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

Philippe AUGER* and Alain MIGEON

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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 cinerea n. sp., Bryobia mercantourensis n. sp. and Eotetranychus quercicola n. sp.. Both Bryobia species were collected on Genista cinea and E. quercicola on Quercus pubescens. A new combination is also proposed for Bryobia longisetis, previously placed in Pseudobryobia by Wainstein (1960).

KEYWORDS — Acari; Tetranychid; Bryobia cinerea n. sp.; Bryobia mercantourensis n. sp.; Eotetranychus quercicola n. sp.; Bryobia longisetis comb. nov.; ATBI; France

INTRODUCTION

All Taxa Biodiversity Inventories (ATBI) 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 Schizobionobia Womersley, 1940 and one to the genus Eotetranychus 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 their bases to their tips.

**TAXONOMY**

**Family Tetranychidae Donnadieu, 1875**

**Subfamily Bryobiinae Berlese, 1913**

**Tribe Bryobiini Reck, 1952**

**Genus Bryobia Koch, 1836**


Type-species: *Bryobia praetiosa* Koch.


Type-species: female, Georgia (Gruziya), from *Salvia nemorosa* and *Salvia* sp. (Labiatae).

*Pseudobryobia longisetis* (Reck, 1947), new combination.


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), *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. 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 cineracea n. sp., female: A – dorsal aspect; B – dorsal h1 seta.

Diagnosis — Limited anterior dorsal propodosomal projections over the gnathosoma, prodorsal lobes scarcely developed, vertical setae (v1 and v2) inserted in tubercle-like structures. Dorsal setae elongated, quite stout, serrate, inserted on tubercles and subequal in length on hysterosoma. Empodia elongated, quite stout, serrate, inserted on tubercles, subequal in length with the ex- socentral setae (sc). Dorsal body setae not dented (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 su"ζ, solenidion short. Peri- treme 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 (Ia) 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). Saccu- lus of spermatheca oblong (shape variations due to mounting) (Fig. 3E). Three anal and two para-anal setae.


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 cinerea* 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 (h1 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 f1 and f2 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 (c2, c3, d1 and d2 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 (v1 slightly inferior to v2 in B. serifiotica vs. v1 up to three times smaller than v2 in B. cinereae), by the position of f1 setae (more or less in normal position and well separated in B. serifiotica whereas f1 and f2 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 (v1 and v2) 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, v1 and v2 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 Mitrofanov (1971) and Mitrofanov et al. (1987) the drawing of B. artemisiae in habitus resembles to B. cinereae: prodorsal lobes are small, v2 are longer than v1, dorso hysterosomal setae are elongate and inserted on tubercles. However, v1 and v2 setae are spatulate and subspatulate (narrow in B. cinereae), dorso central setae (c1, d1, e1) 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, 21-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, 23-VII-2009, leg. P. Auger. All the material deposited in the INRA collection of the CBGP, 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 berleset-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 setae 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 v1 to the tip of h1), 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 v2 setae located on the outer lobes crosses v1 setae about their base, v1 about two-thirds the size of v2. Dorsal body setae spatulate, inserted on tubercles, subequal in length with the exception of v1 setae far smaller, sacrals (f1, f2) and clunals (h1) somewhat longer (Figs. 4A, B). Dorsocentral setae (c1, d1 and e1) shorter than distances between consecutive setae (length of holotype and variations of ten paratypes): v1 22 (18 – 21); v2 33 (29 – 32); sc1 32 (26 – 31); sc2 26 (22 – 27); c1 30 (25 – 31); c2 30 (23 – 29); c3 27 (22 – 28); d1 26 (22 – 27); d2 28 (21 – 28); d3 26 (23 – 30); e1 25 (21 – 27); e2 29 (25 – 29); e3 34 (25 – 31); f1 37 (25 – 37); f2 40 (29 – 41); h1 36 (27 – 40). Distances between setae: c1–c1 62 (58 – 66), d1–d1 48 (47 – 52), e1–e1 31 (24 – 34), c1–d1 85 (81 – 97), d1–e1 172 (62 – 70). Sacral setae (f1 and f2) 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 e3 and h1 setae. Three pairs of oval-shaped areas present between c1–c2, d1–d3, and c1–e3 setae and a triangularly rounded one present posteriorly.

Gnathosoma — Stylphore longer than wide. Tibial claw of palpus bidentate. Palptarsi 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. Peritremes anastomosed distally in a relatively long and slender enlargement (Fig. 6C): length 33 (31 – 40), width 8 (6.5 – 8.5).

Venter — Striaion 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 (8g) 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.


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 serate 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 v1 and v2 spatulate and serrate, v2 the largest almost twice the length of v1 setae; a horizontal line joining the tips of v2 setae also nearly passes the tips of v1 setae. Dorsal body setae inserted on tubercles (stronger in posterior area), spatulate excepted the third pair of dorsolateral setae (e1), sacrals (f1, f2) and clunals (h1), gradually longer, narrower and pectinate. Dorsocentral setae, c1, d1 and e1, shorter than distances between consecutive setae. Lengths of dorsal setae (variations of 3 deutonymphs): v1 15 – 17; v2 25 – 29; sc1 26 – 31; sc2 21.5 – 23; c1 22 – 25; c2 23 – 24.5; c3 23 – 24.5; d1 21.5 – 22.5; d2 20 – 22; d3 23.5 – 24; e1 21 – 21.5; e2 26.5 – 30; e3 32 – 34.5; f1 36.5 – 40; f2 39 – 40; h1 35 – 38. Setae f1 and f2 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 berleset-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 \(f_1\), sub-spatulate 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 dorsohysterosomal setae \((d_1\) and \(e_1)\) in comparison with other dorsohysterosomal 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* resemble 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


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 distally. Distal enlargement asymmetrical, more developed posteriorly, club-shaped, varying in size and shape among and between specimens (Fig. 10B). Peritreme straight, bulbous distally. Distal enlargement asymmetrical, more developed posteriorly, club-shaped, varying in size and shape among and between specimens (Fig. 10B).

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 – 16 µm — distance between solenidia and tactiles 14.5 – 15 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 dorsomedical 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.

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): c1 97 – 109; s2 60 – 68; c1 84 – 91; c2 87 – 92; c3 72 – 79; d1 82 – 91; d2 87 – 95; e1 78 – 87; e2 83 – 96; f1 75 – 81; f2 62 – 67; h1 40 – 55. Distances between setae: c1 – c1 56 – 60, d1 – d1 59 – 64, e1 – e1 40 – 44, c1 – d1 43 – 51, d1 – e1 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”c longer than ul”c; 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;

31
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
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Table 1: Comparison between some morphological characters of *Eotetranychus colurnae* and *Eotetranychus quercicola* n. sp. (lengths are given in micrometers).

<table>
<thead>
<tr>
<th>Character</th>
<th><em>E. colurnae</em></th>
<th><em>E. quercicola</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsal seta <em>c</em> 1 Length</td>
<td>77</td>
<td>84-94</td>
</tr>
<tr>
<td>Dorsal seta <em>d</em> 1 Length</td>
<td>70</td>
<td>82-91</td>
</tr>
<tr>
<td>Dorsal seta <em>e</em> 1 Length</td>
<td>60</td>
<td>77-87</td>
</tr>
<tr>
<td>Distance between <em>c</em> 1</td>
<td>48</td>
<td>56-60</td>
</tr>
<tr>
<td>Distance between <em>d</em> 1</td>
<td>51</td>
<td>59-64</td>
</tr>
<tr>
<td>Distance between <em>e</em> 1</td>
<td>34</td>
<td>40-44</td>
</tr>
<tr>
<td>Distance between <em>c</em> 1-<em>d</em> 1</td>
<td>44</td>
<td>43-51</td>
</tr>
<tr>
<td>Distance between <em>d</em> 1-<em>e</em> 1</td>
<td>40</td>
<td>44-51</td>
</tr>
<tr>
<td>Leg I length</td>
<td>185</td>
<td>203-210</td>
</tr>
<tr>
<td>Tibia I length</td>
<td>50</td>
<td>60-66</td>
</tr>
<tr>
<td>Genu I length</td>
<td>29</td>
<td>25-31</td>
</tr>
<tr>
<td>Femur+trochanter length</td>
<td>71</td>
<td>73-80</td>
</tr>
<tr>
<td>Leg II length</td>
<td>147</td>
<td>167-173</td>
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<tr>
<td>Leg III length</td>
<td>157</td>
<td>175-190</td>
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<tr>
<td>Leg IV length</td>
<td>176</td>
<td>195-213</td>
</tr>
<tr>
<td>Distal duplex of tarsus I solenidion</td>
<td>56</td>
<td>64-70</td>
</tr>
<tr>
<td>Spinneret length x width (ratio)</td>
<td>6.6 x 2.2 (3)</td>
<td>6.6-6.9 x 3.1-3.3 (2-2.1)</td>
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<tr>
<td>Palptarsus solenidion length</td>
<td>5</td>
<td>3.7-4.3</td>
</tr>
<tr>
<td>Eupathidia <em>ul</em> ζ length</td>
<td>5.5</td>
<td>5.2-6.2</td>
</tr>
<tr>
<td>Eupathidia <em>ul’ ζ</em> length</td>
<td>7.7</td>
<td>9-9.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Character</th>
<th><em>E. colurnae</em></th>
<th><em>E. quercicola</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aedeagus length</td>
<td>35</td>
<td>29-32</td>
</tr>
<tr>
<td>Spinneret length x width (ratio)</td>
<td>6.6 x 1.6 (4)</td>
<td>5-5.6 x 1.5-1.7 (3.1-3.7)</td>
</tr>
<tr>
<td>Palptarsus solenidion length</td>
<td>4.4-2</td>
<td>3.7-4</td>
</tr>
<tr>
<td>Eupathidia <em>ul</em> ζ length</td>
<td>similar to <em>ul’ ζ</em></td>
<td>4.5-5.2</td>
</tr>
<tr>
<td>Eupathidia <em>ul’ζ</em> length</td>
<td>similar to <em>ul</em> ζ</td>
<td>8.4-9</td>
</tr>
<tr>
<td>Tarsus II duplex solenidion length</td>
<td>25</td>
<td>32-36</td>
</tr>
<tr>
<td>Tarsus II duplex tactile length</td>
<td>8.8</td>
<td>11-13.2</td>
</tr>
</tbody>
</table>

* After Mitrofanov (1978)

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 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).
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 aedeagus is longer in E. colurnae and male eupathidia ul’ζ and ul”ζ are asymmetrical in male of E. quercicola only. Eotetranychus 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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REFERENCES


Berlese A. 1913 — *Acarotheca Italica* — Firenze. pp. 221.

De Biaggi M., Leccia M.-F., Kroupa A., Monje J.C. 2010 — Creating a biodiversity inventory in protected areas to increase knowledge of their natural heritage and to improve land management — Eco Mont-Journal on Protected Mountain Areas Research and Management, 2: 49-52.


Koch C.L. 1836 — Deutsche Crustacea, Myriapoda, Arachnida —.


Manson D.C.M. 1967 — The spider mite family Tetranychidae in New Zealand. I. The genus *Bryobia* — Acarologia, 9: 76-123.


Reeves R.M. 1963 — Tetranychidae infesting woody plants in New York State, and a life history study of the elm mite Eotetranychus matthyssei n. sp. — Cornell University Agricultural Station Mem. No. 380.


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