1, f_2 and h_1) elongate, serrate and larger. Lengths of dorsal setae (variations of 4 protonymphs): v_1 7 – 11; v_2 23 – 28; sc_1 22.5 – 25.5; sc_2 18.5 – 20.5; c_1 18 – 21; c_2 17 – 18.5; c_3 16 – 18.5; d_1 16 – 18.5; d_2 20 – 23; d_3 21 – 31; e_1 18 – 22; e_2 27 – 31; e_3 33 – 36; f_1 32 – 36; f_2 34 – 37; h_1 35 – 37. Setae f_1 and f_2 in marginal position.

Legs — Length inferior to body length. Internal dorsal row on femur I with one long seta and one normal seta. Leg setal count as follows:
I 2 - 1 - 3 - 4 - 5 + (1) - 10 + (2) + 2 duplexes;
II 1 - 0 - 3 - 4 - 5 - 9 + 1 duplex;
III 1 - 0 - 2 - 2 - 5 - 8;
IV 0 - 0 - 2 - 2 - 5 - 6.
True claws uncinate with one pair of tenent hairs, empodia with two rows of tenent hairs.

Larvae (Figs. 7E, F):
Dorsum — Prodorsal lobes absent, v_1 very short and rod like, v_2 long, serrate, inserted on small tubercles. Dorsal body setae elongate, serrate, setae e_3 to h_1 the largest. Lengths of dorsal setae (variations of 4 larvae): v_1 5 – 7; v_2 23 – 25; sc_1 18 – 22; sc_2 18 – 20; c_1 19 – 24; c_2 17 – 19; c_3 13 – 16; d_1 19 – 24; d_2 18 – 22; d_3 24 – 29; e_1 23 – 28; e_2 25 – 31; e_3 32 – 36; f_1 35 – 39; f_2 35 – 40; h_1 35 – 37. Seta f_1 in normal position.

Legs — Length inferior to body length. Internal dorsal row on femur I with one long seta and one normal seta. Leg setal count as follows:
I 1 - 0 - 3 - 4 - 5 + (1) - 7 + 1 duplex;
II 0 - 0 - 3 - 4 - 5 - 7 + 1 duplex;
III 0 - 0 - 2 - 2 - 5 - 6.
True claws uncinate with one pair of tenent hairs, empodia with two rows of tenent hairs.

Remarks — In addition to the four long setae present on the interior dorsal row of femur I, as this species bears one pair of tenent hairs on the empodium I, *B. mercantourensis* is close to *B. provincialis* Eyndhoven and Vacante, 1985 and *B. dikmenensis* Eyndhoven and Vacante, 1985 that belong to the *berlesei*-group (Eyndhoven, 1957; Eyndhoven and Vacante, 1985). This species is clearly smaller in length and width than *B. provincialis* and the first leg is also obviously longer in the latter. Conversely, *B. mercantourensis* is slightly longer and obviously broader than *B. dikmenensis* and the second, third and fourth pairs of legs are shorter in the latter. It is mainly distinctive from *B. provincialis* and *B. dikmenensis* by the shape of the propodosomal lobes: mammelliform with inner lobes largely fused in the latter whereas conical and well separated in *B. mercantourensis*. The latter can also be separated from *B. provincialis* by differences in shape of deutonymph's dorsohysterosomal setae e_3 and f_1, subspatulate *vs.* elongate and narrow in *B. provincialis* and *B. mercantourensis* respectively. Legs chaetotaxy also clearly differs between the deutonymphs of these two species. *Bryobia dikmenensis* can be distinguished from *B. mercantourensis* and from *B. provincialis* by the reduced size of its second and third pairs of dorsocentral setae (d_1 and e_1) in comparison with other dorsohystersomal setae. Several characters found in juveniles of *B. dikmenensis* and of *B. mercantourensis* can also be used to separate them: the ratio between larval v_1 and v_2 setae is two-fold higher (4 *vs.* 2) in *B. mercantourensis*; protonymphal prodorsal lobes in *B. dikmenensis* ressemble that of female whereas they are almost absent (weakly developed) in *B. mercantourensis*.

Etymology — The species designation *mercantourensis* is named after the location where the specimens were found: in the Mercantour French National Park.

Subfamily Tetranychinae Berlese, 1913

Tribe Tetranychini Reck, 1950

Genus *Eotetranychus*Oudemans, 1931

Eotetranychus Oudemans, 1931:224; Pritchard and Baker, 1955:138; Gutierrez, 1967:370; Tuttle and Baker, 1968:85; Meyer, 1974:189; Tuttle, Baker and Abatiello, 1976:37; Meyer, 1987:110. *Schizotetranychus* (*Eotetranychus*), Wainstein , 1960: 178; Mitrofanov, Strunkova and Livshits, 1987: 90 (subgenus)
Type-species: *Trombidium tiliarium* Hermann.

***Eotetranychus quercicola* n. sp.**
(Figures 8-13)

Type-specimens — Holotype (male), 7 male, 20 female and one deutonymph paratypes on 26 preparations from *Quercus pubescens* Willd., (Fagaceae), cime de Braus (43.875°N 7.394°E, alt. 1040 m), Lucéram, France, 23-VII-2009, leg. P. Auger. All the material housed in the INRA collection of the CBGP, coll. Auger-Migeon N° 1807 for holotype and 1788-1814 for paratypes.

Diagnosis — Dorsohysterosomal setae longer than the intervals between their bases, genital area provided with a genital flap and the area anterior to it bearing a transverse striation design. End of peritreme straight, bulbous, posteriorly enlarged. Male aedeagus long and slender, flagellate and undulate near the middle.

Description:
Male: Holotype 338 μm long (without gnathosoma), gnathosoma 92 μm long. Seven paratypes measured, 325 – 361 μm long, gnathosoma 84 – 91 μm long.

Dorsum — Dorsal body setae long, linear lanceolate, well surpassing in length distance between consecutive bases (length of holotype and variations of seven paratypes): v_1 49 (44 – 49); sc_1 (79 – 84); sc_2 55 (50 – 55); c_1 70 (66 – 72); c_2 68 (68 – 72); c_3 60 (57 – 61); d_1 60 (60 – 63); d_2 73 (64 – 74); e_1 52 (53 – 59); e_2 66 (64 – 72); f_1 47 (47 – 51); f_2 30 (28 – 39); h_1 26 (23 – 26). Dorsal striation with rounded lobes on propodosoma and hysterosoma up to third row of dorsal setae (*e*).

Gnathosoma — Palptarsus terminal sensillum about 3 – 3.5 as long as broad (length of holotype and variations of four paratypes): 5.6 (5 – 5.6) long 1.6 (1.6 – 1.7) wide, solenidion 3.7 (3.8 – 4) μm long, lateral eupathidia asymmetrical, $ul''\zeta$ longer than $ul'\zeta$: 8.7 (8.4 – 9.1) μm and 5 (4.5 – 5) μm respectively (Fig. 10B). Peritreme straight, bulbous distally. Distal enlargement asymmetrical, more developed posteriorly, club-shaped, varying in size and shape among and between specimens (Fig. 10A).

Venter — Ventral striae without lobe.

Legs — Length inferior to body length, leg I 165 (165 – 169) μm long (from trochanter to tarsus, holotype and variations of seven paratypes), leg II 148 (140 – 146), leg III 150 (142 – 154), leg IV 170 (169 – 175). Length of segments of leg I as follows (Figs. 9A, B): trochanter 18 (18 – 21), femur 50 (48 – 52), genu 22 (22 – 25), tibia 29 (30 – 31), tarsus 46 (42 – 45). Leg setal count as follows (Figs. 9A,B):
I 2 - 1 - 10 - 5 - 9 + (4) - 13 + (3) + 2 duplexes;
II 2 - 1 - 7 - 5 - 8 - 13 + (1) + 1 duplex;
III 1 - 1 - 4 - 4 - 6 - 10 + (1);
IV 1 - 1 - 4 - 4 - 7 - 10 + (1).
Tarsus I with distal duplex solenidion longer than that of proximal duplex: 49 – 56 μm and 33 – 36 μm respectively. Tactile members of distal and proximal duplexes subequal in length 10 – 12 μm and 11 – 13 μm respectively. Tarsus II sensory member of duplex 26 – 30 μm long and tactile 10 – 12 μm. Tarsus II with dorsal proximal solenidion slightly longer 13 (13.5 – 15 μm) than distance with duplex setae 12 (12 – 13 μm). Solenidia of tarsi III and IV shorter than distances to distal tactiles: length of solenidia III and IV 13.5 – 15.5 and 15 – 16 μm – distance between solenidia and tactiles 14.5 – 20 and 18 – 20 μm. Empodium I bifid each side composed of three digits, medial digit the stoutest, strong, ventral and dorsal digits slender and shorter (Fig. 9C). Empodia II-IV split into three pairs of hairs with proximoventral pair stronger and with ancillary setae (Fig. 9D). No dorsomedian spur observed.

Aedeagus — Long, slender, acutely tapering and strongly undulate near the middle, 32 (29 – 32.5) μm in length (Fig. 10C).

Female: 15 females measured.
Idiosoma — length 352 – 405 μm, gnathosoma 99 –

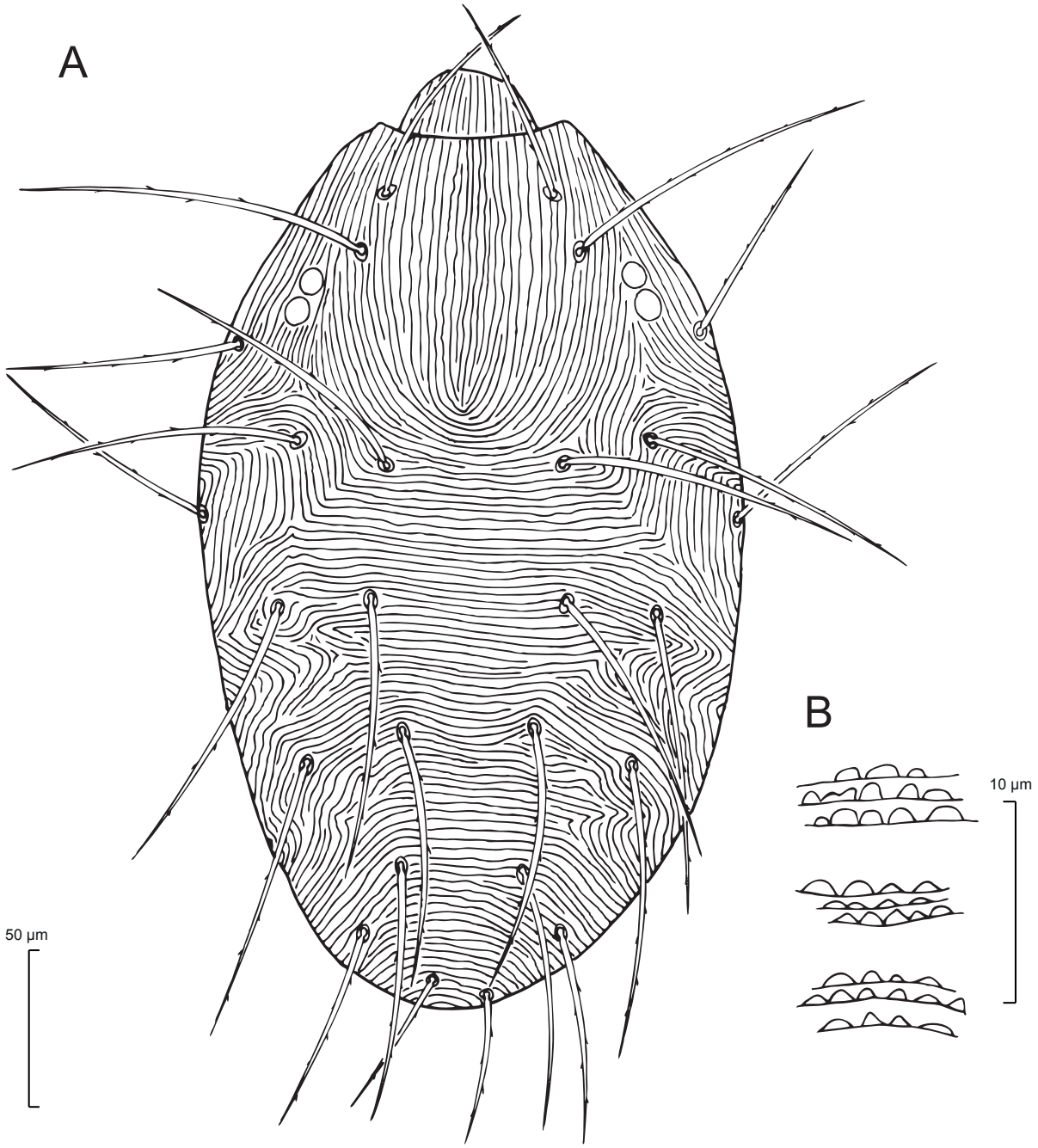


FIGURE 8: *Eotetranychus quercicola* **n. sp.**, female: A – dorsal aspect; B – lobes on dorsal striation.

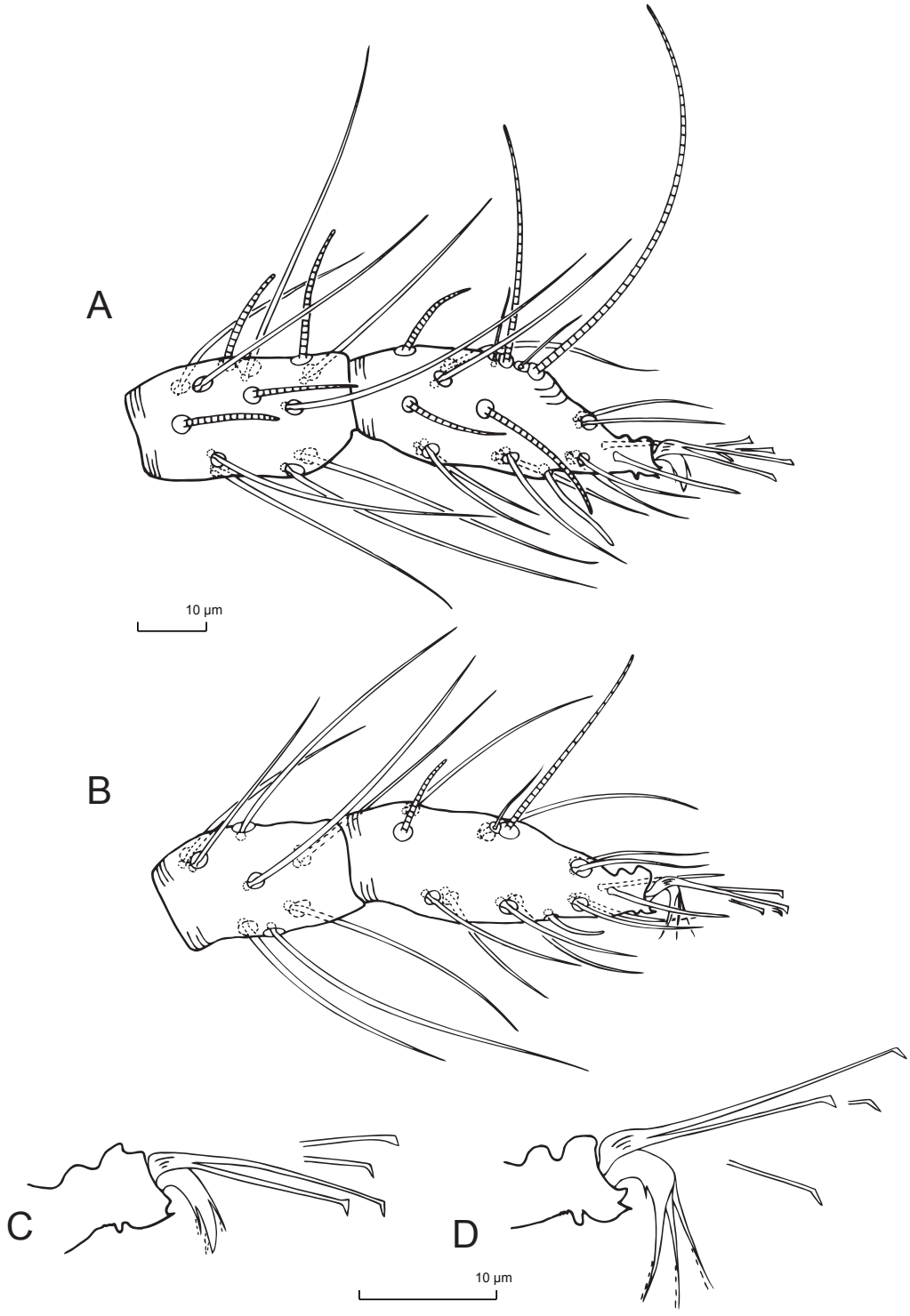


FIGURE 9: *Eotetranychus quercicola* **n. sp.**, male: A – tarsus and tibia I; B – tarsus and tibia II; C – empodium I; D – empodia II-IV.

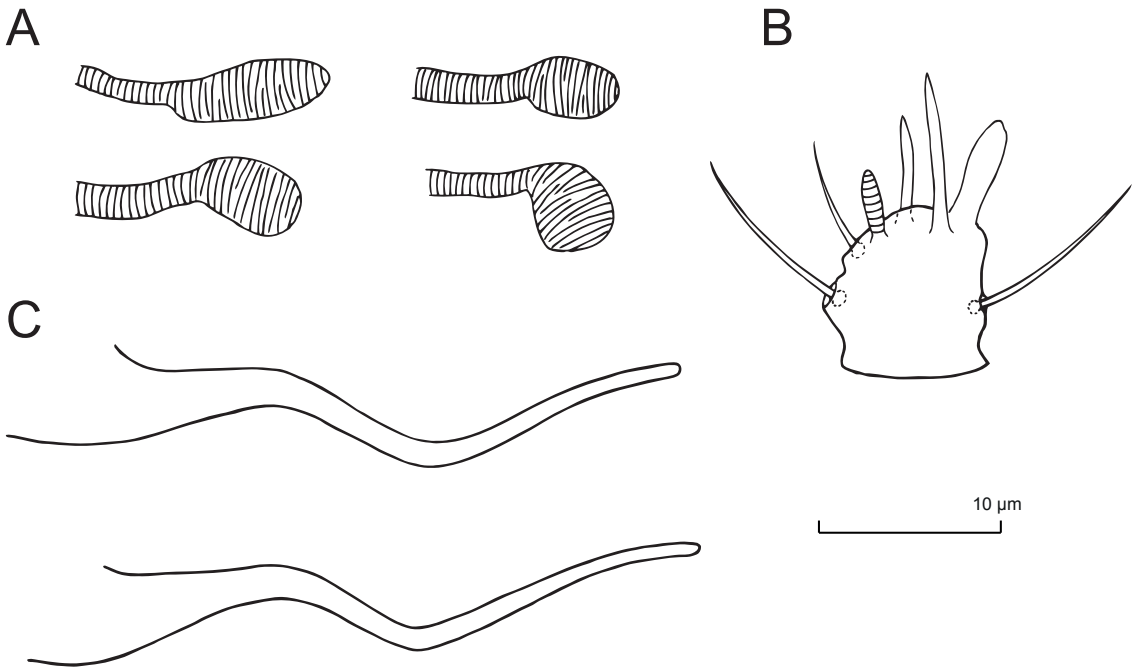


FIGURE 10: *Eotetranychus quercicola* **n. sp.**, male: A – variations in the distal end of the peritreme (superposed peritremes belong to the same mite, juxtaposed one are variations between mites); B – palptarsus; C – aedeagi.

106 µm long, width 186 – 210 µm.

Dorsum — Dorsal body setae lanceolate, longer than distances between bases of consecutive setae (Fig. 8A) (variations of 15 paratypes): v_2 50 – 61; sc_1 97 – 109; sc_2 60 – 68; c_1 84 – 91; c_2 87 – 92; c_3 72 – 79; d_1 82 – 91; d_2 87 – 95; e_1 78 – 87; e_2 83 – 96; f_1 75 – 81; f_2 62 – 67; h_1 40 – 55. Distances between setae: c_1- c_1 56 – 60, d_1- d_1 59 – 64, e_1- e_1 40 – 44, c_1- d_1 43 – 51, d_1- e_1 44 – 51. Hysterosomal striation transverse, dorsal hysterosomal striae with small lobes mostly broader than tall, rounded to triangularly rounded without oblong lobes (Fig. 8B). Prodorsal lobes on striation rounded and broader than tall.

Gnathosoma — Palptarsus terminal sensillum about 2 – 2.3 as long as broad, 6.6 – 6.9 µm long 3.1 – 3.3 µm wide (variations of six paratypes), solenidion 3.7 – 4.2 µm long, lateral eupathidia asymmetrical, *ul*″ζ longer than *ul*′ζ: 9 – 9.6 µm and 5.2 – 6.2 µm respectively (Fig. 12B). Peritreme as in male (Fig. 12C).

Venter — Area immediately anterior to genital flap with transverse striae, genital flap with transverse slightly arched striae typical of *willamettei*-group (Pritchard and Baker, 1955) (Fig. 12D). Lobes on ventral striation present laterally between third pair of ventral setae (*4a*) and aggenital pair (*ag*), rare poorly developed lobes may be present between members of *4a*, anteriorly and posteriorly. Two pair of para-anal and two pairs of anal setae.

Legs — Length inferior to body length, leg I 203 – 210 µm long (from trochanter to tarsus, variations of seven paratypes), leg II 165 – 173, leg III 175 – 190, leg IV 201 – 213. Length of segments of leg I as follows: trochanter 12 – 16, femur 60 – 65, genu 25 – 31, tibia 36 – 40, tarsus 60 – 64. Leg setal count as follows (Figs. 11A, B):
I 2 - 1 - 10 - 5 - 9 + (1) - 14 + (1) + 2 duplexes;
II 2 - 1 - 7 - 5 - 8 - 13 + (1) + 1 duplex;

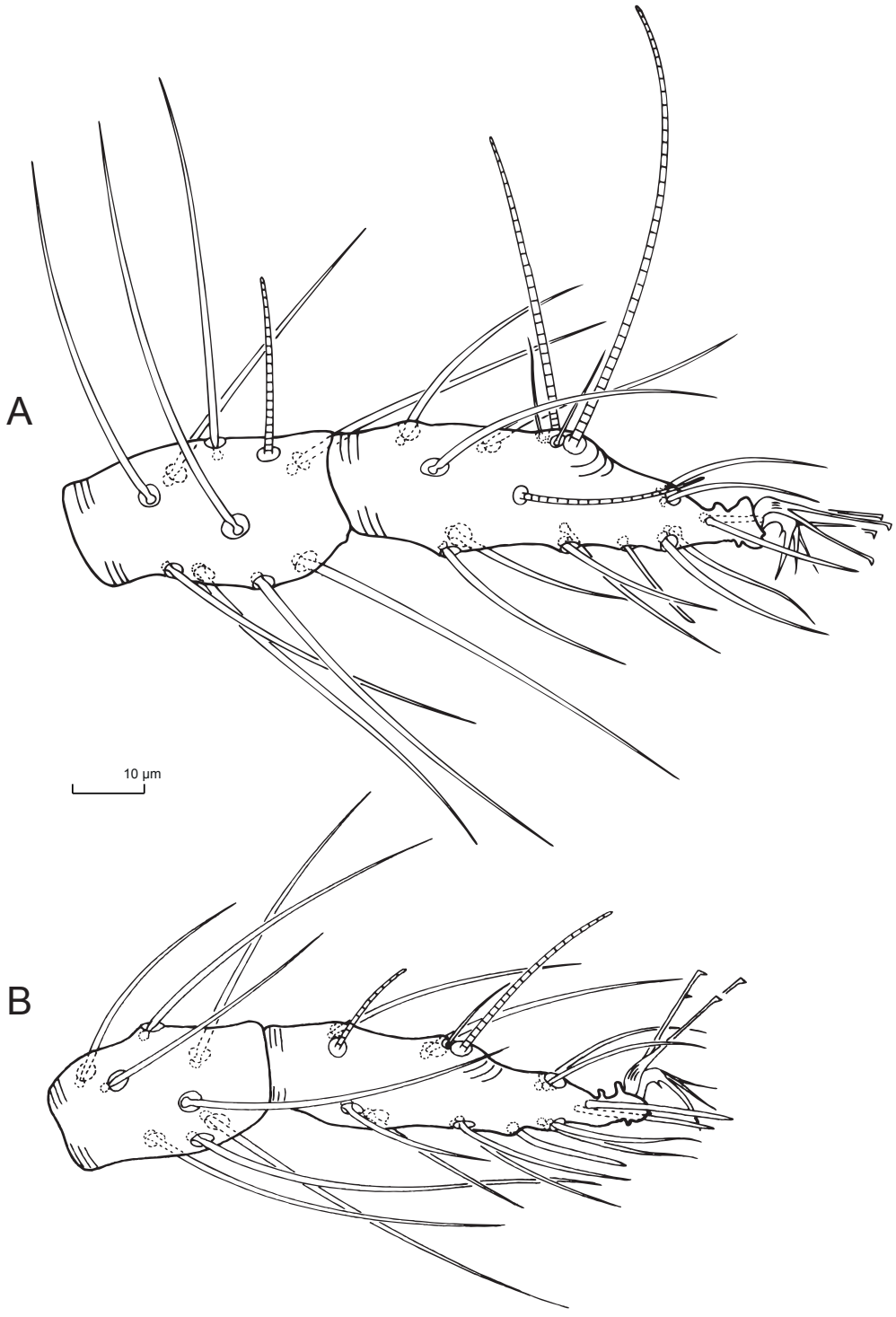


FIGURE 11: *Eotetranychus quercicola* **n. sp.**, female: A – tarsus and tibia I; B – tarsus and tibia II.

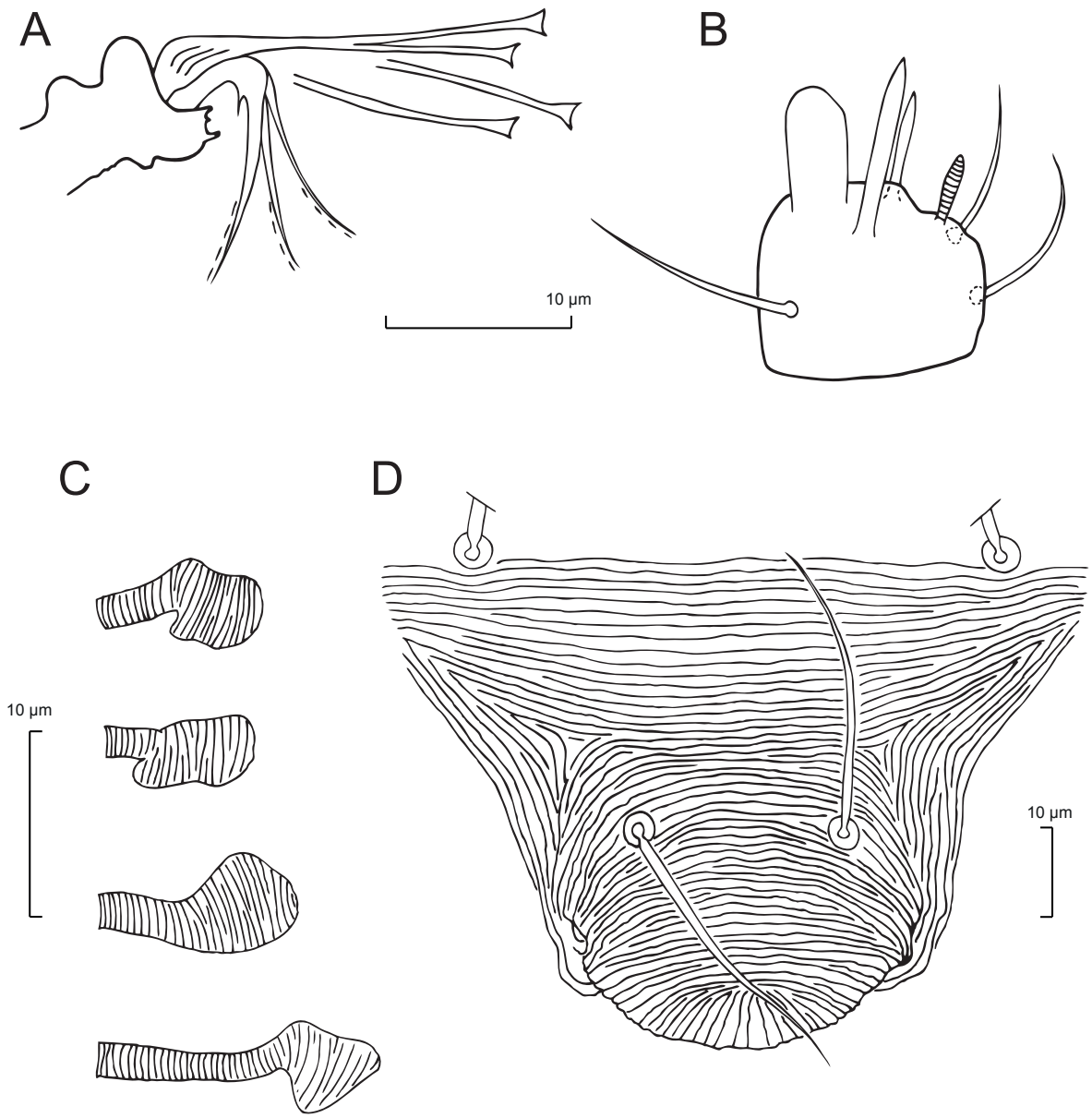


FIGURE 12: *Eotetranychus quercicola* **n. sp.**, female: A – empodia I-IV; B – palptarsus; C – distal part of the peritreme (variations between individuals); D – flap and anterogenital area.

III 1 - 1 - 4 - 4 - 6 - 10 + (1);
IV 1 - 1 - 4 - 4 - 7 - 10 + (1).
Tarsus I with distal duplex solenidion longer than that of proximal duplex: 64 – 70 µm and 40 – 45 µm respectively. Tactile members of distal and proximal duplexes equal in length 13 – 15 µm. Lateral solenidion and five tactile setae proximal to proximal duplex. Tarsus II sensory member of duplex 32 – 36 µm long and tactile 11 – 14 µm. Tarsus II with proximal solenidion dorsal, longer (18 – 23 µm) than distance with duplex setae (15 – 17 µm). Tarsi III and IV solenidia subequal in length (length

TABLE 1: Comparison between some morphological characters of *Eotetranychus colurnae* and *Eotetranychus quercicola* **n. sp.** (lengths are given in micrometers).

	*E. colurnae**	*E. quercicola*
	Females	
Dorsal seta c_1 Length	77	84-94
Dorsal seta d_1 Length	70	82-91
Dorsal seta e_1 Length	60	77-87
Distance between c_1	48	56-60
Distance between d_1	51	59-64
Distance between e_1	34	40-44
Distance between c_1-d_1	44	43-51
Distance between d_1-e_1	40	44-51
Leg I length	185	203-210
Tarsus I length	50	60-66
Tibia I length	35	37-40
Genu I length	29	25-31
Femur+trochanter length	71	73-80
Leg II length	147	167-173
Leg III length	157	175-190
Leg IV length	176	195-213
Distal duplex of tarsus I solenidion length	56	64-70
Spinneret length x width (ratio)	6.6 x 2.2 (3)	6.6-6.9 x 3.1-3.3 (2-2.1)
Palptarsus solenidion length	5	3.7-4.3
Eupathidia *ul'* ζ length	5.5	5.2-6.2
Eupathidia *ul''* ζ length	7.7	9-9.6
	Males	
Aedeagus length	35	29-32
Spinneret length x width (ratio)	6.6 x 1.6 (4)	5-5.6 x 1.5-1.7 (3.1-3.7)
Palptarsus solenidion length	4-4.2	3.7-4
Eupathidia *ul'* ζ length	similar to *ul''* ζ	4.5-5.2
Eupathidia *ul''* ζ length	similar to *ul'* ζ	8.4-9
Tarsus II duplex solenidion length	25	32-36
Tarsus II duplex tactile length	8.8	11-13.2

* After Mitrofanov (1978)

of solenidia III and IV 19 – 22 and 16 – 23 μm respectively), slightly shorter than distances between their bases and those of distal tactile setae: distance between solenidia III and IV and tactile setae 21 – 26 and 21 – 27 μm respectively. Empodia I-IV split into three pairs of hairs with proximoventral pair stronger and with ancillary setae. No dorsomedian spur observed (Fig. 12A).

Remarks — With dorsal setae longer than the intervals between them and eight tactile setae on tibia II this species is assigned into the *tiliarium* group (Pritchard and Baker, 1955), its genital area pattern corresponds to the *willamettei* species group (Tuttle *et al.*, 1976; Baker and Tuttle, 1994) and because



FIGURE 13: *Eotetranychus quercicola* **n. sp.**, female.

of the shape of its aedeagus this species belongs to the *carpini*-species group (Pritchard and Baker, 1955; Ehara, 1970; Baker and Tuttle, 1994). Among members of *Eotetranychus* from this group it can be easily distinguished by the shape of the distal peritremal enlargement: neither bent nor hooked but straight and bulbous, asymmetrical and posteriorly enlarged. *Eotetranychus quercicola* shares this character with only one species belonging to the *carpini* group: *E. colurnae* Mitrofanov, 1978. However, *E. quercicola* can be separated from this species by several obvious characters: for example dorsal setae, duplex solenidia, legs and distances between dorsocentral setae insertions are shorter in *E. colurnae* (see Table I). The aeadeagus is longer in *E. colurnae* and male eupathidia *ul'ζ* and *ul''ζ* are asymmetrical in male of *E. quercicola* only. *Eotetranycus querci* Reeves, 1963, that also belongs to the *carpini*-species group can be found on oak and birch in the USA (Reeves, 1963) and on *Tilia japonica* (Miq.) Simonk. in Japan (Ehara, 1970). It can be easily separated from *E. quercicola* by the shape of its peritreme (slightly bent to almost U-shaped) and by its aedeagus which is weakly undulate near the middle.

Etymology — the species designation, *quercicola*, refers to the host plant on which mites were collected meaning inhabits oak.

Biological observations — Adults of this species are yellowish green in colour (Fig. 13). This species lives on the under surface of the leaves, produces webbing that delimits small colonies more or less oval-shaped.

ACKNOWLEDGEMENTS

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