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ON THE IDENTITY OF PHOTOSEIUS PLUMIFER
(CANESTRINI & FANZAGO, 1876) (ACARI: PHYTOSEIIDAE)

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(Accepted March 2001)

SUMMARY: The identity of Phytoseius plumifer, one of the first phytoseiid species to be described, is a matter of longstanding controversy among taxonomists. On the other hand, the examination of specimens collected in the type locality has not been performed and references on this argument have been neglected in specific literature. During surveys carried out in the type locality, we found as common a Phytoseius species having features consistent with some of those originally reported for P. plumifer. In this work, the literature on the identity of P. plumifer is critically analyzed and a neotype of this species is designated and described.

INTRODUCTION

The identity of Phytoseius plumifer, a species originally described by Giovanni Canestrini & Filippo Fanzago (1876) as Gamasus plumifer from specimens collected in northern Italy (Maser, Treviso, Veneto region), is a matter of longstanding controversy among acarologists. The type of Canestrini & Fanzago and the specimens used by Ribaga (1904) to propose the genus Phytoseius were probably lost. Ribaga redescribed P. plumifer using material collected by Berlese and described two new species: P. finitimus and P. horridus.

These contributions (Canestrini & Fanzago, 1876; Ribaga, 1904) did not appear to be exhaustive enough to the acarologists working on this subject. Chant (1957) examined two slides labelled by Berlese (Phytoseius plumifer, Vitis vinifera, Spalato, Berlese collection, Florence, Italy). He proposed to attribute the identity of the species described by Canestrini & Fanzago to these specimens. Pritchard & Baker (1962) stated that some

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characteristics of BERLESE's specimens were discordant with RIBAGA's redescription of P. plumifer (1904) whereas they corresponded to the description of P. finitimus. Other taxonomists contributed to this problem, adding further interpretations and hence several doubts still remain on the real identity of P. plumifer and of the Phytoseius species described by RIBAGA.

None of these dissertations were based on the examination of specimens collected from the type locality or from other Italian sites: the specimens of Phytoseius of the BERLESE's collection were collected from Croatia (Spalato, now Split). Moreover, references on this argument are not limited to those reported by taxonomists working on this subject, in particular the contributions of CANESTRINI & FANZAGO (1876) and of RIBAGA (1904). The additional publications (CANESTRINI & FANZAGO, 1877; CANESTRINI & CANESTRINI, 1882) and especially BERLESE's studies (1882, 1886, 1901, 1905, 1913, 1918), reported important information on the identity of P. plumifer. They have been neglected in specific literature. Moreover, it should be mentioned that RIBAGA was BERLESE's assistant and that the latter co-operated with CANESTRINI at the beginning of his career.

During surveys carried out in the Veneto region, where P. plumifer was originally collected, we collected a widespread Phytoseius species on some wild plants, frequent on nettle and bramble. The features of this species fit with some of those reported for P. plumifer by CANESTRINI & FANZAGO (1876, 1877), BERLESE (1886) and RIBAGA (1904). During these surveys, several individuals were found at Maser (the type locality) and Padua, where specimens used in RIBAGA's redescription of P. plumifer had been collected. In this work, the literature on the identity of P. plumifer is critically analyzed and a neotype of this species is designated.

NOTES ON THE ORIGINAL DESCRIPTION OF P. PLUMIFER (SUB GAMASUS PLUMIFER) AND ITS REDESCRIPTIONS BY ITALIAN ACAROLOGISTS

The original description of G. plumifer was compiled by CANESTRINI & FANZAGO in 1876:

_Trovato sotto alle foglie a Maser nel Trevigiano. E' di un color giallognolo biancastro sporcio; ed il corpo è assai allungato, tronco alle due estremità. Questa specie è caratterizzata dalle spine del dorso leggermente pennate. Ve n'hanno quattro per lato, piantate alquanto indentro sul dorso: le prime due agli omeri, una più interna e l'altra inferiore marginale, posta nella stessa linea verticale, in modo che questa resta coperta dalla superiore; la terza subito dopo l'inserzione delle zampe del terzo paio; e la quarta, o ultima ai lati della troncatura posteriore. Sul margine posteriore se ne vedono quattro, due più esterne curve indentro; e due interne, diritte, convergenti l'una verso l'altra. Un altro paio di simili setole pennate si trova all'estremità anteriore del corpo, e sono più brevi. Le zampe sono armate di setole, le quali vanno aumentando in lunghezza dalla base all'apice, ma nessuna si fa particolarmente notare. Solo su quelle del quarto paio, sulla patella, ve ne sta una al lato interno, robustissima e lunga._

_Raggiunge quasi due terzi di millimetro di lunghezza._

One year later, CANESTRINI & FANZAGO (1877) redescribed G. plumifer adding some important notes. The first concerned the position of one of the dorsal setae, which was not located along the dorsum, the second to the long seta placed on the fifth (tibia) rather than on the fourth (genu) leg article. The length of G. plumifer was 0.75 mm.

In the contribution “I Gamasi Italiani”, Giovanni and Riccardo CANESTRINI (1882) mentioned that the original description of G. plumifer concerned a juvenile stage of a mesostigmatic mite. This form was not attributed to a definite species. This concept was accepted by BERLESE (1882) who considered G. plumifer to be a nymphal stage (“ninfa ibontomorfa”) of Gamasus stabularis var. echinatus. These particular nymphs presenting male and female features were able to reproduce and were commonly found on the leaf undersurface of pubescent leaves.

Some years later (1886) BERLESE assigned G. plumifer to the genus Laelaps Koch and redescribed the species:

_Protonympha. Foemina ovigera. Corpus valde elongatum, setis sex posticis, robustis, spinosis, subplumo­sis, quatuor scapularibus, dubus ad verticem, nec non altera in tibiis posticis. Hyalina 300 μ. long. Mas stric­tor, foeminae aequalis._

_Può darsi, sia la protonympha del Seius echinatus,

The redescription of *L. (= Gamasus) plumifer*, based on material collected by Berlese himself, is similar to that reported by Canestrini & Fanzago (1877). The dorsal chaetotaxy is more precise and the long seta on the tibia of leg IV is still reported but the body length is quite different (300 μm rather than 0.75 mm). A drawing of the species is also given. Since this material was collected on *Vitis vinifera* one could suggest a relationship between these specimens and those located in the Berlese collection in Florence. However, the long and robust seta on tibia IV mentioned by Berlese is not present on the material in Berlese's collection examined by Chant. In the latter specimens, two relatively short macrosetae are present only on tibia IV (20 μm) and basitarsus IV (32 μm) (Chant & Athias-Henriot, 1960). Therefore, the specimens used by Berlese to describe *L. plumifer* show different characteristics from those preserved in Berlese's collection. According to Berlese, *L. plumifer* is the protonymph of another species, probably *Seius echinatus* Koch. At that time, the author considered the protonymphs of "Gamasidi" as having phytophagous habits.

In 1901, Berlese changed his opinion about the form described by Canestrini & Fanzago, considering the same a true species, i.e. *Iphidulus plumifer*, belonging to the family Laelaptidae. Moreover, he attributed the status of predatory mite to *I. plumifer*. The description of *Iphidulus plumifer*, reported in Italian language, is very similar to that given in 1886 and the same drawing is added:

*Corpo molto allungato, con sei setole posteriori robuste, spiniformi, barbatule; quattro altre scapolari e due al vertice conformi, ed una ancora sulle tibie posteriori. Italino.*

*Lungo circa 300 μ.*

*La presente forma è la più allungata tra quelle che vivono sulle piante e rientrano nel gruppo. Inoltre sono caratteristici i sei peli dell’addome posteriori, lunghi e di cui quelli più dorsali rivolti all’insù. Si trova col precedente, ma è più raro.*

Berlese recommended the study of these predators to Ribaga, who later published a preliminary note (1904) reporting four genera (*Seiulus* Berlese, *Iphidulus Ribaga, Echinoseius Ribaga* and *Phytoseius Ribaga*) and some simple criteria for their identification. The description of the genus *Phytoseius* is here reported:

*Corpus ovale, setulis quattuordecim perlongis, denticulatis, dorsalibus armato. Setis dubius infrascapularibus dubiusque medianis erectis, majoribus, setis pre- caudalibus arcuatius, antorsum vergentibus; seta gemule bene evoluta sed simplice. Scuto genitale foeminae basi latiore quam scutum anale.*

The species belonging to this genus are characterized by an oval body shape and 14 long and serrated dorsal setae. We attribute the terms *infrascapulare* to setae *s4, medianae* to *s6, precaudales* to *ZA* (in setae nomenclature we follow Rowell et al., 1978). Thus, the genus *Phytoseius* is characterized as having setae *s4* and *s6* large and erect, seta *Z4* curved and turned forward, a developed seta on the genu, the base of genital shield wider than that of anal shield. The interpretation of the terms *scutum* *anale* and *seta* *generale* is discussed later.

The redescription of *P. plumifer* is then reported:

*Phytoseius plumifer* Can. et Fan.

*Setulis dorsalis omnibus mediocriter incrassatis. Setulis medianis vix majoribus quam infrascapulares. Scuto anale feminae subpentagono, angulis anticus evanidis, margine rotundato, pilorum parti unico.*

*Long. corp. 330 μ. Lat. > 170 μ.*

*Habitat. Exempla vidi a cl. Berlese, Patavii collecta (super Urticas).*

The features of dorsal setae, the ratio between certain of them (*s4* and *s6*), the shape and the chaetotaxy of the *scutum* *anale* are the most significant characters used by Ribaga to describe *P. plumifer*. Most of them are innovative in comparison with the descriptions given by Canestrini & Fanzago, and Berlese. The ratio between the length of the above-mentioned setae and body width, and the features of *scutum* *generale* were also used in the description of *P. horridus* and *P. finitimus*. The contribution of Ribaga has been developed as a diagnostic key of 4 genera and respective species. The reader must consi-
nder the whole manuscript in order to interpret some apparent mistakes. The manuscript has recently been reported in a publication devoted to Ribaga’s contribution where the original descriptions of P. plumifer, P. horridus and P. finitimus have been translated to English (Fontana & Duso, 1995).

The most relevant problems regarding the interpretation of the identity of these species concern the term scutum anale and the location occupied by the setae mentioned at the end of descriptions. In our opinion scutum anale means ventri-anal shield for at least two reasons: its width in relation to the genital shield basis reported in the description of genera Phytoseius and Iphidulus; its sub-pentagonal shape in P. plumifer (unusual in anal shields). In this case, the setae mentioned by Ribaga in P. plumifer’s description are inserted in the ventri-anal shield and should be the preanals. Concerning P. horridus and P. finitimus, Ribaga described the genital shield rather than the ventri-anal shield. One could suggest that the setae reported at the bottom of the description are located in the genital shield. However, the sentence concerning setae is separated from the description of the genital shield by a semicolon (P. horridus) or a mark (P. finitimus). Hence, these setae should be preanals in accordance with P. plumifer’s description and the logic of the comparative analysis among the three species. Moreover, it is well known that the genital shield of the Phytoseius species bears only one pair of setae.

Another question concerns the term seta geminale, as a characteristic of the genus Phytoseius. The first description of P. plumifer by Canestrini & Fanzago (1876), reporting a large seta on the genu (patella), was amended one year later when these authors stated that a large seta was present on the tibia of leg IV but not on the genu. Berlese (1886) confirmed this version.

It should be mentioned that a long macroseta on tibia IV and relatively short macrosetae on genu and basitarsus are present on P. plumifer sensu Athias-Henriot, 1957 and P. horridus sensu Athias-Henriot, 1957.

Doubts remain on this matter. When Ribaga published his note he declared that the study would be presented in a more precise and extensive way. Unfortunately this contribution has not been published and, apparently, the material by Ribaga concerning mites is not available (Fontana & Duso, 1995).

After Ribaga’s contribution, Berlese published the “Monografia del genere Gamasus” (1905), in which Gamasus plumifer Canestrini & Fanzago (1876 et 1877, sic) was assigned to the genus Phytoseius Ribaga. Berlese mentioned both descriptions by Canestriani & Fanzago and accepted Ribaga’s contribution suggesting that there was agreement on the identity of P. plumifer among these authors despite the different approaches and methods used in their descriptions. Later, in the Acarotheca italica (1913), Berlese put the tribe Phytoseini, in which he included the genera Seiulus Berlese, Iphidulus Ribaga, Echinoseius Ribaga and Phitoseius Ribaga (sic) in the family Laelaptidae and in the suborder Mesostigmata. When, some years later (1918), Berlese published the “Centuria quarta di Acari nuovi”, Seiulus spoofi Oudemans was considered to be a junior synonym of Phytoseius horridus Ribaga, confirming the relevance given to Ribaga’s contribution at that time.

THE INTERPRETATIONS OF MODERN ACAROLOGISTS ON THE IDENTITY OF P. PLUMIFER

In the 40’s, Gamasus plumifer was designated as the type of the genus Phytoseius Ribaga by Vitzthum (1943).

In a revision, Nesbitt (1951) considered the original descriptions of P. plumifer inadequate for recognizing the true identity of this species. He included only one species, formerly Typhlodromus spoofi (Oudemans), in the genus Phytoseius that was redescribed. Phytoseius finitimus and P. horridus were considered to be “dubious species”.

In 1957, Chant examined two slides of the Berlese collection (224/41 and 224/42) containing specimens found on Vitis vinifera (Split, Croatia) and labelled as Phytoseius plumifer. He described these specimens as characterized by having 3 pairs of preanal setae on the ventrianal shield, setae J2 and R1, a relatively short macroseta on basitarsus of leg IV. Since types of P. plumifer were not available,
Fig. 1: *Phytoseius plumifer* (neotypus) adult female, dorsal aspect.

Figs. 2-4: *Phytoseius plumifer* (neotypus) adult female. 2. — ventral aspect. 3. — leg IV. 4. — Spermathecae.
CHANT assigned a considerable importance to these slides. He considered that BERLESE had had the possibility of visiting the CANESTRINI & FANZAGO collection and hence of determining these specimens correctly.²

During the same period of the CHANT contribution, ATHIAS-HENRIOT (1957) described specimens of Phytoseius collected in Algeria, having one pair of preanal setae. She considered them conspecific with those described by RIBAGA as P. plumifer. ATHIAS-HENRIOT also collected specimens of Phytoseius having three pairs of preanal setae and assigned them to P. horridus.

In 1959, CHANT reproposed the concept of P. plumifer presented in 1957. WAINSTEIN (1959) accepted this interpretation and proposed to divide the genus Phytoseius into the subgenera Phytoseius s. str. and Dubininellus. In the first subgenus, including P. plumifer, setae J2 and R1 were present. The second subgenus, in which J2 and R1 were lacking, included P. corniger, P. finitimus and P. macropilus (sic).

In 1960, CHANT & ATHIAS-HENRIOT provided the first revision of the genus Phytoseius and accepted the division into the subgenera proposed by WAINSTEIN. CHANT (1957, 1959) reported P. plumifer as being characterized by three pairs of preanal setae. The authors concluded that RIBAGA had misidentified his specimens and that the identity of P. plumifer was assigned to an unidentified species. The specimens having one pair of preanal setae reported as P. plumifer by ATHIAS-HENRIOT (1957), were attributed to a new species, P. ribagai ATHIAS-HENRIOT, which was elevated to the rank of type species of the genus Phytoseius. The status of P. horridus, redescribed by ATHIAS-HENRIOT (1957), was confirmed while P. finitimus was considered species dubia.

MUMA (1961) considered Dubininellus as a genus. PRITCHARD & BAKER (1962) considered the interpretation of the identity of P. plumifer given by WAINSTEIN (1959) and by CHANT (1960 sic, should be 1959) as being wrong, while they agreed with the early position of ATHIAS-HENRIOT (1957). PRITCHARD & BAKER (1962) attributed to P. finitimus the species described by CHANT (1957) as P. plumifer. These authors included the species in which the sublateral posterior setae were lacking in the subgenus Phytoseius s. str. (e.g. P. plumifer) while those characterized by these setae belonged to the subgenus Pennaseius (e.g. P. finitimus). The subgenus Dubininellus (sic, should be Dubininellus) WAINSTEIN was considered a synonym of Phytoseius s. str. Later, SCHUSTER & PRITCHARD (1963) elevated Phytoseius and Pennaseius to generic rank.

In 1965, CHANT confirmed his previous opinion and in particular that P. ribagai was the type of the genus Phytoseius (CHANT, 1957, CHANT & ATHIAS-HENRIOT, 1960). However, CHANT & BAKER (1965) reconsidered P. plumifer as type species of the genus.

One year later, in his revision of the genus Phytoseius, DENMARK (1966) stated that the mites in BERLESE’s collection examined by CHANT (1957) probably refer to P. finitimus because, according to RIBAGA (1904), P. plumifer is characterized by a single pair of preanal setae. In DENMARK’s opinion, RIBAGA missed the posterior sublateral setae when he examined P. plumifer. DENMARK (1966) did not find specimens referring to P. plumifer, i.e. showing one pair of preanal setae and two pairs of sublateral setae. At the same time, the author redescribed P. finitimus, from specimens collected on the grape in Algeria, as a species characterized by 3 pairs of preanal setae and three macrosetae on genu (18.8 μm), tibia (19.4 μm) and basitarsus (40.2 μm). DENMARK included in the subgenus Phytoseius those species having usually a smooth dorsal shield, 16 pairs of dorsal setae, two pairs of sublateral setae, such as P. finitimus, and implicitly P. plumifer. In the species belonging to the subgenus Dubininellus, he included P. horridus and P. ribagai. The description of P. horridus is consistent with that given by ATHIAS-HENRIOT (1957) whereas that of P. ribagai differs because of the presence of two pairs of preanal setae rather than a single pair. Two years later, MUMA & DENMARK (1968) adopted the subgenera Phytoseius s. str. and Pennaseius proposed by PRITCHARD & BAKER (1962).

² In the original catalogue of the Canestrini collection, held in Padua, G. plumifer is not mentioned.
In 1970, Wainstein again discussed the identity of *P. plumifer* suggesting that the specimen described by Ribaga (1904) was a deutonymph of *P. finitimus* as only nymphs are characterized by a simple anal shield (literal interpretation of the term *scuto analis feminae*), having one pair of para-anal setae. In accordance with Wainstein’s concept *P. finitimus* should be considered a synonym of *P. plumifer*. Wainstein proposed 4 subgenera: *Phytoseius* s. str. having *P. plumifer* as type species, *Dubininellus*, *Platysyeiella*, and *Euryseius*.

In 1992 Chant & Yoshida-Shaul analysed the literature dealing with the genus *Phytoseius*. They stated that the identity of *P. plumifer* should be based on the specimens preserved in Berlese’s collection in Florence. This position was shared by Karg (1993) who agreed on the characteristics of *P. ribagai* reported by Denmark (1966).

Chant & McMurry (1994) revised the status of the subfamily Phytoseiinae and proposed three genera: *Chantia*, *Phytoseius* and *Platysyeiella*. The genus *Phytoseius* included three species-groups: *plumifer* Chant and Yoshida-Shaul, *purseglovei* Chant and Yoshida-Shaul and *horridus* Denmark. The species of the *plumifer* group bear *J2* and *R1* setae while those belonging to the *horridus* group lack these setae. Walter & Beard (1997) reviewed the subfamily Phytoseiinae from Australia and Wu (1997) the genus *Phytoseius* from China. They followed most of the concepts proposed by Chant & McMurry (1994). More recently, Swirsksi et al. (1998) described *Phytoseius plumifer* from Israel as characterized by having *J2* and *R1* setae.

**Discussion**

The majority of acarologists working on this subject have considered that the original descriptions of *P. plumifer* (Canestrini & Fanzago, 1876; Ribaga, 1904) were too generic and vague. Only Athias-Henriot (1957) and Pritchard & Baker (1962) paid attention to Ribaga’s contribution. However, the redescription of *G. plumifer* by Canestrini and Fanzago (1877) and that of *L. plumifer* by Berlese (1886), with the relative drawing, were ignored by all the authors involved in this subject. The knowledge of the latter might be useful for clarifying that the specimens in Berlese’s collection could not belong to the species described and illustrated by the same author. In this paper the tibia of leg IV bears a long macroseta but this feature does not appear in Chant’s redescription (1957). In the subsequent contribution on *P. plumifer*, Chant & Athias-Henriot (1960) reported two relatively short macrosetae on tibia and basitarsus of leg IV.

Authors working on this argument could not examine the type material, which has probably been lost, and they did not search for topotypic specimens of *P. plumifer*.

During the last two decades, extensive surveys of phytoseids occurring on wild and cultivated plants in north-eastern Italy (Veneto region) have been carried out by the present authors and some colleagues. Frequently, we collected specimens of *Phytoseius* characterized as having setae s6 (*medianae*) comparable to or slightly longer than setae s4 (*infrascapulare*), the ventri-anal shield bearing one pair of preanal setae, a long macroseta on tibia of leg I, setae R1 and J2 are not present on their dorsum. These specimens have features consistent with the descriptions of *P. plumifer* reported by Canestrini & Fanzago, but especially with the descriptions by Berlese and Ribaga. The species was often dominant on nettle (Duso & Fontana, 1996) and rare on *Vitis vinifera* and *Vitis labrusca*. *Phytoseius* specimens having features consistent with those of *P. finitimus* were found on bramble in only a few sites located near the Adriatic sea (Girolami, pers. comm.) and on cultivated grapes (Duso & Moretto, 1994; Duso & Ren, 1997). *P. finitimus* is frequently collected in central and southern Italy (Castagnoli et al., 1989; Ragusa & Ciulla, 1991) where the taxon referring to *P. plumifer* sensu Ribaga was not recorded. Specimens probably referring to *P. horridus* were found on arboreal plants, and rarely on bushes, in various regions.

The species that we herewith propose to attribute to *P. plumifer* has been collected from Maser (on nettle, bramble and pellitory-of-the-wall) and from Padua (on nettle, pellitory-of-the-wall, wild grapes). These specimens are morphologically identical and, according to a preliminary electrophoretical analysis, belong to the same species. The
characteristics of this taxon are consistent with those reported for the species collected and described by BERLESE and later by RIBAGA. The neotype is described and illustrated. A definition of the neotype was necessary in order to be included in the redefinition of the genus Phytoseius Ribaga, P. plumifer being the type species.

**DESCRIPTION OF THE NEOTYPE OF PHytoseius plumiFEr (G. CANESTRINGI & FANzAGO, 1876)**

The style used in the description of the neotype of P. plumifer and idiosomal chaetotaxic formulae follows those of CHANT & YOSHIDA-SHAUL (1992) and YOSHIDA-SHAUL & CHANT (1995), setae nomenclature that of ROWELL et al. (1978). Measurements, in micrometers, are provided for a female and a male.

**Adult female (Figs. 1-4)**

Idiosomal setal pattern 12A:3A/JV-3, 4:ZV: setae j1, j3, j4, j5, j6, z2, z3, z4, z5, s4, s6, and r3 are present on the podoscutum; setae J5, Z4, Z5 are present on the opisthoscutum; setae JV1, JV2, JVS, ZV1, ZV2 and ZV3 are present on the caudoventral region; setae J2 and J1 are absent.

Dorsal shield reticulated on the opisthoscutum and laterally on the podoscutum, rugose on the central region of the podoscutum; length 317 μm; width 187 μm. No solenostomes are visible on the dorsal shield. Seta s4 inserted at level of r3 as well as setae Z5 and j5. Setae j1, j3, j4, j5, j6, r3, Z4 and Z5 serrated, short to long; z2, z4 and J5 short and slightly serrated, j4, j5, j6 and z5 short and not serrated. Measures of dorsal and sublateral setae (respectively right and left) are reported: j1 36-36 μm; j3 43-43 μm; j4 5-5 μm; j5 5-5 μm; j6 5-5 μm; J5 7-7 μm; z2 12-12 μm; z3 34-36 μm; z4 14-14 μm; z5 3-3 μm; Z4 86-84 μm; Z5 94-94 μm; s4 103-103 μm; s6 103-103 μm; r3 53-53 μm.

Sternal shield smooth. Genital shield with light rugose areas, width 74 μm. Ventrianal shield smooth sub-pentagonal with setae JV2 near the anterior margins on the shield; length 96 μm, width 62 μm. Setae JV1, JV5, ZV1, ZV2, ZV3 are located on the integument surrounding the ventrianal shield; JV5 are clearly serrated; length 74-74 μm. Length of primary metapodal plate 34-34 μm, width 4-4 μm, secondary metapodal plate not distinguishable. Peritreme extending anteriorly to level of j1.

Cervix of spermatheca cup-shaped with long neck. Fixed digit of chelicera with three big teeths, of different size, and pilus dentilis; movable digit with one tooth.

The number of setae on trochanter, femur, genu and tibia of palp are respectively: 2, 5, 6, 12; Chaetotaxy of femora, genua, tibiae of leg segments: femur I 10; genu I 10; tibia I 9; femur II 10; genu II 7; tibia II 7; femur III 6; genu III 6; tibia III 6; femur IV 5; genu IV 6; tibia IV 5.

Length of palp and legs: palp 173 μm; leg I 336-341 μm; leg II 288-298 μm; leg III 293-293 μm; leg IV 461-461 μm. Genu, tibia and basitarsus of leg IV each with one macroseta: genu 30-30 μm; tibia 84-82 μm; basitarsus 22-24 μm.

**Adult male (Figs. 5-7)**

The features of dorsal shield and of dorsal setae are similar to those described for the female. Length of dorsal shield 247 μm; width 168 μm. Measures of dorsal and sublateral setae (respectively right and left) are reported: j1 24-24 μm; j3 36-36 μm; j4 5-5 μm; j5 5-5 μm; j6 5-5 μm; J5 6-6 μm; z2 11-12 μm; z3 29-29 μm; z4 22-24 μm; z5 4-4 μm; Z4 46-46 μm; Z5 53-53 μm; s4 60-60 μm; s6 60-60 μm; r3 38-38 μm.

Sternogenital shield with five pairs of setae. Ventrianal shield with three pairs of setae (JV1, JV2, ZV2). Length of ventrianal shield 103 μm; width 136 μm. Seta JVS serrated inserted on the integument surrounding the ventrianal shield; length 26 μm.

Spermadactyl features are reported. Palp and legs measures: palp 137 μm; leg I 288 μm; leg II 240 μm; leg III 230 μm; leg IV 374 μm. Genu, tibia and basitarsus with one macroseta: genu 17-19 μm; tibia 44-38 μm; basitarsus 22-22 μm.

**TYPE** — The female neotype and other topotypic specimens have been collected on nettle at Maser, Veneto, Italy, October 12, 1994. The neotype is deposited at the Istituto Sperimentale per la
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REFERENCES


