

WOJCIECH L. MAGOWSKI¹ - ANTONELLA DI PALMA²

**First record of *Tarsonemus caucasicus*
(Acari, Tarsonemidae) in Italy, with notes on morphology
and systematics**

ABSTRACT

Tarsonemus caucasicus Sharonov & Mitrofanov (Acari: Tarsonemidae) is re-described and illustrated, on the base of newly recorded material from Apulia (Italy), where it was found affecting laboratory cultures of fungi. The morphology and systematic position of the species are briefly discussed.

Key words: morphology, systematics, taxonomy, *T. bilobatus*, lab fungi cultures.

INTRODUCTION

Among many species of tarsonemid mites described in 70-ies and 80-ies by Ukrainian authors (mainly Livshits, Mitrofanov and Sharonov), only a few have been found subsequently outside the Ukraine. This is largely due to the poor knowledge of tarsonemid mite fauna in those regions of the world where they have not been subject of such intensive studies as in the former USSR, as well as sometimes incomplete descriptions, and, probably, the lack of linguistic competence among the western scientific community.

The present paper is intended to present a new record and redescription of *Tarsonemus caucasicus* Sharonov & Mitrofanov, which has been found in southern Italy affecting laboratory cultures of fungi. It is also a tribute to Ukrainian authors, whose work has often been inadequately accounted for by other acarologists.

MATERIALS AND METHODS

Mite material was sampled from lab cultures of fungi and subsequently mounted on microscopic slides. Then it was examined with an Olympus phase-contrast microscope. Terminology and notation for body and leg

¹Department of Animal Taxonomy and Ecology, A. Mickiewicz University, Szamarzewskiego 91A, 60- 569 Poznań, Poland (magowski@amu.edu.pl).

²Facoltà di Agraria, Università degli Studi di Foggia, via Napoli, 25, Foggia, Italy (a.dipalma@unifg.it).

structures follows that of Lindquist (1986), with some minor modifications. Measurements are given in micrometers (μm). The following abbreviations are used below: PrS (prodorsal shield), PrP (ventral propodosomal plate) MeP (ventral metapodosomal plate).

Tiny setae flanking pretarsi are excluded from the leg chaetotaxy: Ta I u' and u'' and Ta II and III u'' and p' (the latter in male only); sign "-" marks separation of leg segments, sign "+" - their fusion. The description of larva is fragmentary and based on the larval skin covering pre-emerging adult females.

TARSONEMUS CAUCASICUS SHARONOV & MITROFANOV, 1986

Tarsonemus caucasicus Sharonov & Mitrofanov, 1986; p. 15

DESCRIPTION

Female - (fig. 1) Gnathosoma (length 27, width 21): ovoid, tending toward a subtriangular outline, both pairs of gnathosomal setae slender, postpalpal setae indiscernible; pharynx without defined horseshoe sclerotization, very densely striated transversely with indistinct glandular bodies, and a single small external lobe in mid-length on each side. Cheliceral stylets and levers small.

Idiosoma (fig. 2) (length 189, width 99) - dorsum: frontal projection of PrS round anteriorly. Setae v_1 slender, slightly longer than distance between their bases. Each trachea with one, well sclerotized postatrial sac, sensilla sc_1 with rounded heads. Setae sc_2 about 1.6x longer than the distance between their bases, reaching with their tips about 0.4x of their lengths beyond posterior edge of PrS, and beyond the bases of c_2 . Setae c_1 as long as 0.66x of length of c_2 , not reaching to posterior edge of a tergite C. Setae $d-b$ stiff, weakly serrated similar in size; d slightly the shortest, e and f of similar length, intermediate,

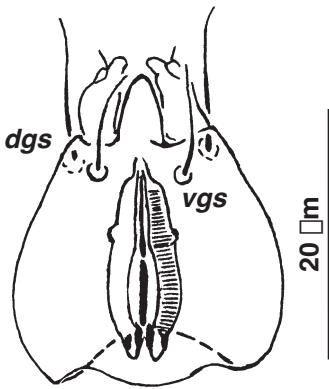


Fig. 1. Female gnathosoma venter.

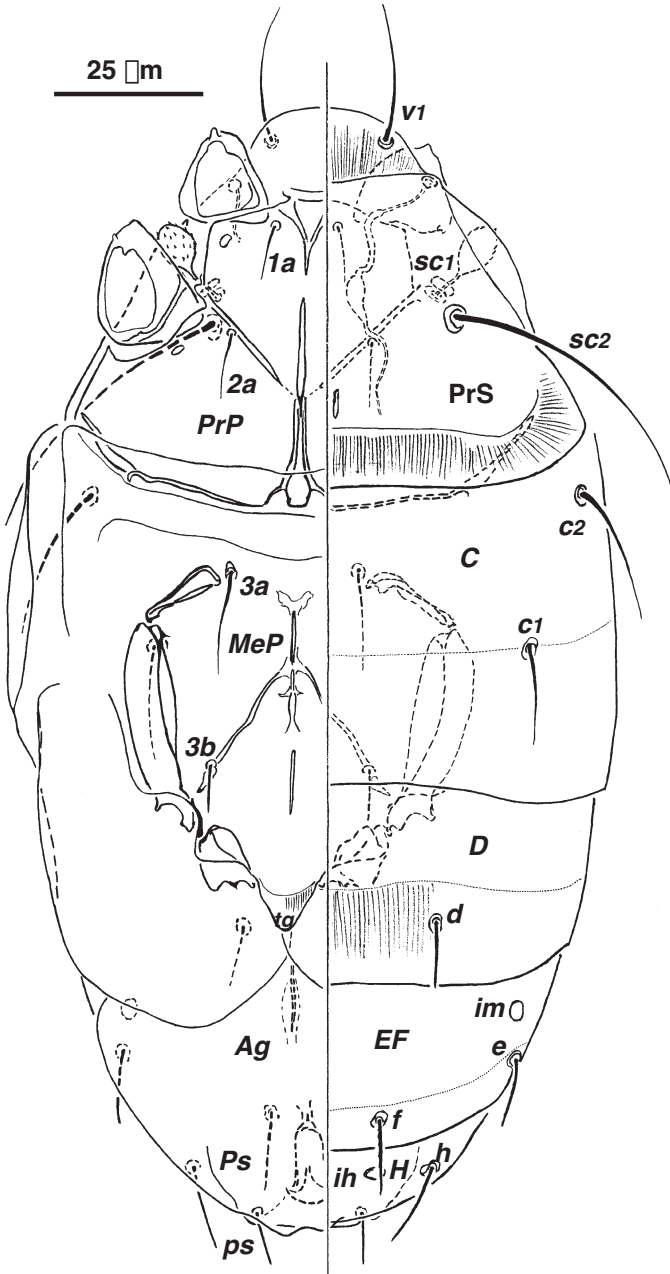


Fig. 2. Female idiosoma: left- venter, right - dorsum.

b slightly the longest.

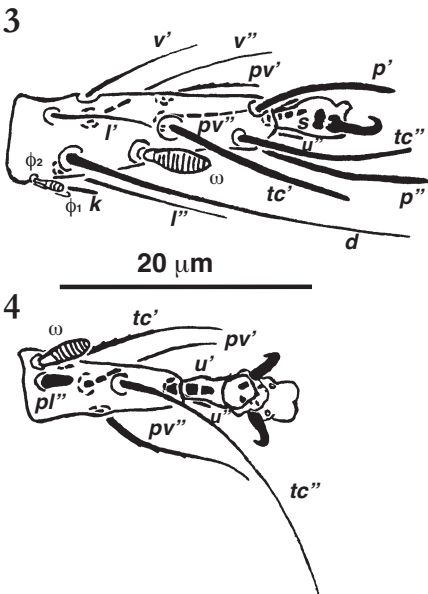
Idiosoma - venter: anteromedial apodeme interrupted between apodemes 1 and 2. Sternal platelet small but apparent, sejugal apodeme broken laterally on each side in direction of trochanters II, lateral segments of sejugal apodeme slightly oblique; coxal setae *1a* slightly shorter than *2a*, both pairs slender, attenuate. Posteromedial apodeme with very weak, diffused arterial bifurcation. Setae *3a* slender, clearly longer than *1a* and *2a*; setae *3b* stiff, the shortest of all coxals. Tegula small (approaching the width of trochanters IV), triangular with rounded tip, almost as long as wide. Setae *ps* stiff, about as long as *3b*.

Legs - (figs 3-4) Chaetotaxy of leg I: 4-4-6(2 ϕ)+7(1 ω); leg II: 3-3-4-6(1 ω); leg III: 1+3-4-5. Tarsal part of tibiotarsus I with 2 attenuated setae (lacking *pl*"), solenidion ω located at mid-length of tibiotarsus. Tibial solenidion ϕ_2 slightly smaller than ϕ_1 ; eupathidion *k* longer than both solenidia. Seta *l*' on genu I stiff, not thicker than others on the segment. Femur I without ventral process. Setae *l*" short, and *v*" longer, both attenuate; *l*' and *d* stiffer. Tarsal

II spine *pl*" subequal or slightly smaller than solenidion ω , located nearby the latter. Seta Ta II *tc*" about twice longer than other (attenuate) setae of segment. Seta Ge II *l*' attenuate, thicker than others on the segment, barbed. Femur II without ventral lobe, seta *d* short, stiff. Free segments of leg IV longer than femorogenu and tibia III; femorogenu 3x as long as tibiotarsus; femoral seta *v*' weaker and shorter than genual one; seta Tb *v*' shorter than length of femorogenu and tibiotarsus, stiff; seta Ta *tc*" approximately 1.5x as long as whole leg IV.

Male - (fig. 5) Gnathosoma (length 24, width 21): shape and proportions as that of female, except external lobe at mid-length of pharynx almost indiscernible.

Idiosoma (length 141, width 86) - dorsum: setae *v*₁, *sc*₂ and *sc*₁ on PrS,



Figs 3-4. Female terminal segments of legs I and II: 3- tibiotarsus I; 4- tarsus II.

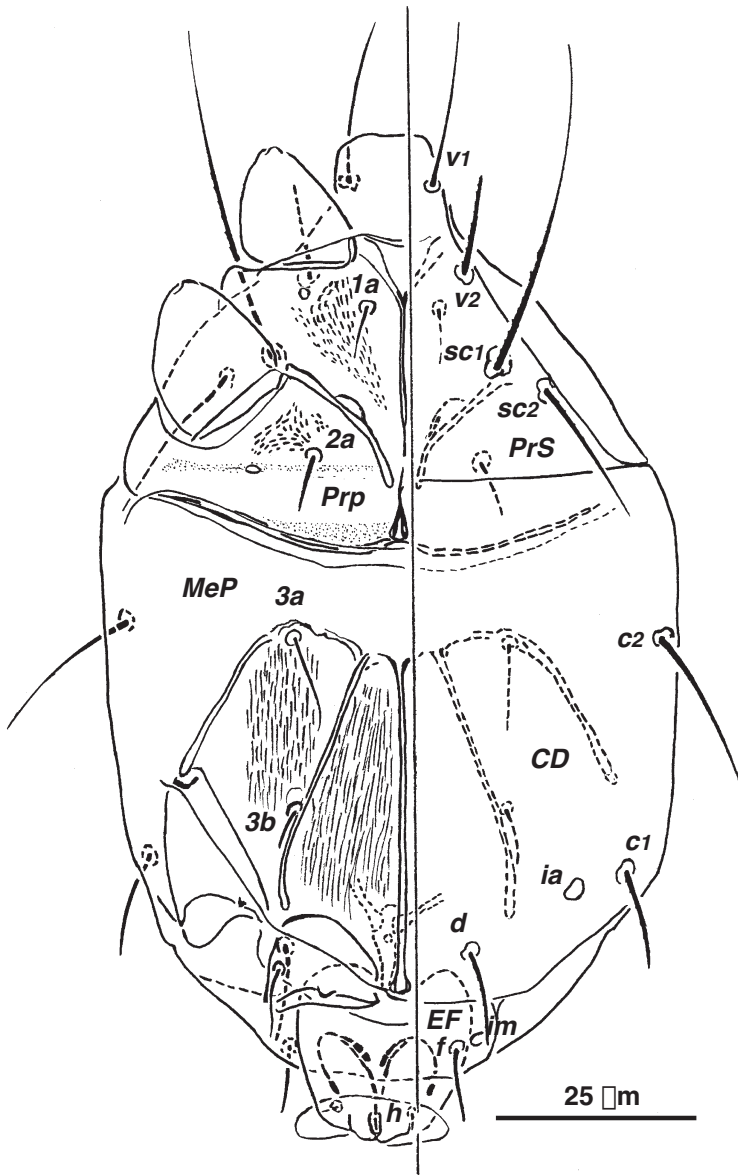
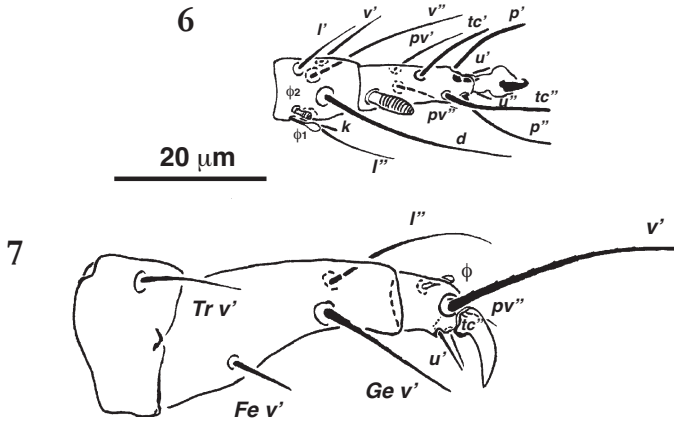


Fig. 5. Male idiosoma: left - venter, right - dorsum.



Figs 6-7. Male leg segments: 6- tibia and tarsus I; 7- segments of leg IV.

tapering, pointed; v_2 , sc_2 and sc_1 barbed; v_2 apparently stiffer, blunt. Setae sc_2 located laterad of line v_1-sc_1 on each side. Setae c_2 attenuated, smooth, not reaching with their tips to bases of c_1 . Setae c_1 and d stiff, barbed, subequal in length. Setae f stiff, shorter than c_1 and d . Setae b very small, almost indiscernible. Genital capsule as long longitudinally as its maximum width. Accessory stylets pronounced.

Idiosoma - venter: anteromedian apodeme interrupted at the level of setae $2a$, with well defined nodule at sejugal apodeme. Sejugal apodeme continuous, biconvex. Coxal setae $1a$ slender; $2a$ stiff, subequal to $1a$. Setae $3a$ slender, the longest of all ventrals; $3b$ stiff, the shortest. Apodemes 3, 4 and posteromedial apodeme well expressed, joining anteriorly by an area of slightly diffused sclerotization. Dorsum covered with uniform, very fine grain-like sculpture; coxal fields I and II ornamented with small, elongated spots, coxal fields III and IV with longitudinal striae.

Legs - (figs 6-7) Chaetotaxy of leg I: 4-4-6(2 ϕ)-7(1 ω); leg II: 3-3-4-6(1 ω); leg III: 1-3-4-4. Tarsus I with 2 attenuated setae, neither of the tiny eupathidial setae ft' - ft'' visible. Solenidion ω located basally on tarsus. Tibial solenidion ϕ_2 subequal to ϕ_1 ; eupathidion k slightly longer. Seta l' on genu I stiff, as thick as other setae of segment, femoral d short, thick. Tarsal II spine pl'' apparently smaller than solenidion ω . Seta tc'' about 2x longer than other setae of segment. Seta Ge II l' slender; both femoral setae d and l' stiff, short. Tarsal III seta tc'' the longest on segment. Free segments of leg IV slightly shorter than those of leg III. Tarsal claw curved, about as long as tibia and tarsus IV.

Tarsus fused with tibia, with three setae (all subequal in length). Tibiotarsus subrectangular in outline, solenidion ϕ smaller than tarsal solenidia of legs I and II, rod-like, smooth. Seta Tb v' thick, stiff, barbed and blunt, about as long as Fege IV. Femurogenu IV about twice longer than wide at the base, without any marked posterior ridge or protrusion; seta Ge v' stiff, thicker than attenuate l' ; Fe v' the shortest, stiff.

Larva (provisional description based on the two, strongly damaged larval skins covering emerging adult females) - Setae b_1 and b_2 on terminal segment HPs stiff, blunt and barbed, b_1 (medial) 2x longer than b_2 (lateral). Of two pairs of tiny setae ps , external one slightly longer than internal. Ventral metapodosomal setae $3a$ slender and $3b$ stiff. Tibial III seta l' spinelike, tarsal III lc'' ca. 2.5x longer than others on the segment.

Type locality: Ukraine, Crimea, Suchumi district, Gulripshi; on grass; 05.11.1982; leg. A. Sharonov. Type material not seen by present authors.

Studied material: 1 adult and 2 pharate females, 3 males, in cultures of *Verticillium dahliae*, 4 adult females in cultures of *Armillaria mellea*; Bari, (Apulia, Italy) on 15.01.2000, coll. A. Di Palma.

Distribution: Eastern and Southern Europe: Crimea (Ukraine), Apulia (Southern Italy).

Remarks: due to the fact that the type material of *T. caucasicus* was unavailable for study, the identity of examined mite specimens was inferred upon the congruence between observed morphological characters and those given in the original description. Particularly, the measurements which subject the least mounting distortion (lengths of dorsal setae d , e , and f ; lengths of ventral setae $3b$ and ps ; length of tibiotarsus IV) fit within observed variation among four examined females (except for seta b being slightly longer in specimen from Ukraine)

DISCUSSION

In their original paper, Sharanov and Mitrofanov compared this species with *T. interruptus* Vitzthum, 1928 sensu Mahunka 1973, from which it was thought to differ by rounded sensilla, point of junction of anteromedial and sejugal apodemes, lengths of setae on ventral metapodosomal plate, shape of tegula and "others". Based on those diagnostics, the senior author of the present work initially included the species in the *T. interruptus* group (Magowski, unpublished Ph.D. thesis). However, the finding of a new material in Southern Italy provided many morphological evidences, demonstrating closer kinship to the *T. bilobatus* group. These are the most notably: tarsal I and femoral I chaetotaxy, the form of ventral metapodosomal

setae, shape of sejugal apodeme and the shape of tegula. Also, the morphology of male (as newly described herewith) indicates the similarity to *T. bilobatus* Suski, 1965. Tarsus I in both sexes is lacking one simple attenuated seta (p''), which normally is present in the majority of species of the genus *Tarsonemus*. Sejugal apodeme, though similar to that of *T. interruptus* and *T. bifurcatus* Schaarschmidt, 1959 by the formation of defined sternal platelet, can also be well compared to that of *T. bilobatus* by straight segments on each side, rather than uniformly arched (in the two former species).

In fact, species of *T. bilobatus* group (including *T. caucasicus*) differ from those of *T. interruptus* group (*T. interruptus* and *T. bifurcatus*) by a richer setal complement of femur II (3 vs. 2 setae) and less triangular gnathosoma (both sexes). Females of *T. caucasicus* differ, in turn, from *T. bilobatus*, *T. saccatus* Livshits, Mitrofanov et Sharonov, 1979, and *T. annotatus* Livshits, Mitrofanov et Sharonov, 1979 by the form of an area of sternal platelet (defined vs. undefined), and males (from *T. bilobatus*) by the form of dorsal setae v_2 and ventral $2a$ and $3b$ (stiff and thick vs. attenuated, slender).

An interesting feature of *T. caucasicus* is a minor distinction between the morphology of the male and female. The structure of the oral parts and the leg chaetotaxy (in general) are congruent (apart from the usual sexual dimorphism characteristic for all tarsonemids). However, the form of ventral coxal setae $2a$ differs between the sexes of this species, being slender in females, but stiff in males (the condition was indistinguishable in studied larvae). In the vast majority of Tarsoneminae the morphology of male ventral setae follows that of the female; and the above mentioned difference seems to be an unusual departure from the common pattern.

ACKNOWLEDGEMENTS

We thank Dr. Evert E. Lindquist (Agriculture Canada; Ottawa, Ontario, Canada) for his valuable comments on the manuscript.

RIASSUNTO

NUOVA SEGNALEZIONE DI *TARSONEMUS CAUCASICUS* (ACARI, TARSONEMIDAE) IN ITALIA CON NOTE MORFOLOGICHE E SISTEMATICHE

T. caucasicus (Acari: Tarsonemidae) viene ridescritto sulla base di un nuovo ritrovamento in Puglia (Italia) su colture di laboratorio di *Verticillium dahliae* e *Armillaria mellea*.

Segue una discussione sulla morfologia e posizione sistematica di questa specie.

Parole chiave: morfologia, sistematica, tassonomia, *T. bilobatus*, funghi in colture di laboratorio.

REFERENCES

- LINDQUIST E.E., 1986 - The world genera of Tarsonemidae (Acari: Heterostigmata): a morphological, phylogenetic, and systematic revision, with a reclassification of family-group taxa in the Heterostigmata. *Mem. Ent. Soc. Can.*, 136: 1-517.
- LIVSHITS I.Z., MITROFANOV V.I., SHARONOV A.A., 1979 - Raznokogotkovye kleschi fauny Kryma (Tarsonemidae. Acariformes). LIVSHITS I.Z. (ed.), Vriediteli i bolezni lesoparkovykh i plodovykh nasazhdenii Kryma. *Trudy Gossudarskovo Nikitskovo Bot.Sada*, Yalta 79: 7-50.
- MAGOWSKI W.L., unpub. - Revision of the genus *Tarsonemus* Canestrini L. Fanzago, 1876 (Acari: Heterostigmata: Tarsonemidae) in Europe. Ph.D. thesis, A. Mickiewicz University, Poznań.
- MAHUNKA S., 1973 - Beiträge zur Kenntnis der Systematik, Taxonomie, Ontogenie, Ökologie und Verbreitung der Tarsonemiden. I. (Acari: Tarsonemida). *Folia Ent. Hung.*, 26(2): 345-355.
- SCHAARSCHMIDT L., 1959 - Systematik und Ökologie der Tarsonemiden. *Beitr. Syst. Ökol. Mitteleur. Acarina I, Abschn.*, 5: 713-823.
- SHARONOV A.A., MITROFANOV V.I., 1986 - Dva novykh vida roda *Tarsonemus* (Acariformes, Tarsonemidae). *Vestn. Zool.*, 6: 15-18.
- SUSKI Z.W., 1965 - Tarsonemid mites on apple trees in Poland. II, *Tarsonemus bilobatus* n. sp. (Acarina, Tarsonemidae). *Bull. Acad. pol. Sci. Cl. V. Ser., Sci. biol.*, 13: 539-544.
- VITZTHUM H. GRAF, 1928 - Acarologische Beobachtungen. 13. Reihe. *Zool. Anz.*, 75: 281-295.