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Current taxonomical and faunistic status of Caucasian ptyctimous mites (Acari, Oribatida)

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Abstract. Eleven soil samples taken from new localities in the Caucasus region, were found to contain twelve species of ptyctimous mites. One new species, *Oribotritia teberdaensis* **sp. nov.,** is described. A checklist of known Caucasian ptyctimous mite species is included. In taxonomical remarks, six species are presented as conspecific or probably conspecific.

Key words: Oribatida, ptyctimous, new species, checklist, Caucasus.

Introduction

Ptyctimous mites, characterized by ptychoid body, are a rich species group of the oribatid mites. They occur in great numbers in forest litter where they feed on dead organic material, which facilitates fungal activity (Luxton 1991).

These mites are relatively numerous in the Caucasus region, over 50 species have been reported. For comparison, only 40 species from the whole of Poland and 30 species from Germany are known (Niedbała 2011).

The purpose of the present paper is to present a checklist of known Caucasian species, the identification of species found in eleven new localities, the description of one new species, and the synonymization of some species.

Material and methods

Ten soil samples were received from Dr. J. Starý, České Budějovice which belonged to the unsorted soil samples from the collection of Dr. Jan Vaněk; they originated from the Northern slope of Central Caucasus, from Teberda. One sample provided by Prof. Błoszyk from the Natural History Collections, Adam Mickiewicz University, Poznań, comes from Georgia.

The material of eleven soil samples contained 140 adult specimens of ptyctimous mites. All emerged in lactic acid, and were mounted on temporary cavity slides for the duration of the study. The new species measurements are presented in micrometers. Length of body setae was measured in lateral aspect. The morphological terminology is based on Niedbała (2000). The number of examined specimens is given in parenthesis just behind species names.

Results and Discussion

Description of the new species

Oribotritia teberdaensis **sp. nov.** (Figs 1A–F)

Description: Measurements of holotype: prodorsum: length 384, width 303, height 116, sensillus 190, setae: *in* 119, *le* 109, *ro* 86; notogaster: length 636, width and height 505, setae: c_1 154, $c_3$104, h_1 177, ps_1 96; genital and aggenital plates 182×111, anal and adanal plates 318×76.

Colour light brown. Integument finely punctate.

Prodorsum with double lateral carinae nearly similar in length. Sensilli long, setiform, rough; interlamellar and rostral setae stout, erect covered with small cilia, lamellar setae setiform, procumbent, smooth; exobothridial setae vestigial.

Notogaster with setae of medium size (c_1=c_1–d_1), majority of setae rigid, stout covered with small cilia, only setae c_3 and ps_3 fine, smooth, setae c_1 and c_2 remote from anterior margin, setae c_3 close to anterior margin. Opening of opisthosomal gland and three pairs of lyrifissures present.

Ventral region. Setae *h* of mentum longer than distance between them. Genital plates each with nine setae, among which five smaller in progenital position, aggenital plates each with two setae, setae ag_2 considerably longer than ag_1 setae. Two pairs of small anal and two pairs of adanal setae present, setae ad_1 small, setae ad_2 long, similar in length to ag_2 setae. Lyrifissures *iad* situated laterally and slightly anteriorly of ad_2 setae.

Chaetome of legs (without tarsi): I: 1-4-5(2)-5(1), II: 1-4-4(1)-3(1), III: 3-2-3(1)-3(1), IV: 3-2-2(1)-3(1). Tarsi heterotridactylous. Femur I with hooked anterior spine, distal point with three small teeth.

Type material: Holotype (CAU-008) in Department of Animal Taxonomy and Ecology, Adam Mickiewicz University, Poznań, Poland.

Etymology: The specific epithet refers to the locality Taberda Nature Reserve.

Differential diagnosis: The new species is easily distinguishable from congeners by the unusually long setae ad_2 and furthermore by the following combination of characters: presence of two pairs of lateral carinae of prodorsum, interlamellar and rostral setae rigid covered with small cilia, lamellar setae fine and smooth, majority of notogastral setae stout, covered with small spines, only c_3 and ps_3 fine and smooth, different length of aggenital setae, presence of two pairs of anal and two pairs of adanal setae.

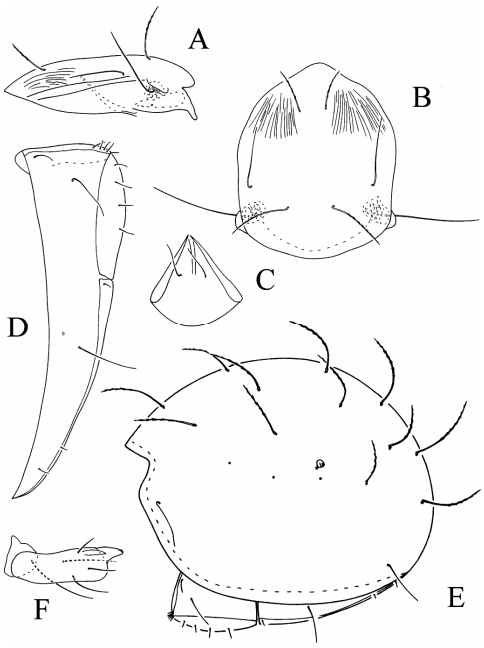

Figure 1. *Oribotritia taberdaensis* sp. nov. (holotype): (A) prodorsum, lateral view; (B) prodorsum, dorsal view; (C) mentum of subcapitulum; (D) right genitoaggenital and anoadanal plates; (E) opisthosoma, lateral view; (F) trochanter and femur of leg I.

New Caucasian localities with ptyctimous mites species identified in them

CAU-001, Central Caucasus, 71-051, Teberda Nature Reserve, 21.VII.1971, northern slopes, coniferous forest, spruce growth, sample of spruce litter, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *Phthiracarus crassus* Niedbała, 1983 (2), *Phthiracarus propinquus* Niedbała, 1983 (1), *Phthiracarus subdolus* Niedbała, 1983 (4), *Steganacarus* (*Steganacarus*) *magnus* (Nicolet, 1855) (2), *Atropacarus* (*Atropacarus*) *obesus* (Niedbała, 1983) (3).

CAU-002, Central Caucasus, 71-052, Teberda Nature Reserve, 21.VII.1971, northern slopes, coniferous forest, fir growth, sample of fir litter, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *Mesotritia nuda* (Berlese, 1887) (3), *Steganacarus* (*Steganacarus*) *spinosus* (Sellnick, 1920) (7), *Austrophthiracarus pavidus* (Berlese, 1913) (17).

CAU-003, Central Caucasus, 71-053, Teberda Nature Reserve, 21.VII.1971, northern slopes, coniferous forest, spruce and fir growth, sample of decaying wood of spruce stump, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *P. crassus* (2), *P. subdolus* (10), *S.* (*S.*) *magnus* (1), *A. pavidus* (1), *A.* (*A.*) *obesus* (7).

CAU-004, Central Caucasus, 71-054, Teberda Nature Reserve, 21.VII.1971, northern slopes, coniferous forest, spruce growth, sample of spruce litter, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *Steganacarus* (*Steganacarus*) *patruelis* Niedbała, 1983 (5), *S.*(*S.*) *spinosus* (6).

CAU-005, Central Caucasus, 71-055, Teberda Nature Reserve, 21.VII.1971, northern slopes, coniferous forest, spruce growth, sample of mosses and lichens lying on spruce stem, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *Steganacarus* (*Steganacarus*) *coniunctus* Niedbała, 1983 (2), *S.* (*S.*) *patruelis* (8), *A. pavidus* (13), *A.* (*A.*) *obesus* (4).

CAU-006, Central Caucasus, 71-056, Teberda Nature Reserve, 22.VII.1971, northern slopes, mixed forest, growth of beech and spruce, sample of beech and spruce litter, leg. J.Vaněk and D.A. Krivolutsky

Species composition: *S.* (*S.*) *coniunctus* (1), *S.* (*S.*) *patruelis* (1), *A. pavidus* (7), *A.* (*A.*) *obesus* (4).

CAU-007, Central Caucasus, 71-057, Teberda Nature Reserve, 22.VII.1971, northern slopes, mixed forest, beech growth, sample of beech litter, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *S.* (*S.*) *patruelis* (1), *S.*(*S.*) *spinosus* (2).

CAU-008, Central Caucasus, 71-058, Teberda Nature Reserve, 22.VII.1971, northern slopes, mixed forest, beech growth, sample of mosses on beech stem, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *Oribotritia teberdaensis* **sp.**

nov. (1), *P. crassus* (1), *A.* (*A.*) *obesus* (3).

CAU-009, Central Caucasus, 71-059, Teberda Nature Reserve, 22.VII.1971, northern slopes, mixed forest, beech growth, sample mosses on boulders, leg. J. Vaněk and D.A. Krivolutsky.

Species composition: *P. subdolus* (3), *S.* (*S.*) *magnus* (1), *A.* (*A.*) *obesus* (18).

CAU-010, Central Caucasus, 71-061, Teberda Nature Reserve, 22.VII.1971, northern slopes, mixed forest, beech growth, sample of beech litter, leg. J.Vaněk, and D.A.Krivolutsky.

Species composition: *S.* (*S.*) *coniunctus* (1).

CAU-011, Georgia, Gombori mountains, Telavi, litter in deciduous bushes 50 m from forest, 01.V.2013, leg. R.Bajaczyk (sample from Prof. Błoszyk).

Species composition: *Phthiracarus furvus* Niedbała, 1983 (2).

From the 11 new Caucasian localities, 12 species already known from the Caucasus region were identified.

Checklist of Caucasian species of ptyctimous mites based on Niedbała (2011, 2012).

Mesoplophora Berlese, 1904
M. (*M.*) *michaeliana* Berlese, 1904
Oribotritia Jacot, 1924
O. berlesei (Michael, 1898), *O. krivoluckii* Liu, Niedbała & Starý, 2010
Mesotritia Forsslund, 1963
M. nuda (Berlese, 1887)
Protoribotritia Jacot, 1938
P. aberrans (Märkel & Meyer, 1959)
Euphthiracarus Ewing, 1917
E. monodactylus (Willmann, 1919), *E. reticulatus* (Berlese, 1913)
Acrotritia Jacot, 1923
A. ardua (C.L. Koch, 1841), *A. duplicata* (Grandjean, 1953)
Microtritia Märkel, 1964
M. minima (Berlese, 1904)
Phthiracarus Perty, 1839
P. anonymus Grandjean, 1933, *P. assimilis* Niedbała, 1983, *P. baloghi* Feider & Suciu, 1957, *P. boresetosus* Jacot, 1930, *P. bryobius* Jacot, 1930, *P. clavatus* Perry, 1979, *P. compressus* Jacot, 1930, *P. crassus* Niedbała, 1983, *P. dissonus* Niedbała, 1983, *P. globosus* (C.L. Koch, 1841, *P. incertus* Niedbała, 1983, *P. incredibilis* Niedbała, 1983, *P. furvus* Niedbała, 1983, *P. largus* Niedbała, 1984, *P. lautus* Niedbała, 1981, *P. lentulus* (C.L. Koch, 1841), *P. longulus* (C.L. Koch, 1841), *P. nitens* (Nicole, 1855), *P. opacus* Niedbała, 1986, *P. peristomaticus* Willmann, 1948, *P. propinquus* Niedbała, 1983, *P. scitus* Niedbała, 1983, *P. subdolus* Niedbała, 1983
Steganacarus (*Steganacarus*) Ewing, 1917
S. (*S.*) *coniunctus* Niedbała, 1983, *S.* (*S.*) *incomptus* Niedbała, 1983, *S.* (*S.*) *magnus* (Nicole, 1855), *S.* (*S.*) *patruelis* Niedbała, 1983, *S.* (*S.*) *personatus* Niedbała, 1983, *S.* (*S.*) *spinosus* (Sellnick, 1920)
Steganacarus (*Tropacarus*) Ewing, 1917
S. (*T.*) *carinatus* (C.L. Koch, 1841)
Austrophthiracarus Balogh & Mahunka, 1978
A. candidulus (Niedbała, 1983), *A. heterotrichus* (Mahunka, 1979), *A. pavidus* (Berlese, 1913), *A. vicinus* (Niedbała 1984)
Atropacarus (*Atropacarus*) Ewing, 1917
A. (*A.*) *csiszarae* (Balogh & Mahunka, 1979), *A.* (*A.*) *immundus* (Niedbała, 1983), *A.* (*A.*) *maculosus* (Niedbała, 1983), *A.* (*A.*) *obesus* (Niedbała, 1983), *A.* (*A.*) *ochraceus* (Niedbała, 1983), *A.* (*A.*) *plakatisi* (Mahunka, 1979), *A.* (*A.*) *parvulus* (Niedbała, 1983), *A.* (*A.*) *perversus* (Niedbała, 1983), *A.* (*A.*) *striculus* (C.L. Koch, 1836), *A.* (*A.*) *substrictus* (Niedbała, 1983)

So far, 54 species have been identified from Caucasus. One representing the genus *Mesoplophora*, nine representing six genera of Euphthiracaroidea (from the twelve genera known from Palaearctic Region), and 44 species from four genera of Phthiracaroidea (from among eight known from the Palaearctic Region) (Niedbała 2011),

Taxonomical remarks

The following is a thorough critical analysis of the species of ptyctimous mites described by Shtanchaeva & Subías (2012) is offered. All of six described species were proved to be conspecific or probably conspecific.

Steganacarus (*Tropacarus*) *carinatus* (C. L. Koch, 1841) (Fig. 2A)
Steganacarus (*Tropacarus*) *carinatus*: Niedbała 2011
Hoplophora carinata var. *pulcherrima* Berlese, 1887: Bernini & Avanzati 1988
S. (*T.*) *pulcherrimus* was synonymised by Bernini & Avanzati (1988) with *S.* (*T.*) *carinatus*.

The specimens of *Steganacarus* (*Tropacarus*) *adelaidae* Shtanchaeva & Subías, 2012 (Fig. 2B) do not differ in measurements from *Steganacarus* (*Tropacarus*) *carinatus* (C. L. Koch, 1841) (see Niedbała 2011). The species *S.* (*T.*) *adelaidae* does not show any morphological differences except the position of notogastral setae c_3 located far from

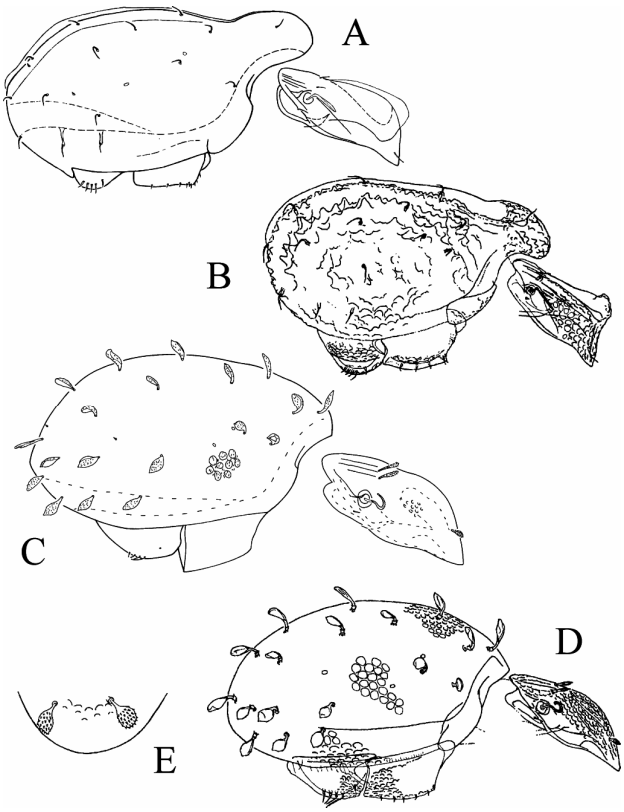

Figure 2. (A) *Steganacarus* (*Tropacarus*) *carinatus* (C.L. Koch, 1841), lateral view of body (after Niedbała 2011); (B) *Steganacarus* (*Tropacarus*) *adelaidae* Shtanchaeva & Subías, 2012, lateral view of body (after Shtanchaeva & Subías 2012); (C) *Atropacarus* (*Atropacarus*) *maculosus* (Niedbała, 1983), lateral view of body (after Niedbała 2011); (D, E) *Atropacarus kremenitsai* Shtanchaeva & Subías, (D) lateral view of body, (E) part of prodorsum with rostral setae (after Shtanchaeva & Subías 2012).

anterior border (versus near anterior border in *S.*(*T.*) *carinatus*).

Despite the above, my suspicion is that *Steganacarus* (*Tropacarus*) *adelaidae* is conspecific with *S.* *T.*) *carinatus*.

The species known from many localities in Caucasus (Niedbała 2012).

Atropacarus (*Atropacarus*) *echinodiscus* (Mahunka, 1982) (Fig 3A)
Steganacarus echinodiscus Mahunka, 1982
Atropacarus (*Atropacarus*) *echinodiscus*: Niedbała 2011

This species was described from Greece and has been so far known from Ponto-Mediterranean and Iranian areas (Niedbała 2011).

I suppose that *Atropacarus chernovae* Shtanchaeva & Subías, 2012 (Fig 3B) found from Abkhasie and Armenia is conspecific with *A.* (*A.*) *echinodiscus*. *A. chernovae* is only slightly larger than *A.*(*A.*) *echinodiscus*. The most important morphological similarities concern the presence of deep areoles on the surface of the body, the shape of sensilli, shape and arrangement of prodorsal and notogastral setae, the number of 16 pairs of notogastral setae, presence of short anal and adanal setae, implantation of setae ad_3 remote from paraxial margin. However in *A. chernovae* the sensilli are obviously longer and setae h_3 and ps_4 inserted more posteriorly.

Atropacarus (*Atropacarus*) *maculosus* (Niedbała, 1983) (Figs 2C-E)
Steganacarus (*Atropacarus*) *maculosus* Niedbała, 1983
Atropacarus (*Atropacarus*) *maculosus*: Niedbała, 2011
Atropacarus kremenitsai Shtanchaeva & Subías, 2012 **syn. nov.**

A. (*A.*) *maculosus* was described from North and Greater Caucasus (Niedbała 1983, 2011). Measurements of this species and conspecific species are similar. The important morphological characteristics are the following: the presence of deep areoles on the surface of the body, shape of sensilli widened at distal end, shape and arrangement of prodorsal and notogastral setae, presence of short anal and adanal setae, implantation of setae ad_3 far from paraxial margin.

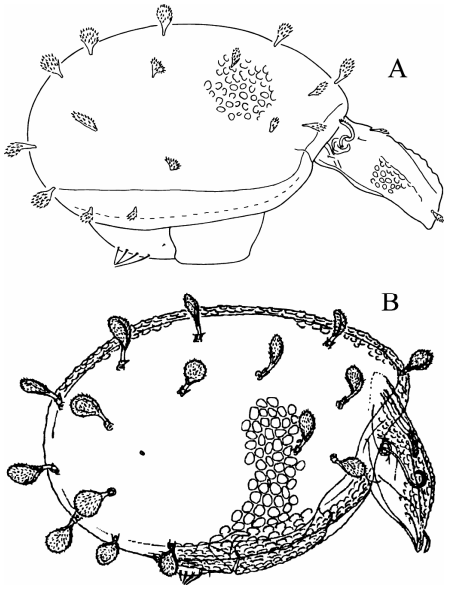

Figure 3. (A) *Atropacarus* (*Atropacarus*) *echinodiscus* (Mahunka, 1982), lateral view of body (after Mahunka 1982); (B) *Atropacarus chernovae* Shtanchaeva & Subías, 2012, lateral view of body (after Shtanchaeva & Subías 2012).

The only difference is the number of notogastral setae: 18 pairs in *A. kremenitsai* and 19 pairs in *A.* (*A.*) *maculosus*. However, in Fig. 6 in Shtanchaeva & Subías (2012), seta ps_1 has clearly been omitted. The report given by Shtanchaeva & Subías (2012) is the third known locality of this species from Caucasus.

Atropacarus (*Atropacarus*) *obesus* (Niedbała, 1983) (Figs 4A, B)
Steganacarus (*Atropacarus*) *obesus* Niedbała, 1983
Atropacarus (*Atropacarus*) *obesus*: Niedbała 2011
Atropacarus obesus minimus Shtanchaeva & Subías, 2012 **syn. nov.**

A.(*A.*) *obesus* was described from North Ossetia (Greater Caucasus). *A. obesus minimus* is only slightly smaller than the holotype of *A. obesus* (length of prodorsum 125-200, in holotype of *A. obesus* 202, length of notogaster 190-390, in holotype of *A. obesus* 404). The principal morphological characters are identical: the presence of deep areoles on the surface of the body, shape and arrangement of prodorsal and notogastral setae (16 pairs), shape of sensilli, arrangement of setae *c* on notogaster (c_1 near anterior border), the presence

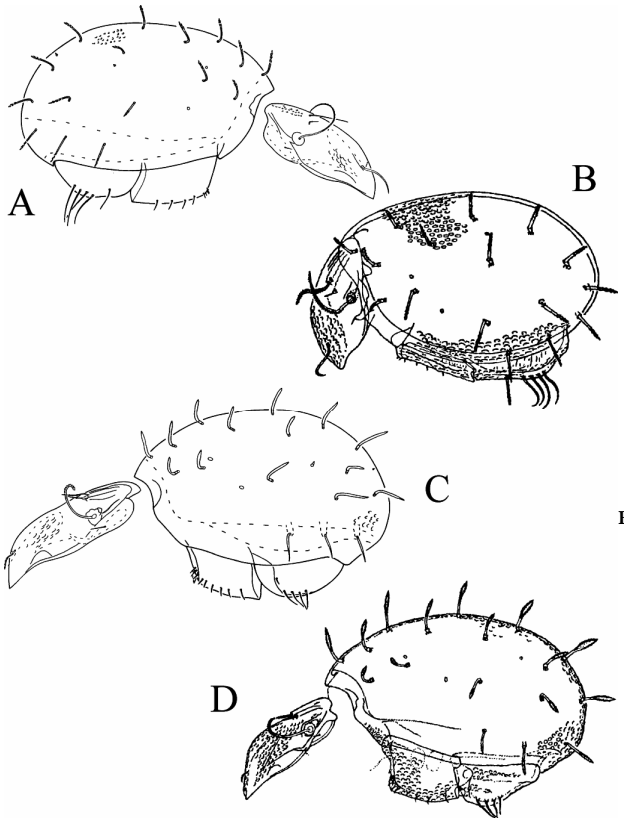

Figure 4. (A) *Atropacarus* (*Atropacarus*) *obesus* (Niedbała, 1983), lateral view of body (after Niedbała 2011); (B) *Atropacarus obesus minimus* Shtanchaeva & Subías, 2012, lateral view of body (after Shtanchaeva & Subías 2012); (C) *Atropacarus* (*Atropacarus*) *parvulus* (Niedbała, 1983), lateral view of body (after Niedbała 2011); (D) *Atropacarus yarovenkoi* Shtanchaeva & Subías, 2012, lateral view of body (after Shtanchaeva & Subías 2012).

of medium size of anal and adanal setae. Setae ad_3 are ciliated, not smooth (error in figure 227 in Niedbała (1983)). The report given by Shtanchaeva & Subías (2012) is the third known locality of this species from Caucasus.

Atropacarus (*Atropacarus*) *parvulus* (Niedbała, 1983) (Figs 4C, D)
Steganacarus (*Atropacarus*) *parvulus* Niedbała, 1983
Atropacarus (*Atropacarus*) *parvulus*: Niedbała 2011
Atropacarus yarovenkoi Shtanchaeva & Subías, 2012 **syn. nov.**

A. (*A.*) *parvulus* was described from Greater Caucasus (Niedbała 1983, 2011). Measurements of *A. yarovenkoi* and *A.* (*A.*) *parvulus* are similar and main morphological characters are: a similar shape (serrate, except exobothridial setae) and length of prodorsal setae, the presence of 17 pairs of notogastral setae, shape and arrangement of notogastral setae, the presence of short anal and adanal setae, location of setae ad_3 far from paraxial margin. In total, three localities of this species are known from Caucasus (Niedbała 2012, Shtanchaeva & Subías 2012)

Atropacarus (*Atropacarus*) *plakatisi* (Mahunka, 1979) (Figs 5A-D)
Steganacarus plakatisi Mahunka, 1979
Atropacarus (*Atropacarus*) *plakatisi*: Niedbała, 2011, 2012
Atropacarus achmedovi Shtanchaeva & Subías, 2012 **syn. nov.**

The species was described from Greece. The sizes of *A.* (*A.*) *plakatisi* and *A. achmedowi* are similar. Significant similarities were found in the presence of foveolate structure of surface of body, length and shape of prodorsal setae, shape of sensilli, shape and arrangement of notogastral setae, length and arrangement of anal and adanal setae, location of setae ad_3 near paraxial margin. The number of notogastral setae is variable and 17 and 18 pairs is present in *A. achmedovi* and 16 pairs in *A.* (*A.*) *plakatisi*. *A.* (*A.*) *plakatisi* is known only from a few localities in Caucasian Region: Georgia, Azerbaijan and Dagestan (Niedbała 2011). It is Western Palaearctic species, known from East Europe, Maghrebian, Ponto-Mediterranean, Balkan, Anatolia and Black-Sea-Pontic areas.

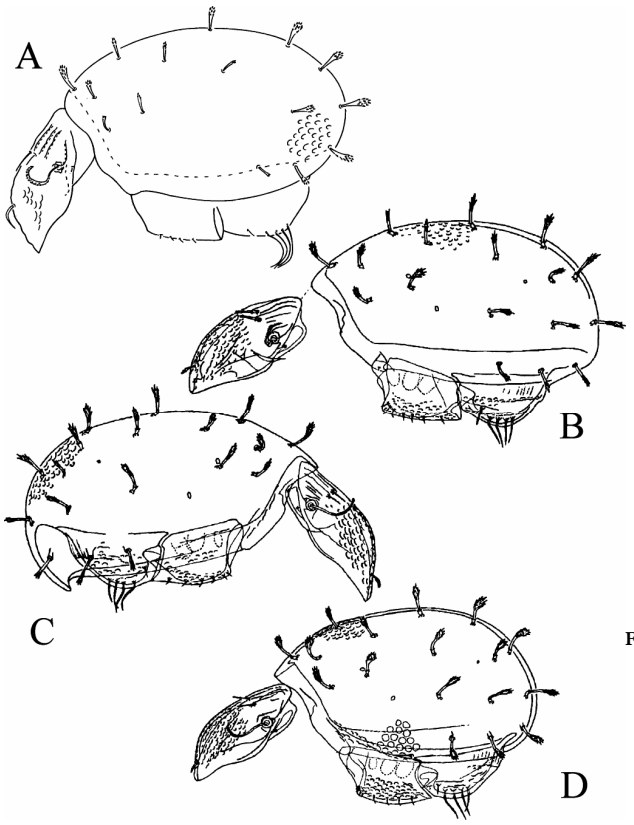

Figure 5. (A) *Atropacarus* (*Atropacarus*) *plakatisi* (Mahunka, 1979), lateral view of body (after Mahunka 1979); (B-D) *Atropacarus achmedovi* Shtanchaeva & Subías, 2012, lateral view of body of three specimens (after Shtanchaeva & Subías 2012).

The most important mistake of Shtanchaeva & Subías (2012) was to neglect the paper by Niedbała (1983a). As a result, three from among the phthiracaroid species described by Shtanchaeva & Subías (2012) were assumed as conspecific, and two of them as probably conspecific with the species described by Niedbała (1983a).

Both Dr. Shtanchaeva (in her letter of 28 Nov. 2012) and Prof. Subías (in his letter of 29 Nov. 2012) informed me that lending me the typical material of the species described by them was not possible.

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