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ORIBATID MITES OF THE SUPERFAMILY CERATOZETOIDEA (ACARI: ORIBATIDA) FROM TURKEY

КЛЕЩИ-ОРИБАТИДЫ НАДСЕМЕЙСТВА CERATOZETOIDEA (ACARI: ORIBATIDA) ИЗ ТУРЦИИ

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Ключевые слова: клещи, орибатиды, Ceratozetoidea, таксономия, новые находки, Турция

ABSTRACT

The present paper deals with the members of oribatid mites of the superfamily Ceratozetoidea found in Turkey. Nine species of ceratozetoid mites in eight genera, representing four families are recorded from the leaf litter and soils under hedge plants and hazel orchards in the Black Sea coastal area of Turkey. All species, *Minunthozetes semirufus* (C. L. Koch, 1841), *M. pseudofusiger* (Schweizer, 1922), *P. punctum* (C. L. Koch, 1839), *Ceratozetes mediocris* Berlese, 1908, *Diapterobates humeralis* (Hermann, 1804), *Trichoribates novus* (Sellnick, 1928), *Vicinebates sergienkoae* Pavlitshenko, 1991, *Xiphobates kieviensis* (Shaldybina, 1980), and *Euzetes globulus* (Nicolet, 1855) are newly recorded for the fauna of Turkey. The redescriptions of these species are given, and the taxonomy of the genus *Vicinebates* is discussed. A key to the Turkish species of Ceratozetoidea is given.

РЕЗЮМЕ

Статья посвящена клещам-орибатидам надсем. Ceratozetoidea фауны Турции. Девять видов из 8 родов и 4 семейств этого надсемейства обнаружены в листовом опаде и почве в ореховых плантациях на Черноморском побережье Турции. Все виды *Minunthozetes semirufus* (C. L. Koch, 1841), *M. pseudofusiger* (Schweizer, 1922), *P. punctum* (C. L. Koch, 1839), *Ceratozetes mediocris* Berlese, 1908, *Diapterobates humeralis* (Hermann, 1804), *Trichoribates novus* (Sellnick, 1928), *Vicinebates sergienkoae* Pavlitshenko, 1991, *Xiphobates kieviensis* (Shaldybina, 1980) и *Euzetes globulus* (Nicolet, 1855) обнаружены в Турции впервые. Приведено переописание этих видов, обсуждается таксономия рода *Vicinebates*. Приводится определительный ключ для видов надсем. Ceratozetoidea Турции.

INTRODUCTION

The superfamily Ceratozetoidea Jacot, 1925 is one of the largest groups of oribatid mites, which is very rich in species number. Its classification is still somewhat difficult. Representatives of this superfamily have been described or recorded mostly from the Northern Hemisphere, but a rather large number of species has been found in the Southern Hemisphere. However, the taxonomy, distribution and diversity of Ceratozetoidea have been inadequately investigated in most countries of the world except a few countries of Europe and North America [Shaldybina, 1975; Behan-Pelletier, 1984, 1985, 1986, 1994, 2000; Pavlitshenko, 1994].

The ceratozetoid fauna of Turkey is inadequately known and only three species, *Trichoribates trimaculatus* (C.L. Koch), *Minguezetes hexanosus* (Berlese) and *Ceratozetes microsetosus* Ayyildiz and Luxton have been recorded before [Ayyildiz 1988, 1990; Ayyildiz, Luxton 1989].

This is the second part of our studies on ceratozetoid mites from Turkey. In the first part we described one new species of *Punctoribates* from soils under field mushrooms [Bayartogtokh *et al.*, 2000]. In this part, the redescriptions of nine known species belonging to the genera *Minunthozetes*, *Punctoribates*, *Ceratozetes*, *Vicinebates*, *Xiphobates*, *Diapterobates*, *Trichoribates,* and *Euzetes* are presented, which were collected from leaf litter under hedge plants and the leaf samples of hazel

orchards. All species studied here, *Minunthozetes semirufus* (C. L. Koch), *M. pseudofusiger* (Schweizer), *P. punctum* (C. L. Koch), *Ceratozetes mediocris* Berlese, *Vicinebates sergienkoae* Pavlitshenko, *Xiphobates kieviensis* (Shaldybina), *Diapterobates humeralis* (Hermann), *Trichoribates novus* (Sellnick), and *Euzetes globulus* (Nicolet) are recorded for the first time in Turkey.

MATERIAL AND METHODS

This work is based on the material collected in 1999 by the third author from the leaf litter of hedge plants or leaf samples of hazel orchards in the Black Sea coastal area of Turkey. The habitat characteristics for each species are given in the respective «Material examined» sections.

The morphological terminology used in this paper is based on that (with a few modifications) of Grandjean [1936, 1957, 1970] as summarized and applied by Menke [1963, 1964a, b, 1966], Shaldybina [1967a, b] and Behan-Pelletier [1984]. In the generic classification of the superfamily we followed the system proposed by Balogh and Balogh [1992] and Pavlitshenko [1994].

Body length is measured in lateral view, from the tip of the rostrum to the posterior edge of notogaster. Notogastral length is measured in lateral aspect, from the anterior to the posterior edge. Notogastral width refers to the maximum width in dorsal aspect. Length measurements of body setae are made on dissected specimens. All measurements are given in micrometers and average measurement values are given in parenthesises after the ranges.

REDESCRIPTIONS OF SPECIES

Family Mycobatidae Grandjean, 1953

Minunthozetes semirufus (C. L. Koch)

Figs. 1–10.

Zetes semirufus C. L. Koch, 1841: vol. 31(7).

Oribata fusigera Michael, 1883: 268, pl. 12, figs. 6–11; 1898: 23.

Punctoribates (Minunthozetes) semirufus: Sellnick, 1928: 15, fig. 26; Willmann, 1931: 174, fig. 288; Schweizer, 1956: 321, fig. 275.

Minunthozetes semirufus: Buitendijk, 1945: 387; Radford, 1950: 199; Hammen, 1952: 102, fig. 9b; Sellnick, 1960: 67; Shaldybina, 1965b: 81, figs. 1, 2; 1975: 306, fig. 761; Fieder, Vasiliu and Călugár, 1971: 409, figs. 1–3; Pérez-Iñigo, 1972: 303, fig. 47; 1993: 149, fig. 55a; Pavlitshenko, 1994: 53, fig. 52.

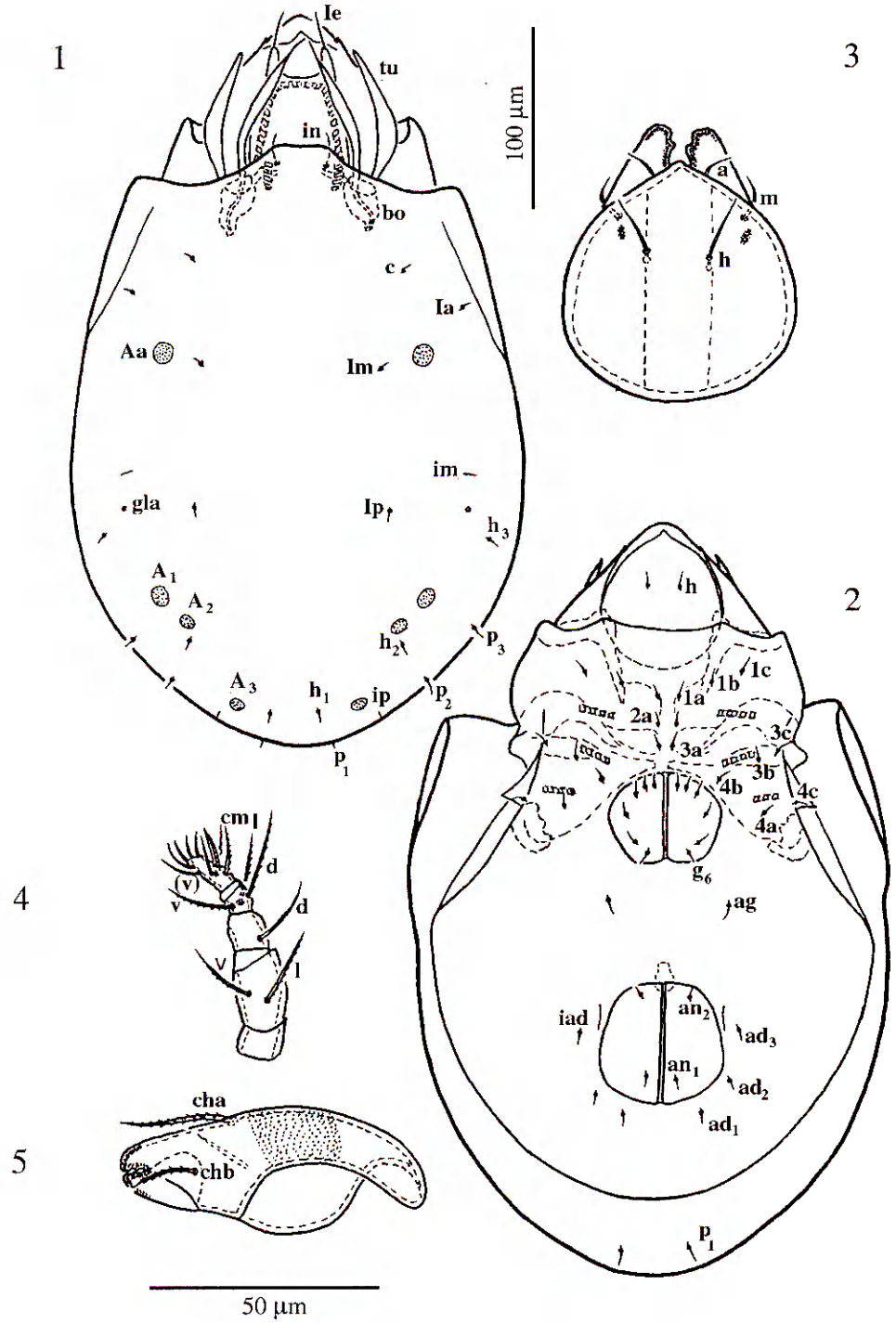
Diagnosis. Small in size (260–280 in length; 163–178 in width); rostrum rounded; rostral seta not evident; lamellae narrow; lamellar cusp and translamella well developed; lamellar and interlamellar setae moderately long, thin, smooth; sensillus fusiform, elongate distally and sharply pointed; tutorium relatively narrow, slightly widened in its middle part, distal end with three small teeth; notogastral setae short.

Measurements. Six specimens were measured: body length 260–280 (270); width of notogaster 163–178 (173); length of notogaster 204–224 (213).

Integument. Body color yellowish-brown to reddish-brown. With thin cerotegument, roughened by minute granules. Lateral region of podosoma with relatively large, dense granules. Integument nearly smooth.

Dorsal aspect. Rostrum rounded in dorsal view, with small lateral dens. On dorsal side of prodorsum, nearly at the level of lateral dens of rostrum situated distinct, sharply pointed triangular ridge (Fig. 6). Rostral seta not evident. Lamella narrow, slightly converging anteriorly. Translamella and lamellar cusp narrow, nearly same in length. Lamellar (*le*) and interlamellar (*in*) setae thin, medium long, smooth. Bothridium (*bo*) large, completely covered by the anterior tectum of notogaster. Sensillus (*ss*) fusiform, smooth, tip elongate distally and sharply pointed. Tutorium (*tu*) relatively narrow, slightly widened in its middle part, distal end with three small teeth (Figs. 1, 6). Notogaster oval, about 1.2–1.3 times as long as wide. Anterior tectum of notogaster small, its margin nearly straight or slightly curved downwards. Pteromorpha bent downwards, line of desclerotization extending three-quarters of the length of pteromorpha. Notogastral setae short, smooth. Porose areas circular to oval; *Aa* and A_1 largest, two others small, almost same in size. Notogastral lyrifissures *im* and *ip* small, but conspicuous in dorsal view, other lyrifissures visible in lateral view. Opisthosomal gland opening (*gla*) located posterior to *im* (Fig. 1).

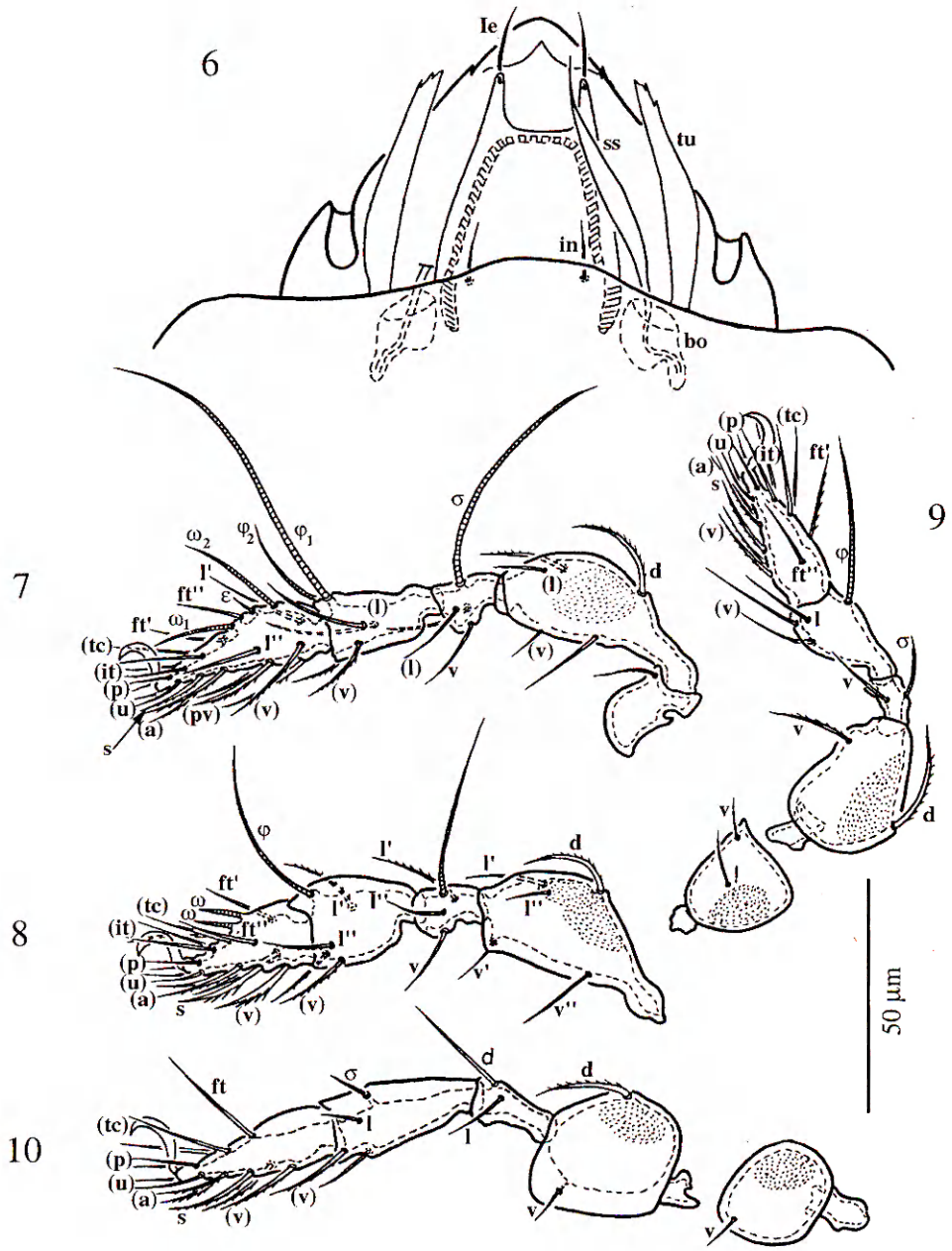
Ventral aspect. Infracapitulum with well-developed mental tectum. Hypostomal setae *a*, *h* and *m* medium long, smooth. Anteromedian margin of rutellum strongly sclerotized, with a few blunt teeth (Fig. 3). Palpal setation: 1–2–1–3–10 including solenidion ω of tarsus (Fig. 4). Digital and fixed digits of chelicera with a few. sclerotized blunt teeth; setae *cha* and *chb* conspicuously barbed (Fig. 5). Epimeral region nearly smooth. Apodemes *II*, *sj* and *III* well developed, almost parallel to each other. Epimeral setae short, smooth, setal formula: 3–1–3–3. Discidium distinctly projected distally.



Figs. 1–5. *Minunthozetes semirufus* (C. L. Koch): 1 — Dorsal aspect; 2 — Ventral aspect; 3 — Infracapitulum; 4 — Palp (left, antiaxial view); 5 — Chelicera (left, antiaxial view). Scale bar same for Figs. 1, 2 and 3–5, respectively.

Circumpedal carina well developed, reaching to lateral margin of ventral plate (Fig. 2). Anal aperture slightly longer than genital aperture. All anogenital setae smooth. Setae g_1, g_2 and g_3 inserted along anterior margin of genital plates; other setae inserted close to lateral or posterior margins. Adanal lyrifissure (*iad*) large, situated adjacent to anterolateral margin of anal aperture (Fig. 2).

Legs. Tibiae II–VI with distinct dorsodistal projections. Femur IV with large, distally rounded ventral blade. Femora II and III with small, almost indistinct ventrodistal projection. Femora I–IV and trochanters III and IV with large porose areas. Seta *l* of femur III not evident. Formula of leg setation (including famulus): I (1–5–3–4–20); II (1–5–3–4–15); III (2–2–1–3–15); IV (1–2–2–3–12); formula



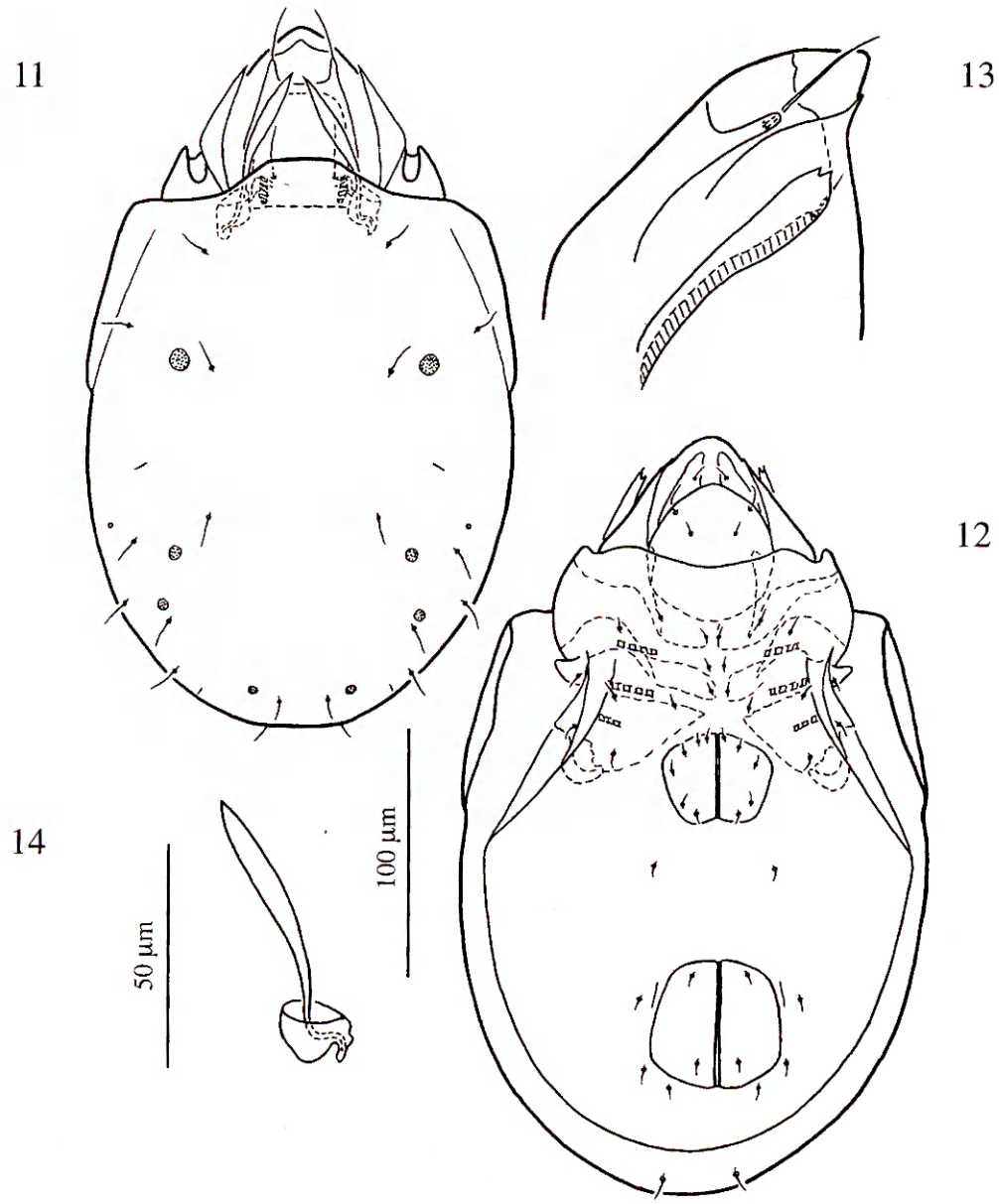
Figs. 6–10. *Minunthozetes semirufus* (C. L. Koch): 6 — Prodorsum; 7 — Leg I (left, antiaxial view); 8 — Leg II (left, antiaxial view); 9 — Leg III (right, antiaxial view); 10 — Leg IV (right, antiaxial view).

of solenidia: I (1–2–2); II (1–1–2); III (1–1–0); IV (0–1–0). Setation of legs I–IV as shown in Figs. 7–*10*.

Material examined. Nine specimens (females): Tirebolu Ozlu, soils under hedge plants, 24.01.1999; one specimen (female): Demirli, Carsamba in Black Sea coastal area of Turkey, leaf litter, 16.01.1999, coll. S. K. Ozman.

Remarks. Body size of the specimens studied is relatively smaller than that of other specimens studied by Michael [1883], Sellnick [1928], Willmann [1931], Schweizer [1956], Fieder *et al.* [1971], Pérez-Iñigo [1972], and Pavlitshenko [1994]. Body size of all European materials (larger than 280 in length and 180 in width), examined by the above authors was larger than that of the Turkish material.

Shaldybina [1975] and Pavlitshenko [1994] defined this species as being with dark, transverse stripe on the notogaster. However, we have not observed such structure in the specimens examined here. Except for this point, the certain features of the present material accord well with those of the other materials from Europe.



Figs. 11–14. *Minunthozetes pseudofusiger* (Schweizer): 11 — Dorsal aspect; 12 — Ventral aspect; 13 — Lateral aspect of prodorsum; 14 — Sensillus and bothridium. Scale bar same for Figs. 11, 12 and 13, 14, respectively.

Minunthozetes pseudofusiger (Schweizer)

Figs. 11–14.

Oribata pseudofusiger Schweizer, 1922: 59, pl. 3, fig. 25.
Punctoribates (Minunthozetes) pseudofusiger: Sellnick, 1928: 15; Willmann, 1931: 173: fig. 287;
Minunthozetes pseudofusiger: Bernini, 1969: 363; Fieder *et al.* 1971: 410, figs. 4–7; Shaldybina, 1975: 306, fig. 760; Pavlitshenko, 1994: 54, fig. 53; Pérez-Iñigo, 1993: 149, fig. 55b.

Diagnosis. Small in size (265–285 in length; 168–184 in width); rostrum rounded; rostral seta minute; lamella narrow; lamellar cusp and translamella well developed; lamellar and interlamellar setae medium long, thin, smooth; sensillus fusiform, its distal tip neither elongated nor sharply pointed; tutorium relatively wide, distinctly widened in its middle part, nearly elongate triangular in dorsal view, distal end with two or three small teeth; notogastral setae moderately long.

Measurements. Twelve specimens were measured: body length 265–285 (274); width of notogaster 158–184 (170); length of notogaster 214–229 (221).

Integument. Body color yellowish-brown. With thin cerotegument, roughened by minute granules. Lateral region of podosoma relatively large, dense granules. Integument nearly smooth.

Dorsal aspect. Rostrum rounded in dorsal view, with very small lateral dens. On dorsal side of

prodorsum, nearly at the level of lateral dens of rostrum situated distinct, sharply pointed triangular ridge. Rostral seta minute, but well visible in lateral view (Fig. 13). Lamella narrow, slightly converging anteriorly. Translamella and lamellar cusp narrow; translamella slightly longer than cusp. Lamellar and interlamellar setae thin, moderately long, smooth. Bothridium large, completely covered by the anterior tectum of notogaster. Sensillus fusiform, smooth, its head neither elongated nor sharply pointed, but normal (Fig. 14). Tutorium relatively wide, distinctly widened in its middle part, nearly elongate triangular in dorsal view, distal end with two or three small teeth (Figs. 11, 13). Notogaster oval, about 1.3 times as long as wide. Anterior tectum of notogaster small, its margin nearly straight. Pteromorpha bent downwards, line of desclerotization extending three-quarters of length of pteromorpha. Notogastral setae moderately long, thin, smooth. Porose areas circular to oval; *Aa* largest, three others much smaller in size. Notogastral lyrifissures *im* and *ip* small, but conspicuous in dorsal view, other lyrifissures visible in lateral view. Opisthosomal gland opening located posterolaterad of *im* in relatively far distance (Fig. 11).

Ventral aspect. Infracapitulum normal; hypostomal setae *a*, *h* and *m* medium long, smooth. Structure and setation of palp and chelicera similar to those of the former species. Epimeral and anogenital region smooth, all setae short, smooth. Discidium distinctly projected distally (Fig. 12).

Legs. Structure and setation of legs similar to those of the former species.

Material examined. Eight specimens (four females and five males): Tirebolu Ozlu, soils under hedge plants, 24.01.1999; six specimens (two females and three males): Piraziz, Giresun in Black Sea coastal area of Turkey, soils under hazel orchards and hedge plants, 19.03.1999, coll. S. K. Ozman.

Remarks. Certain character states of the specimens examined here correspond well with those of other specimens from the Europe studied by Schweizer [1922], Sellnick [1928], Willmann [1931], Fieder *et al.* [1971], Shaldybina [1975], and Pavlitshenko [1994]. This species is very similar to *M. semirufus* (C. L. Koch), and even their body size is almost the same. The main difference between these two species is the distally elongated and sharply pointed sensilli in *M. semirufus* as opposed to the normally fusiform (not elongated) sensilli in *M. pseudofusiger*. In spite of this principal difference, there are some additional characters, which can also distinguish them. These are moderately long lamellar, interlamellar and notogastral setae in *M. pseudofusiger* as opposed to the relatively short setae in *M. semirufus*; presence of minute, but distinct rostral setae in *M. pseudofusiger* as opposed to the absence of setae *ro* in the other species, and the shape of tutoria, which are distinctly widened medially in *M. pseudofusiger* compared to relatively narrow tutoria in *M. semirufus* (as seen in dorsal view).

Punctoribates punctum (C. L. Koch)

Figs. 15–20.

Oribates punctum C. L. Koch, 1839: vol. 30(22); Berlese, 1886: vol. 30(2).

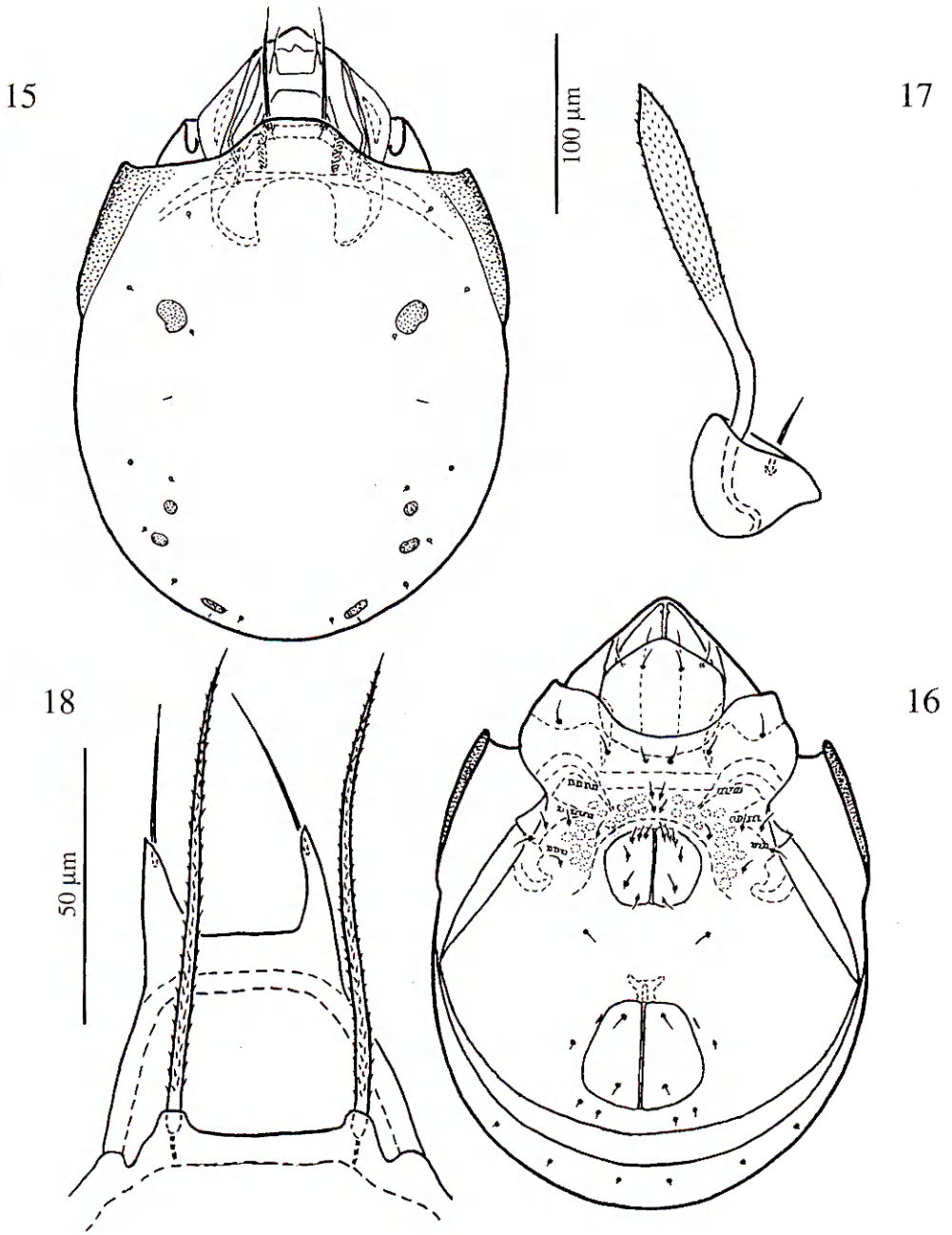
Punctoribates punctum: Berlese, 1908: 6; 1913: 185, fig. 11–31; Sellnick, 1928: 15, fig. 25; Willmann, 1931: 173, fig. 285; Hammen, 1952: 101; Schweizer, 1956: 320, fig. 274; Shaldybina, 1965c: 1565, figs. 1–4; 1975: 310, fig. 772; Hammer, 1967: 30, fig. 37; Pérez-Iñigo, 1972: 306; 1993: 153, fig. 56c; Marshall *et al.* 1987: 306; Pavlitshenko, 1994: 55, fig. 54.

Diagnosis. Medium in size (321–331 in length; 229–250 in width); rostrum rounded; rostral seta reduced, not evident; lamella narrow; lamellar cusp short; translamella wide; lamellar seta medium long, smooth; interlamellar seta long, thick, barbed; sensillus smooth, fusiform; tutorium relatively wide, distinctly widened in its middle part, nearly elongate triangular in dorsal view, distal end without tooth; notogastral setae represented by microsetae; pteromorpha densely punctate.

Measurements. Six specimens were measured: body length 321–331 (326); width of notogaster 229–250 (240); length of notogaster 265–275 (270).

Integument. Body color deep reddish-brown. With thin cerotegument, roughened by minute granules. Lateral region of podosoma with small, but distinct granules. Anterolateral part of notogaster and pteromorpha punctate.

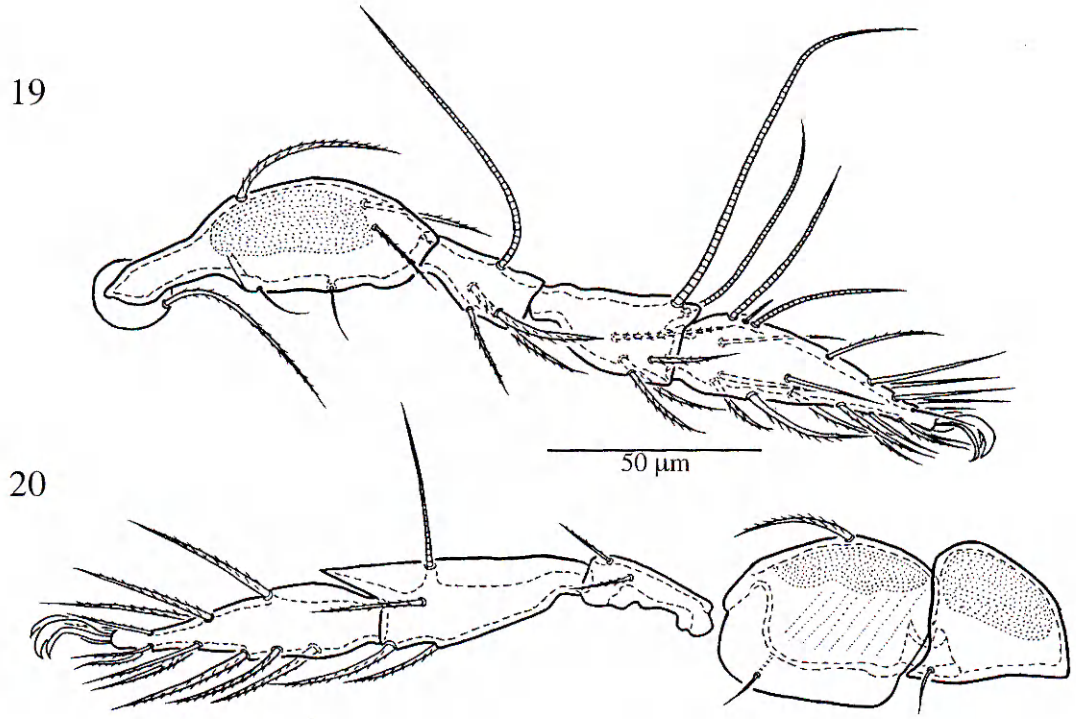
Dorsal aspect. Rostrum rounded in dorsal view. On dorsal side of prodorsum, at the level a little anterior to the distal end of lamellar cusp situated sharply pointed triangular ridge (Fig. 15). Rostral seta not evident. Lamella narrow, slightly converging anteriorly; lamellar cusp narrow, pointed distally. Translamella very wide. Lamellar seta thin, smooth, moderately long. Interlamellar seta long, thick, barbed, extending beyond tip of rostrum (Fig. 18). Bothridium large, completely covered by the anterior tectum of notogaster. Sensillus fusiform, smooth, its distal tip neither elongated nor sharply pointed, but normal (Fig. 17). Tutorium



Figs. 15–18. *Punctoribates punctum* (C. L. Koch: 15 — Dorsal aspect; 16 — Ventral aspect; 17 — Sensillus and bothridium; 18 — Lamellae and interlamellar setae. Scale bar same for Figs. 15, 16 and 17, 18, respectively.

relatively wide, distinctly widened in its middle part, nearly elongate triangular in dorsal view, distal end with no tooth. Notogaster oval, about 1.1–1.2 times as long as wide. Anterior tectum of notogaster moderate in size, its margin nearly straight. Pteromorpha bent downwards, line of desclerotization extending three-quarters of length of pteromorpha. Notogastral setae represented by microsetae, hardly visible only under high magnification (×1000), but in some specimens only setal alveoli observable. Porose area A_i nearly circular, others oval or elongate oval; *Aa* largest. Notogastral lyrifissures *im* and *ip* conspicuous in dorsal view, other lyrifissures visible in lateral view. Opisthosomal gland opening located posterolaterad of *im* in rather far distance (Fig. 15).

Ventral aspect. Infracapitulum normal; hypostomal setae *a*, *h* and *m* medium long, smooth. Structure and setation of palp and chelicera similar to those of *P. angulatus* as illustrated by Bayartogtokh *et al.* [2000], but trochanter of palp with no seta. Epimeral and ano-genital region normal, all setae short, smooth. Discidium relatively short, but well projected laterally. Circumpedal carina well



Figs. 19, 20. *Punctoribates punctum* (C. L. Koch): 19 — Leg I (right, antiaxial aspect); 20 — Leg IV (right, antiaxial aspect).

developed, reaching to lateral margin of ventral plate (Fig. 16).

Legs. Tibia I with small, but distinct dorsodistal projection (Fig. 19). Tibiae II–IV with strong dorsodistal projections. Trochanter IV with well developed ventrodistal projection; femur IV with complete ventral blade (Fig. 20). Formula of leg setation (including famulus): I (1–5–3–4–19); II (1–5–3–4–15); III (2–3–1–3–15); IV (1–2–2–3–12); formula of solenidia: I (1–2–2); II (1–1–2); III (1–1–0); IV (0–1–0).

Material examined. Two specimens (one female and one male): Demirli, Carsamba, leaf litter under hazel orchards, 16.01.1999; two specimens (two females): Unye, soils under hazel orchards and hedge plants, 2.04.1999; two specimens (two males): Demirli, Carsamba in Black Sea coastal area of Turkey, leaf litter of hazel orchads, 19.03.1999, coll. S. K. Ozman.

Remarks. Certain characters of the specimens studied here are well in accord with those of the European material examined by Berlese [1913], Shaldybina [1975], Pavlitshenko [1994]. However, the New Zealand material, studied by Hammer [1967] is different not only from our material, but also from others in the very narrow lamellae and translamella, smooth interlamellar setae and elongate oval porose area *Aa*. The Spanish material, studied by Pérez-Iñigo [1993] is differ from the present material in the extremely widely separated lamellae; very long and narrow translamella; very short and almost indistinct lamellar cusps; much shorter lamellar and interlamellar setae; very large, lanceolate sensilli; presence of relatively long notogastral setae, and indistinct anterior notogastral tectum. Some taxonomic problems of this species discussed recently by Bayartogtokh *et al.* [2000].

Family Ceratozetidae Jacot, 1925

Ceratozetes mediocris Berlese

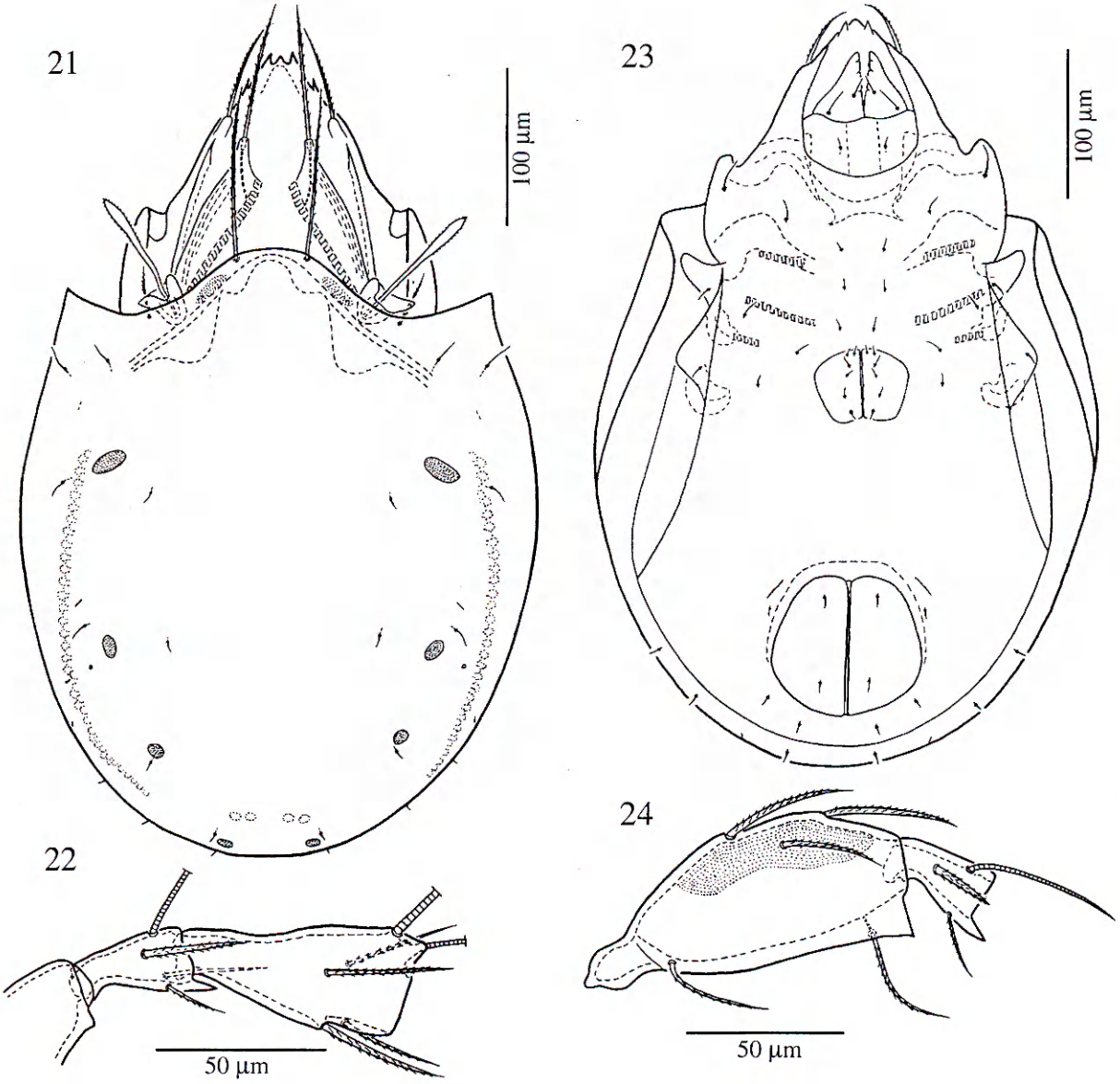
Fig. 21–24.

Ceratozetes mediocris Berlese, 1908: 4.

Ceratozetes mediocris: Sellnick, 1928: 13; 1960: 65; Willmann, 1931: 164, figs. 254, 255; Caroli et Maffia, 1934: 2, figs. 1–4; Hammen, 1952: 95, fig. 7o; Menke, 1966: 371, figs. 12; Hammer, 1967: 21, fig. 27; Shaldybina, 1967c: 692, figs. 1–6; 1975: 297, fig. 723; Aoki, 1970: 437, figs. 101–104; Fujikawa, 1972: 165, fig. 59; Pérez-Iñigo, 1972: 282, figs. 27, 28; 1993: 199, figs. 3, 4; Behan-Pelletier, 1984: 1464, figs. 11–19; Pavlitshenko, 1994: 38, fig. 37.

Ceratozetes campestris Mihelcic, 1956: 207, fig. 4.

Diagnosis. Medium to large in size (495–515 in length; 306–331 in width); rostrum with indentation, paired lateral teeth slightly larger than median tip; rostral seta inserted dorsally on a distinct tubercle; lamella wide, not reaching to the level of insertion of rostral seta; lamellar cusp short, pro-



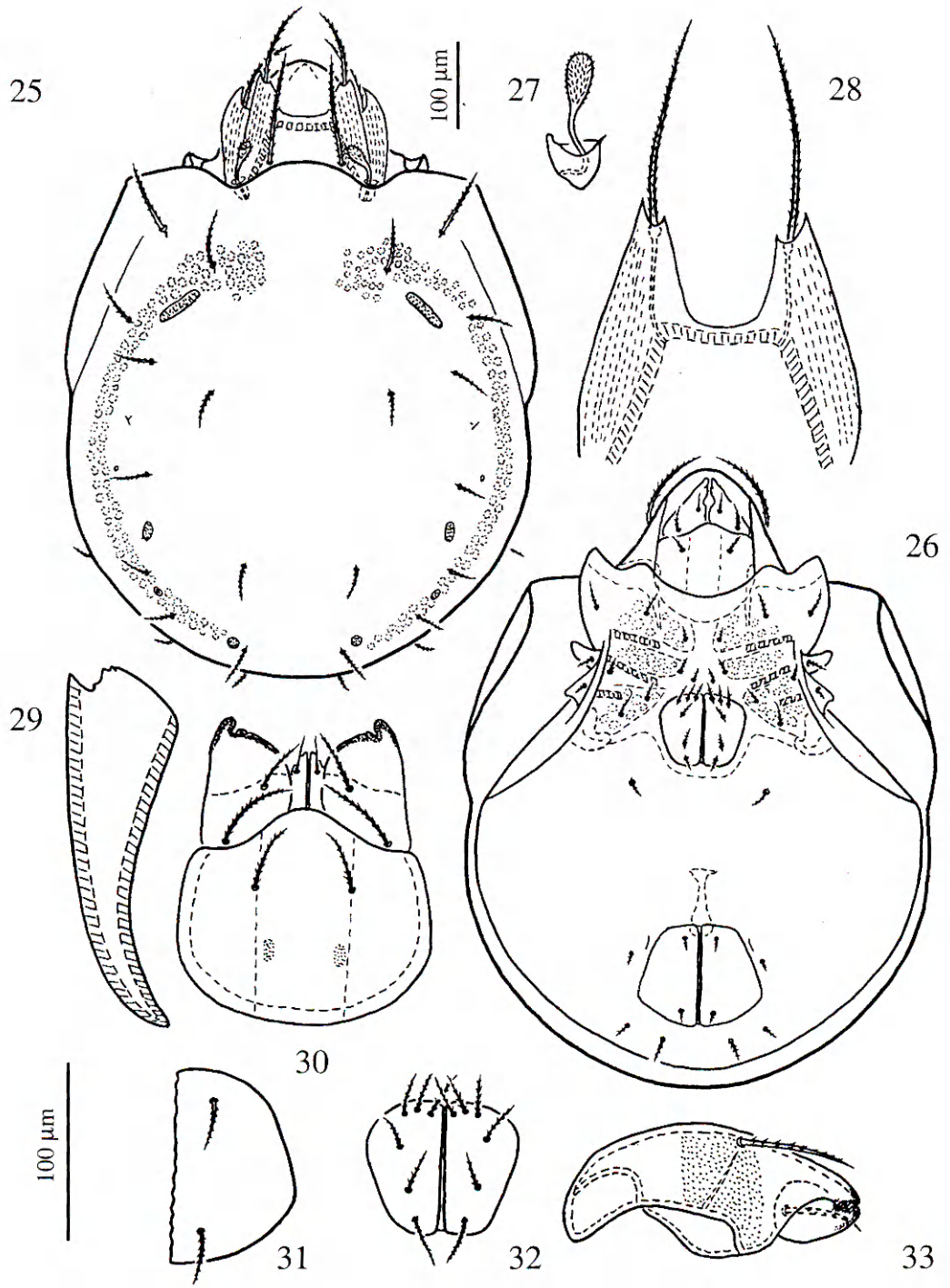
Figs. 21–24. *Ceratozetes mediocris* Berlese: 21 — Dorsal aspect; 22 — Distal part of femur, genu and tibia I (right, antiaxial aspect); 23 — Ventral aspect; 24 — Leg II (right, antiaxial aspect).

jected distally; translamella absent; sensillus with slightly expanded, bilaterally barbed head; tutorium narrow, short, nearly as long as lamella; notogastral setae short, thin, smooth.

Measurements. Seven specimens were measured: body length 495–515 (505); width of notogaster 306–331 (318); length of notogaster 372–408 (395).

Integument. Body color reddish-brown. With thin cerotegument, roughened by minute granules. Lateral region of podosoma with more large granules. Integument nearly smooth.

Dorsal aspect. Rostrum with indentations; paired lateral teeth slightly larger than median tip. Rostral seta barbed, inserted dorsally on distinct tubercle. Lamella wide, but relatively short, not reaching to the level of insertion of rostral seta, laterally with longitudinal striations. Lamellar cusp short, wide at base, but strongly projected distally; translamella absent. Lamellar seta longer than *ro*, barbed. Interlamellar seta long, barbed, extending beyond insertion of *ro*. Sensillus short, with slightly expanded, bilaterally barbed head. Bothridium large, partly concealed under notogaster. Exobothridial seta nearly half as long as *ro*, barbed. Tutorium narrow, short, nearly as long as lamella. Porose area *Aj* oval. Notogaster about 1.2 times as long as wide; anteromedian margin strongly arched. Pteromorpha slightly bent downwards. Notogastral setae short, thin, smooth. Porose are-



Figs. 25–33. *Diapterobates humeralis* (Hermann): 25 — Dorsal aspect; 26 — Ventral aspect; 27 — Sensillus and bothridium; 28 — Lamellae; 29 — Tutorium; 30 — Infracapitulum; 31 — Anal plate; 32 — Genital plate; 33 — Chelicera (left, paraxial aspect). Scale bar same for Figs. 25, 26 and 27–33, respectively.

as oval; lyrifissures small, some of them visible only in lateral view. Opisthosomal gland opening located posterolaterad of porose area A_1 (Fig. 21).

Ventral aspect. Hypostomal setae *a*, *h* and *m* thin, smooth. Epimeral setae thin, smooth; seta *1c* much longer and thicker than other setae. Anogenital setae short, smooth. Discidium relatively wide, rounded distally. Circumpedal carina long (Fig. 23).

Legs. Genua I and II with strong ventrodistal projections. Femur II with distinct ventral blade and strongly pointed ventrodistally. Femur I with small, blunt ventrodistal projection (Figs. 22, 24). Setation of legs same as shown by Menke [1966] and Behan-Pelletier [1984].

Material examined. 4 females and 3 males: Persembe in Black Sea coastal area of Turkey, soils under hedge plants, 2.04.1999, coll. S. K. Ozman.

Remarks. The body size of the specimens studied here was far larger than that of the European and North American ones examined by Menke [1966], Pérez-Iñigo [1972], Behan-Pelletier [1984], and Pavlitshenko [1994]. Except for this point, the certain characters of Turkish specimens correspond well to those of the other specimens.

***Diapterobates humeralis* (Hermann)**

Figs. 25–33.

Notaspis humeralis Hermann, 1804: 94, pl. 4, fig. 5.

Sphaerozetes (Trichoribates) numerosus Sellnick, 1924: 67, figs. 2–5.

Murcia numerosa: Sellnick, 1928: 11.

Humerobates humeralis: Sellnick, 1928: 11, fig. 13

Trichoribates numerosus: Willmann, 1931: 169, fig. 274; Schweizer, 1956: 325, fig. 281.

Diapterobates humeralis: Grandjean, 1936: 77, fig. 8b; Hammen, 1952: 101; Sellnick, 1960: 62; Tarras-Wahlberg 1960: 91, figs. 1–12; Shaldybina, 1965: 59, figs. 1–10; 1975: 288, fig. 692; Pérez-Iñigo, 1972: 297, fig. 39; 1993: 178, figs. 65b, c; Aoki 1982: 197, figs. 43–46; Mahunka 1985: 199, figs. 7–11; Behan-Pelletier, 1986: 1003: figs. 6–9; Pavlitshenko, 1994: 32, fig. 24.

Diagnosis. Large species (687–697 in length; 515–525 in width); rostrum evenly rounded; rostral and lamellar setae approximately same in length, barbed; lamella wide, with broad translamella; lamellar cusp with strong lateral and small inner teeth; sensillus short, with barbed, clavate head; tutorium broad, distally dentate, nearly as long as lamella; notogastral seta c_2 longer than others; porose area *Aa* elongate oval; adanal seta ad_1 longer and thicker than others.

Measurements. Three specimens were measured: body length 687–697 (692); width of notogaster 515–525 (520); length of notogaster 566–576 (571).

Integument. Body color dark brown. With thick cerotegument, roughened by small granules. Faintly microtuberculate on prodorsum, notogaster, ventral plate and leg segments.

Dorsal aspect. Rostrum broadly rounded. Rostral and lamellar setae nearly same in length, barbed. Lamella wide, with longitudinal striations; translamella wide; lamellar cusp with strong lateral and small inner teeth (Fig. 28). Interlamellar seta slightly longer than *ro* and *le*, barbed. Sensillus short, with barbed, clavate head. Bothridium small, mostly concealed under notogaster (Fig. 27). Tutorium broad, distally dentate, nearly as long as lamella (Fig. 29). Notogaster about 1.1× as long as wide; pteromorpha slightly bent downwards; line of desclerotization on posterior two-thirds. Notogastral setae medium long, barbed; c_2 distinctly longer than other setae. Porose area *Aa* narrowly elongate oval, other porose areas oval to round. Lyrifissures and opisthosomal gland opening small (Fig. 25).

Ventral aspect. Hypostomal setae *a*, *h* and *m* long, barbed (Fig. 30). Chelicera normal, setae *cha* and *chb* barbed, porose area large (Fig. 33). Epimeral and ano-genital setae short, barbed, seta ad_1 slightly longer and thicker than other setae. Discidium relatively small, slightly projected distally; circumpedal carina long, reaching anteriorly to the level of apodeme II (Fig. 26).

Legs. Setation of legs same as shown by Shaldybina [1965], Behan-Pelletier [1986].

Material examined. Three specimens (two females and one male): Demirli Carsamba in Black Sea coastal area of Turkey, leaf litter under hazel orchards, 16.01.1999, coll. S. K. Ozman.

Remarks. Certain characters of the specimens studied here well correspond to those of the other specimens from Europe and North America.

***Trichoribates novus* (Sellnick)**

Figs. 34–41.

Murcia nova Sellnick 1928: 11.

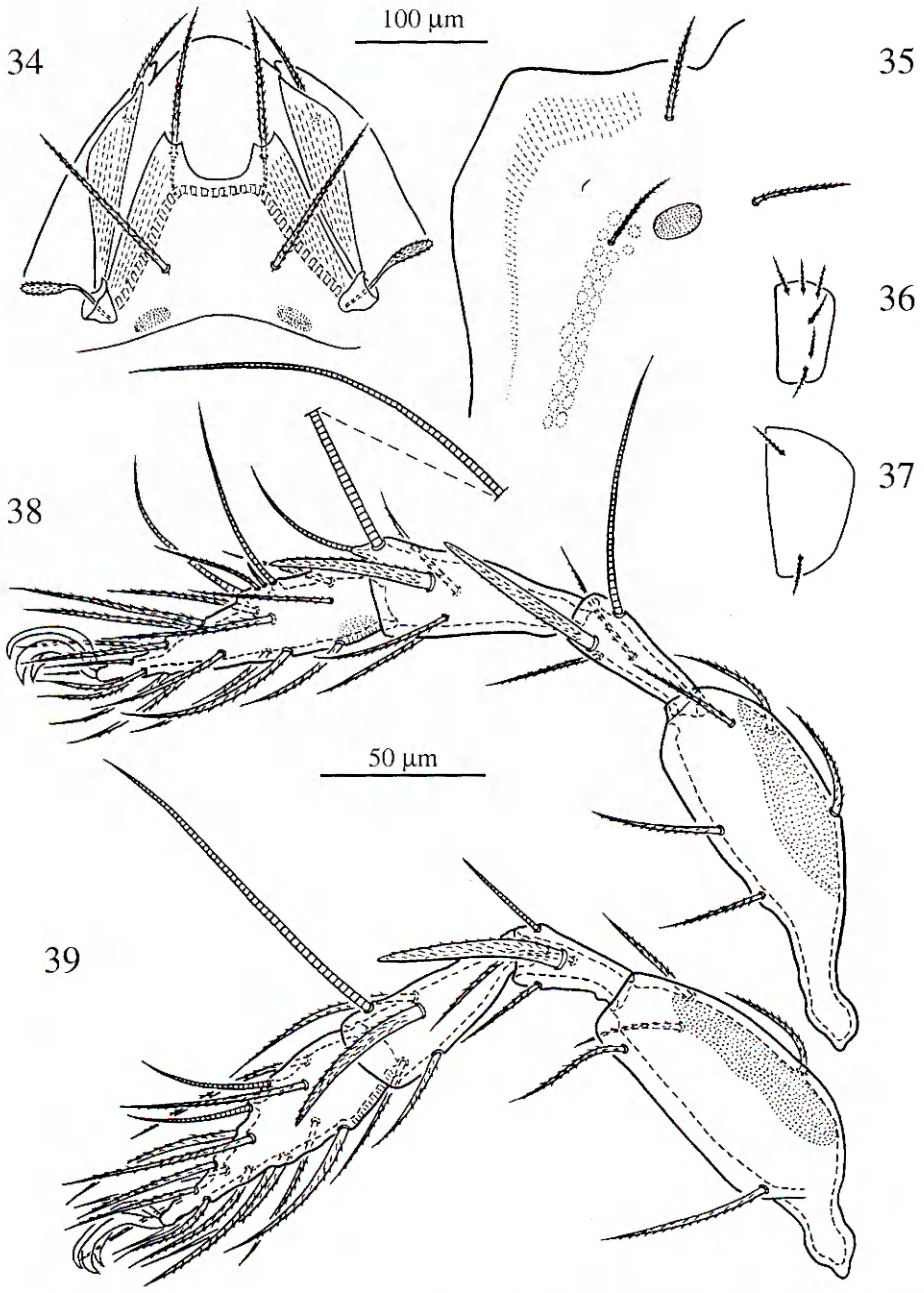
Trichoribates novus: Willmann 1931: 170, fig. 275; Hammen 1952: 100; Schweizer 1956: 326, fig. 285; Shaldybina, 1975: 292, fig. 708; Pérez-Iñigo, 1993: 180; Pavlitshenko 1994: 31, fig. 22.

Diagnosis. Rostrum rounded; rostral, lamellar and interlamellar setae heavily barbed; lamella wide, with broad translamella; lamellar cusp with strong lateral and small inner teeth; sensillus short, with barbed, slightly clavate head; tutorium broad, distally pointed; notogastral setae long, strongly barbed; porose areas oval; all ventral setae barbed; setae *v'* of tibia III, *l''* of genua I–IV and tibiae I, II, IV very thick, much thicker than other setae.

Measurements. Since the single specimen was damaged, only the measurements of part of body and some setae are made: length of rostral seta 109; lamellar seta 104; interlamellar seta 137; notogastral setae 58–73; exposed portion of sensillus 63; length of lamella 139; length of tutorium 157; length of genital plate 76; length of anal plate 111.

Integument. Body color deep reddish brown. With thick cerotegument, roughened by small granules. Faintly microtuberculate on prodorsum, notogaster, ventral plate, leg segments and infracapitular mentum.

Dorsal aspect. Rostrum rounded. Rostral, lamellar and interlamellar setae heavily barbed. Lamella wide, with longitudinal striations; transla-



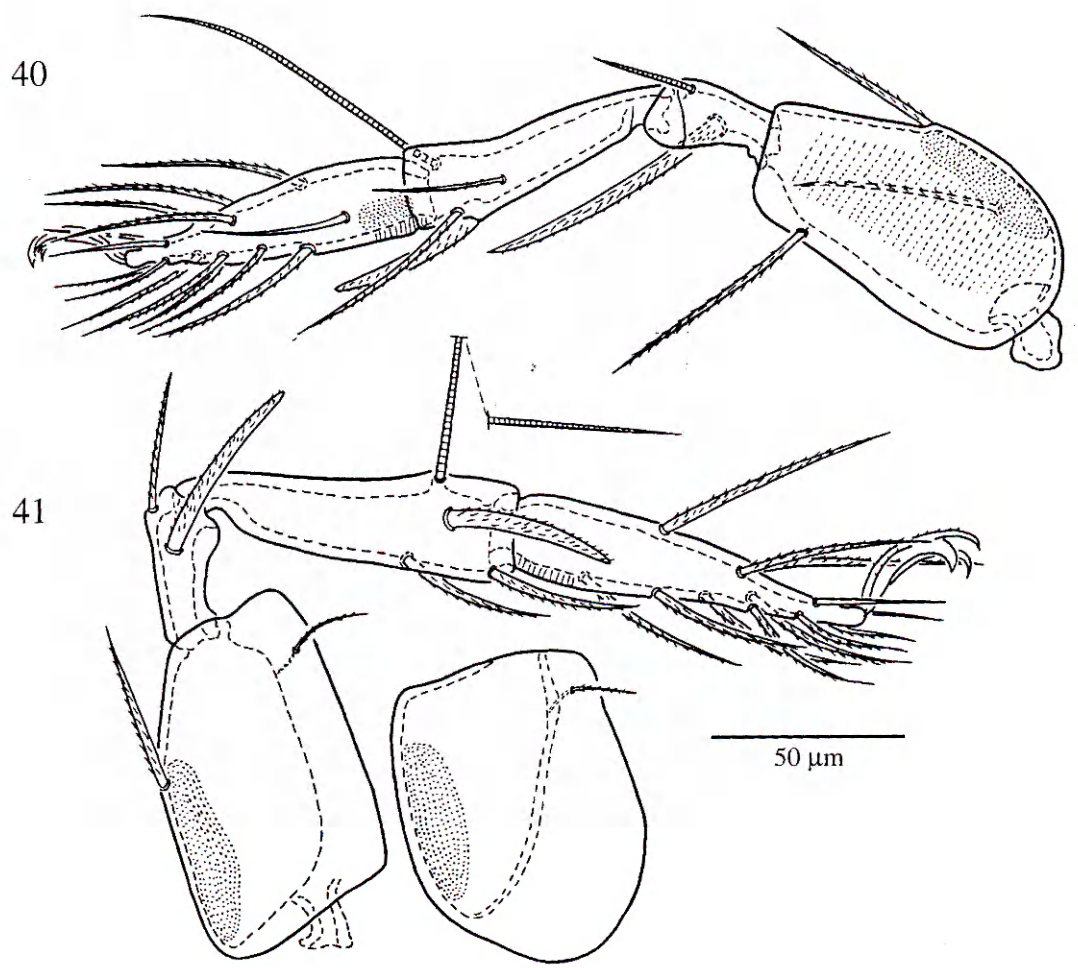
Figs. 34–39. *Trichoribates novus* (Sellnick): 34 — Prodorsum (flattened); 35 — Pteromorpha (left, flattened); 36 — Genital plate; 37 — Anal plate; 38 — Leg I (left, antiaxial aspect); 39 — Leg II (left, antiaxial aspect). Scale bar same for Figs. 34–37 and 38, 39, respectively.

mella wide; lamellar cusp with strong lateral and small inner teeth. Sensillus short, with slightly clavate, barbed, head. Bothridium small. Tutorium broad, distally pointed, with longitudinal striations. (Fig. 34). Pteromorpha with faint striations. Notogastral setae barbed, similar in length to one another. Porose areas oval to round (Fig. 35).

Ventral aspect. All ventral setae barbed, epimeral setae *1c* much longer and thicker than others. Anal and genital setae nearly same in length (Figs 36, 37). Discidium relatively small, slightly projected distally; circumpedal carina long; custodium well developed, extending anteriorly beyond the level of apodeme I.

Legs. Tarsi I–IV with small ventral porose areas; femora I–IV, trochanters III and IV with large dorsal porose areas; femur III with distinct striations. Lateral setae *l''* of genua I–IV and tibiae II and IV, ventral seta *v''* of tibia III very thick, much thicker than other setae. Structure and setation of legs I–IV as shown Figs. 38–41.

Material examined. One female: Demirli, Carsamba in Black Sea coastal area of Turkey, leaf litter under hazel orchards, 16.01.1999, coll. S. K. Ozman.



Figs. 40, 41. *Trichoribates novus* (Sellnick): 40 — Leg III (left, paraxial aspect); 41 — Leg IV (left, antiaxial aspect).

Remarks. Certain character states of the examined specimen are well accords with those of the specimens studied by Shaldybina [1975] and Pavlitsheko [1994]. This species is very similar to *T. trimaculatus* (C. L. Koch) in most characters, but differs in the slender, less swollen head of sensilli as opposed to the more strongly clavated sensilli in *T. trimaculatus*; presence of strongly developed lateral and poorly developed inner teeth of lamellar cusps as opposed to the approximately same sized teeth in *T. trimaculatus*; relatively long notogastral setae, and different body size.

***Vicinebates sergienkoae* Pavlitshenko**

Figs. 42–47.

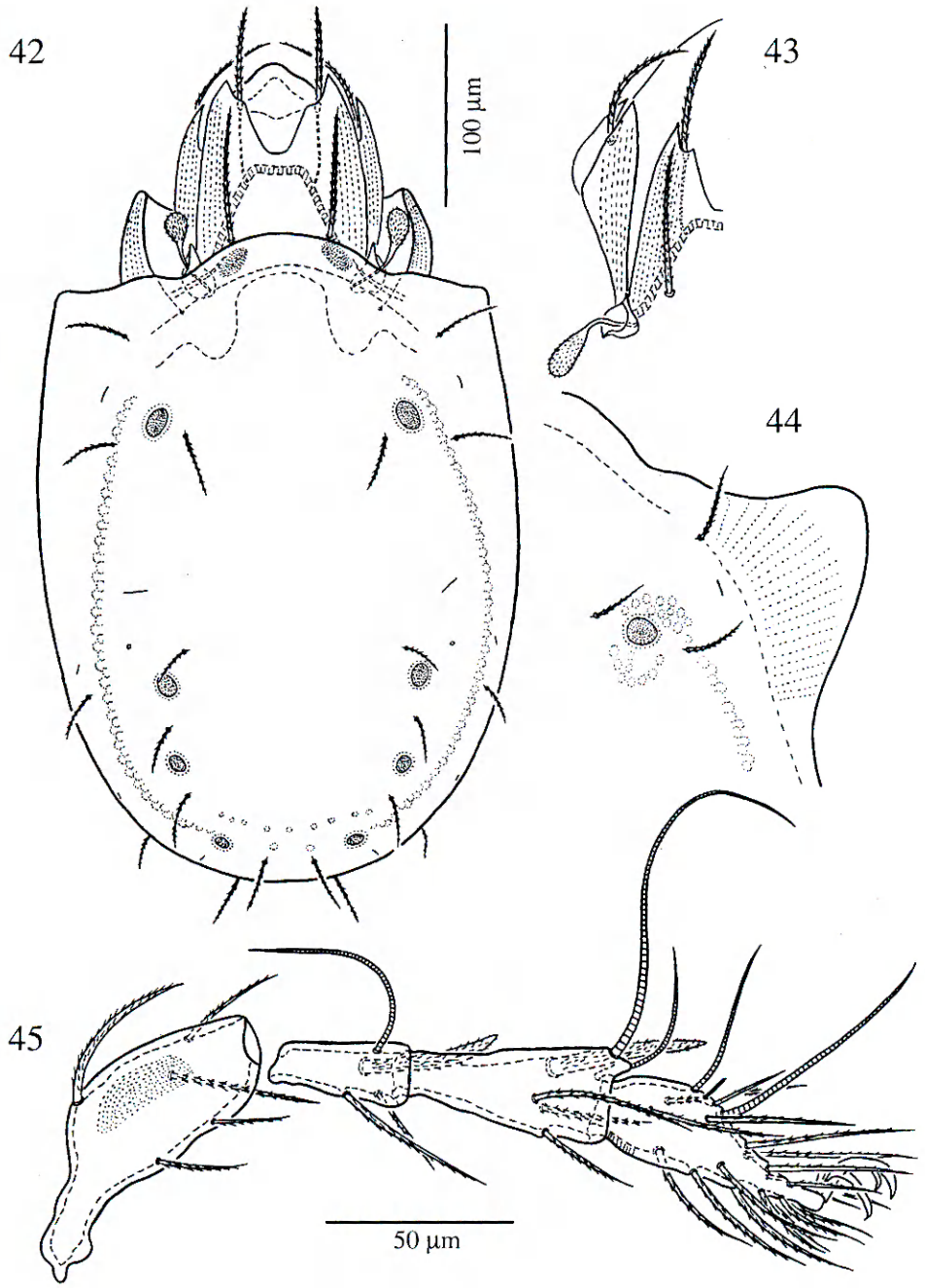
Vicinebates sergienkoae Pavlitshenko, 1991: 38, figs. 1, 2; 1994: 28, fig. 19.

Diagnosis. Rostrum rounded; rostral, lamellar and interlamellar setae heavily barbed; lamella very wide, with broad translamella; lamellar cusp with strong lateral tooth, inner tooth absent or poorly developed; sensillus short, with barbed, clavate head; tutorium elongate triangular, narrowed proximally and pointed distally; notogastral seta long, strongly barbed; porose areas oval; anal and adanal setae thick, barbed, other ventral setae thin, smooth; setae *l''* of genua I–IV and tibiae I–IV very thick, much thicker than other setae.

Measurements. Five specimens were measured: body length 469–482 (476); width of notogaster 265–276 (271); length of notogaster 367–378 (374).

Integument. Body color reddish brown. With thick cerotegument, roughened by minute granules. Faintly microtuberculate on prodorsum, ventral plate, leg segments and infracapitular mentum.

Dorsal aspect. Rostrum rounded. Rostral, lamellar and interlamellar setae similar in length, heavily barbed. Lamella very wide, with longitudinal striations; translamella short, wide; lamellar cusp with strong lateral tooth; inner tooth absent or poorly developed (Figs. 42, 43). Sensillus short, with clavate, barbed head. Bothridium partly covered by anterior margin of notogaster. Exobothridial seta thin, smooth. Tutorium elongate triangular,



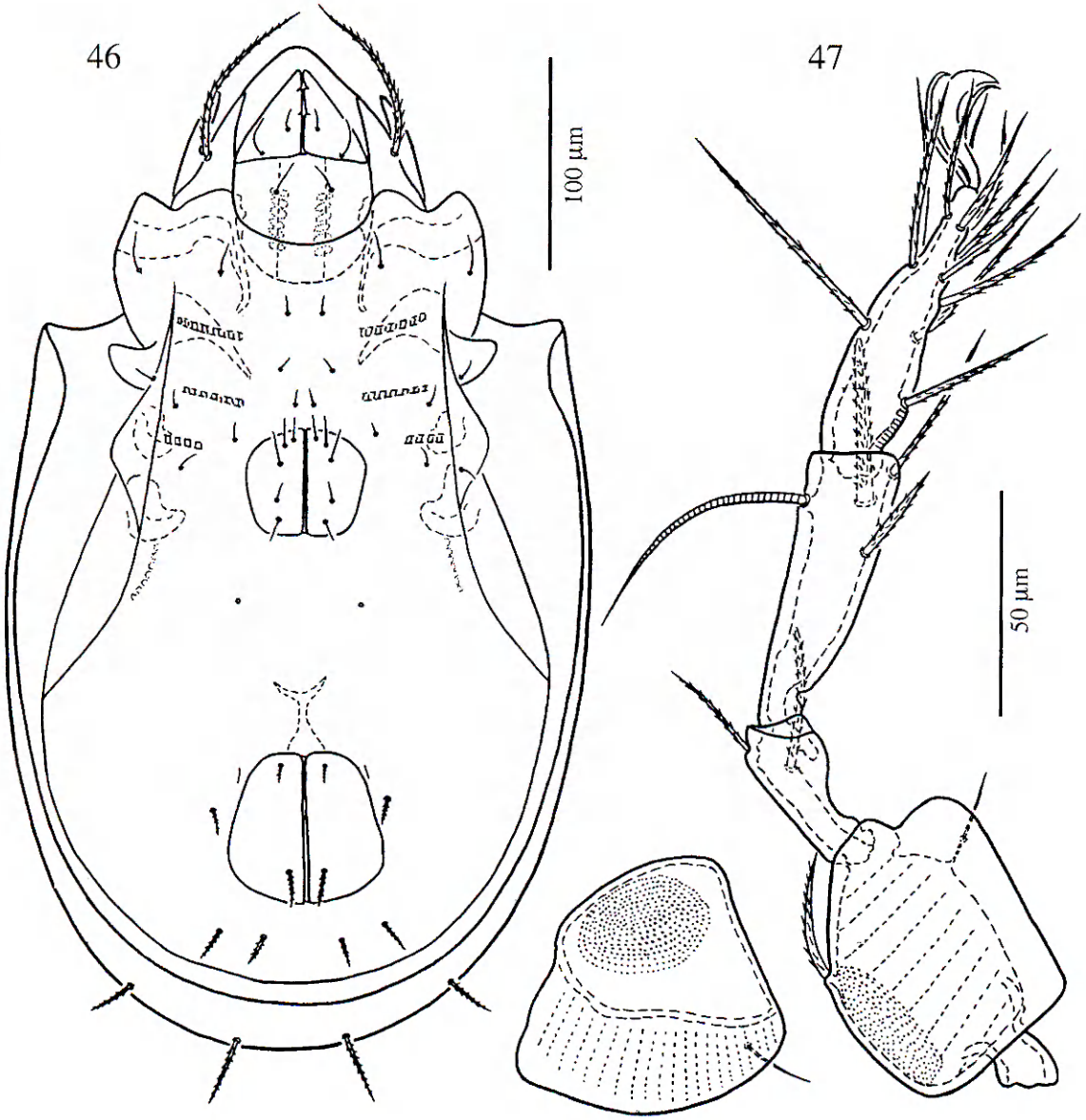
Figs. 42–45. *Vicinebates sergienkoae* Pavlitshenko: 42 — Dorsal aspect; 43 — Part of prodorsum (left, flattened); 44 — Pteromorpha (left, flattened); 45 — Leg I (left, paraxial aspect). Scale bar same for Figs. 42–44.

with longitudinal striations, distally pointed and narrowed proximally (Figs. 42, 43). Pedotectum I with striations dorsally. Notogastral setae barbed, similar in length to one another. Notogastral porose areas oval to round, lyrifissures and opisthosomal gland opening arranged as shown in Figs. 42, 44.

Ventral aspect. Hypostomal, epimeral and genital setae medium long, smooth. Anal and adanal setae thicker than others, barbed. Discidium well developed, rounded distally; circumpedal carina long; custodium extending anteriorly beyond the level of apodeme I (Fig. 46).

Legs. Tarsi I–IV with small ventral porose areas; femora I–IV, trochanter III and IV with large dorsal porose areas; femur and trochanter IV with distinct striations. Lateral setae *l''* of genua I–IV and tibiae I–IV very thick, much thicker than other setae. Structure and setation of legs I and IV as shown Figs. 45, 47.

Material examined. One female: Demirli Carsamba, leaf litter of hazel orchards, 16.01.1999; one specimen (male): Gelemen, soils under hedge plants, 16.01.1999; three specimens (one female and two males): Gelikli, Dikbiyik in Black Sea

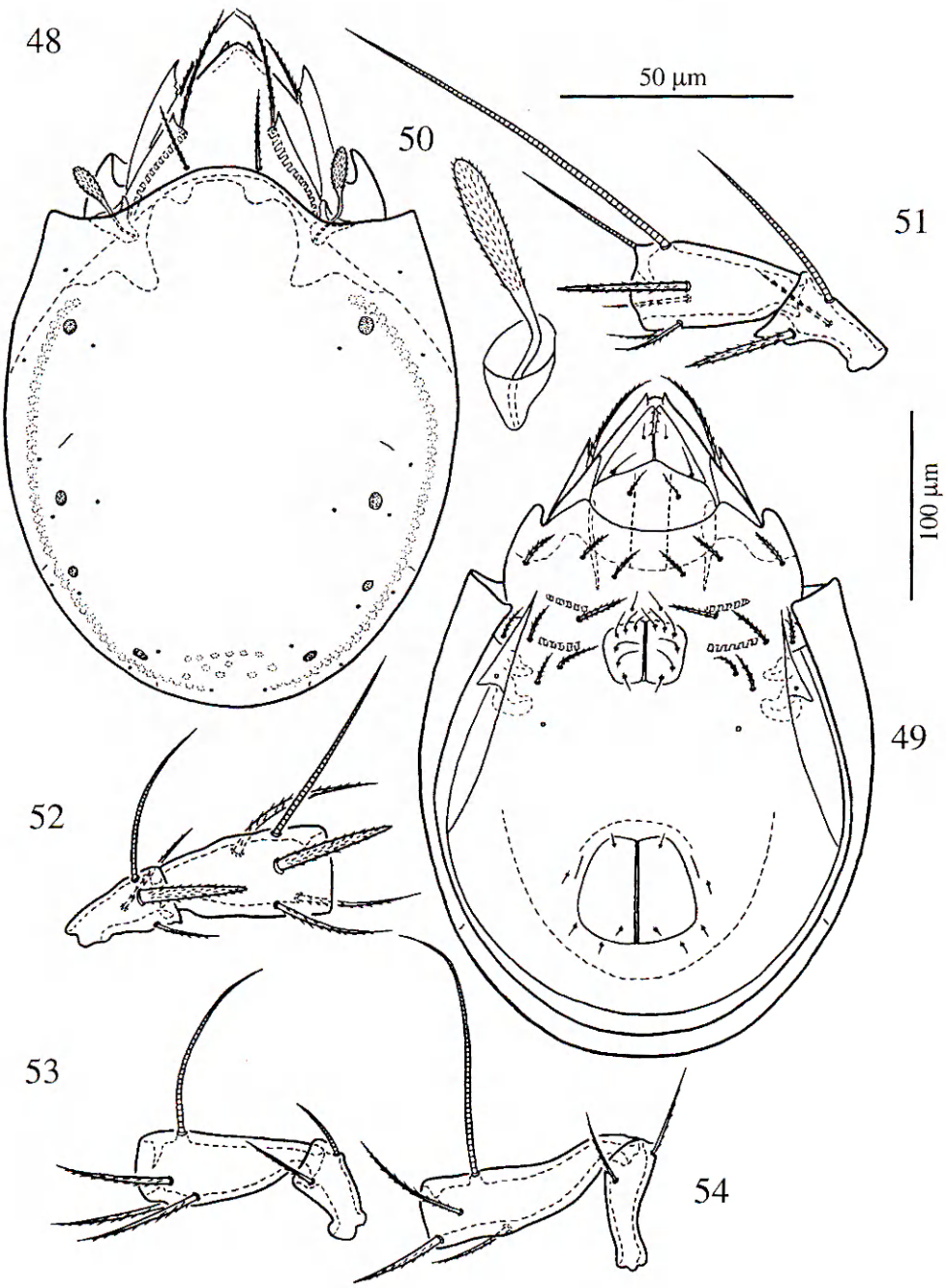


Figs. 46, 47. *Vicinebates sergienkoae* Pavlitshenko: 46 — Ventral aspect; 47 — Leg IV (right, paraxial aspect).

coastal area of Turkey, leaf litter under hedge plants, 16.01.1999, coll. S. K. Ozman.

Remarks. Pavlitshenko [1991, 1994] stated that rostrum of this species being with dorsomedian projection, but the specimens examined by us do not show such structure. Other characters are well accord with those of the Ukrainian material.

Behan-Pelletier [2000] discussed the taxonomic problem of the genus *Latilamellobates* Shaldybina, and she considered that the status of this genus is problematic judging to the discrepancies in the previous literature data. The generic status of *Vicinebates* Pavlitshenko might be questioned also, since it is very similar to *Latilamellobates*. Only a single principal difference between them is presence of five pairs of genital setae in *Vicinebates* instead of four pairs in *Latilamellobates*. However, various authors were differently defined the latter genus. For instance, Shaldybina [1971, 1975] defined the genus *Latilamellobates* as being with four pairs of genital setae, and designated *Oribata incisella* Kramer as type species. However, Balogh and Balogh [1992] considered that this genus has five pairs of genital setae. In the meantime, Pérez-Iñigo [1993] included in *Latilamellatus* the species, which have different numbers (four, five or six pairs) of genital setae. He redescribed the type species, *L. incisellus* as having five pairs of genital setae, but he included it in the group of species, which have six pairs of genital setae in the identification key. The type species, *L. incisellus* is found in Mongolia and examined the senior author. It has



Figs. 48–54. *Xiphobates sergienkoae* (Shaldybina): 48 — Dorsal aspect; 49 — Ventral aspect; 50 — Sensillus and bothridium; 51 — Genu and tibia I (left, antiaxial aspect); 52 — Genu and tibia II (right, antiaxial aspect); 53 — Genu and tibia III (right, antiaxial aspect); 54 — Genu and tibia IV (right, antiaxial aspect). Scale bar same for Figs. 48, 49 and 50–54, respectively.

only four pairs of genital setae and no variation (even asymmetrical) in the number of genital setae. We suppose that the three closely related genera, *Trichoribates*, *Latilamellobates* and *Vicinebates* might be different from each other in the number of genital setae, which is important character at the generic level. Further studies are necessary to show whether these are independent genera.

Family Chamobatidae Grandjean, 1954

Xiphobates sergienkoae (Shaldybina)

Figs. 48–54.

Chamobates sergienkoae Shaldybina, 1980: 21, figs. 1, 3.
Xiphobates sergienkoae: Pavlitshenko, 1994: 65, fig. 79.

Diagnosis. Rostrum with two lateral teeth, tip of rostrum between teeth rounded; rostral, lamellar and interlamellar setae barbed; lamella narrow, with strong lateral tooth, inner tooth absent; lamel-

lar cusp absent; sensillus short, with barbed, clavate head; tutorium with a few teeth dorsodistally; notogastral setae represented by their alveoli; porose areas round to oval; epimeral setae very long, thick, heavily barbed; anal and adanal setae short, smooth; setae *l''* of tibiae I, II, genu II and seta *v''* of genu I much thicker than other setae.

Measurements. Five specimens were measured: body length 342; width of notogaster 240; length of notogaster 270.

Integument. Body color reddish brown. With thick cerotegument, roughened by minute granules. Lateral side of podosoma with relatively large granules. Faintly microtuberculate on prodorsum, notogaster, ventral plate and leg segments.

Dorsal aspect. Rostrum with two lateral teeth; tip of rostrum between teeth rounded. Rostral, lamellar and interlamellar setae barbed; *le* slightly longer than *ro* and *in*. Lamella narrow, with strong lateral tooth, inner tooth absent; lamellar cusp absent. Sensillus short, with barbed, clavate head (Fig. 50). Bothridium large, mostly covered by anterior margin of notogaster. Tutorium with a few teeth dorsodistally. Notogastral setae represented by their alveoli. Notogastral porose areas oval to round, lyrifissures and opisthosomal gland opening arranged as shown in Fig. 48.

Ventral aspect. Hypostomal seta *h* long, barbed; *m* long, but smooth; *a* short, smooth. Epimeral setae very long, thick, heavily barbed; seta *4c* represented by alveolus. Genital setae long, but smooth. Aggenital seta of a single specimen was broken, but according to large alveolus it might be thick. Anal and adanal setae short, smooth. Discidium well developed, projected distally; circumpedal carina long; custodium reaching anteriorly to the level of apodeme I (Fig. 49).

Legs. Genu I with strong, genu II with small, but distinct ventrodistal projections. Lateral setae *l''* of tibiae I, II, genu II and ventral seta *v''* of genu I much thicker than other setae. Structure and setation of genua and tibiae of legs I–IV as shown Figs. 51–54.

Material examined. One specimen (male): Piraziz Giresun in Black Sea coastal area of Turkey, leaf litter under hedge plants, 19.03.1999, coll. S. K. Ozman.

Remarks. Shaldybina [1980] and Pavlitshenko [1994] defined that epimeral setae *1a* and *1b* different in shape (i.e. the former as thicker than the latter), but in a single specimen examined here these setae were similar to each other. Also, they mentioned that the lateral margin of pteromorphae incised, but the Turkish specimen does not show such structure. Except for these points, most other characters of Turkish specimens correspond well to the Ukrainian material.

Family Euzetidae Grandjean, 1954

Euzetes globulus (Nicolet)

Figs. 55–62.

Oribata globula Nicolet, 1855: 439, pl. 5, fig. 1; Michael, 1883: 234, pl. 5, figs. 6–12, pl. 23, fig. 7.
Oribates globulus: Berlese, 1887: vol. 43 (6).
Oribates seminulum Oudemans, 1896: 57.
Notaspis globulus: Oudemans, 1900: 152.
Murcia seminulum: Oudemans, 1905: 10; 1913: 233.
Euzetes aterrimus Sellnick, 1928: 13, fig. 21.
Euzetes seminulum: Willmann, 1931: 166, fig. 261.
Euzetes globulus: Berlese, 1908: 3; Hammen, 1952: 95; Pérez-Iñigo, 1972: 314; 1993: 173, fig. 64b; Shaldybina, 1975: 318, fig. 803; Pavlitshenko, 1994: 67, fig. 84.

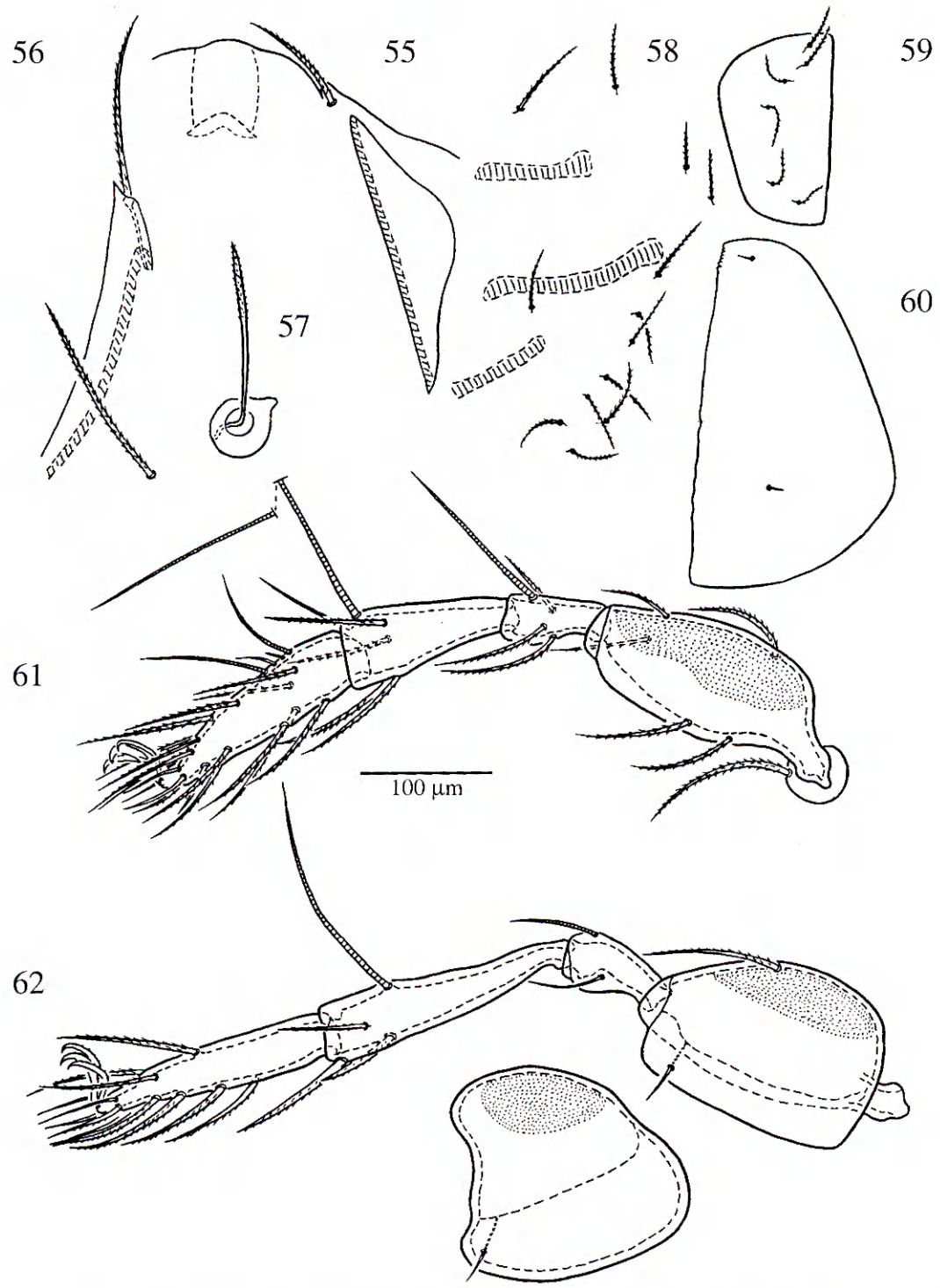
Diagnosis. Rostrum rounded; rostral, lamellar and interlamellar setae heavily barbed; lamella narrow, cusp short, with strong lateral tooth, inner tooth absent; sensillus almost setiform, head very slightly expanded, barbed; tutorium elongate triangular; notogastral setae represented by their alveoli; porose areas round to oval; epimeral and genital setae long, barbed; anal and adanal setae short, smooth.

Measurements. Since the single specimen was damaged, only the measurements of part of body and some setae are made: length of rostral seta 102; lamellar seta 158; interlamellar seta 204; epimeral setae 87–97; length of sensillus 133; length of lamella 280; length of tutorium 306; length of genital plate 148; length of anal plate 265.

Integument. Body color dark brown. With thick cerotegument, roughened by minute granules. Microtuberculate on prodorsum, notogaster, ventral plate and leg segments.

Dorsal aspect. Rostrum rounded; rostral, lamellar and interlamellar setae heavily barbed. Lamella narrow, cusp short, with strong lateral tooth, inner tooth absent (Figs. 55, 56). Sensillus slender, almost setiform, its head very slightly expanded and barbed (Fig. 57). Tutorium elongate triangular, pointed towards distal and proximal ends (Fig. 55). Notogastral setae represented by their alveoli. Porose areas round to oval; lyrifissures and opisthosomal gland opening small.

Ventral aspect. Epimeral setae long, heavily barbed; epimeral region IV with eight setae (Fig. 58). Genital setae also long, barbed; aggenital, anal



Figs. 55–62. *Euzetes globulus* (Nicolet): 55 — Part of prodorsum (right, flattened); 56 — Lamella and interlamellar seta; 57 — Sensillus and bothridium; 58 — Part of epimeral region (left, setae *1c* and *3c* not shown); 59 — Genital plate; 60 — Anal plate; 61 — Leg I (left, antiaxial aspect); 62 — Leg IV (right, antiaxial aspect).

and adanal setae short, smooth (Fig. 60). Discidium well developed, projected distally; circumpedal carina long; custodium reaching anteriorly to the level of apodeme I.

Legs. Trochanters and femora of legs III and IV with large porose areas; no evident porose areas in tarsi. Structure and setation of legs I and IV as shown Figs. 61, 62.

Material examined. One specimen (female): Tribolu, Ozlu in Black Sea coastal area of Turkey, leaf litter under hedge plants, 24.01.1999, coll. S. K. Ozman.

Remarks. Certain character states of the specimen studied here are well accord with those of the European materials, examined by Shaldybina [1975], Pérez-Iñigo [1993] and Pavlitshenko [1994].

KEY TO ADULTS OF THE CERATOZETOID MITES OF TURKEY

1. Pteromorphae movable, line of desclerotization present 2
— Pteromorphae immovable, line of desclerotization absent 7
2. Notogaster with 13 pairs of setae; lamellae wide; anterior notogastral tectum absent (Figs. 25–33) ..... *Diapterobates humeralis* (Hermann)
— Notogaster with 10 pairs of setae; lamellae narrow; anterior notogastral tectum well developed 3
3. Legs monodactylous; interlamellar setae short, thin 4
— Legs tridactylous, interlamellar setae long, relatively thick 5
4. Tip of sensilli elongate, tapered; tutoria narrow; notogastral setae very short (Figs. 1–10) ..... *Minunthozetes semirufus* (C. L. Koch)
— Tip of sensilli not elongate, but normal; tutoria relatively wide; notogastral setae moderately long (Figs. 11–14) ..... *Minunthozetes pseudofusiger* (Schweizer)
5. Anterior notogastral tectum large, forming two projecting points with a concave incision between them; lamellae poorly developed, situated underneath the notogastral tectum ..... *Minguezetes hexagonus* (Berlese)
— Anterior notogastral tectum small, its anterior margin nearly straight; lamellae well developed, not covered under notogastral tectum 6
6. Pteromorphae and lateral part of notogaster punctate; translamella wide; interlamellar setae extending beyond tip of rostrum; sensilli narrowly fusiform, smooth; rostral setae not evident (Figs. 15–20) ..... *Punctoribates punctum* (C. L. Koch)
— Pteromorphae and lateral part of notogaster not punctate; translamella narrow; interlamellar setae not reaching to the tip of rostrum; sensilli narrowly club-shaped, head marginally barbed; rostral setae long, barbed ..... *Punctoribates angulatus* Bayartogtokh, Grobler et Cobanoglu
7. Epimeral neotrichy present, epimeral region IV with eight pairs of setae; sensilli almost setiform, head very slightly expanded (Figs. 55–62) ..... *Euzetes globulus* (Nicolet)
— Epimeral neotrichy absent, epimeral region IV with three pairs of setae; sensilli not setiform, head more or less clavate 8
8. Lamellar cusps absent; epimeral setae very thick, long, heavily barbed (Figs. 48–54) ..... *Xiphobates sergienkoae* (Shaldybina)
— Lamellar cusps well developed; epimeral setae normal, thin, short, mostly smooth or finely barbed 9
9. Genital plates with five pairs of setae; lamellae very wide, covering lateral part of prodorsum, except lateral margin of tutoria; anal and adanal setae heavily barbed, much thicker than setae of genital region (Figs. 42–47) ..... *Vicinebates sergienkoae* Pavlitshenko
— Genital plates with six pairs of setae; lamellae relatively narrow, not covered lateral part of prodorsum; setae of anal and genital regions similar in size, smooth 10
10. Tutoria thin, short, not reaching to the level of the insertion of rostral setae; setae of genua and tibiae of legs similar in size and shape 11
— Tutoria wide, long, extending beyond the level of the insertion of rostral setae; some setae (*l''* or *v''*) of genua and tibiae of legs very thick, long, much thicker than other setae 12
11. Notogastral setae moderately long; translamella absent; sensilli relatively long, extending beyond the level of anterior end of pedotecta I (Figs. 21–24) ..... *Ceratozetes mediocris* Berlese
— Notogastral setae minute; translamella well developed; sensilli short, not reaching to the level of anterior end of pedotecta I ..... *Ceratozetes microsetosus* Ayyildiz et Luxton
12. Lateral tooth of lamellar cusps strongly developed, inner tooth absent or poorly developed; sensilli elongate clavate (Figs. 34–41) ..... *Trichoribates novus* (Sellnick)
— Lateral and inner teeth of lamellar cusps almost equally developed; sensilli clavate ..... *Trichoribates trimaculatus* (C. L. Koch)

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