

## The genus *Folsomides* Stach of the Ibero-balearic fauna, with description of a new species (Collembola, Isotomidae)<sup>1</sup>

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### Resumen

El género *Folsomides* Stach en la fauna íbero-balear, con descripción de una nueva especie (Collembola, Isotomidae)

El género *Folsomides* Stach, 1922 está representado en la fauna Ibero-balear por nueve especies, de las que una se describe como nueva para la ciencia. *Folsomides mediterraneus* sp. n. de Navarra, Zaragoza y Madrid. La nueva especie pertenece al grupo de especies de *Folsomides angularis* (Axelson, 1905) y se diferencia claramente por la quetotaxia de microsensilas. Se adjunta una clave para diferenciar todas las especies del género *Folsomides* presentes en la fauna íbero-balear.

**Palabras clave:** Collembola, Isotomidae, nueva especie, Península Ibérica, Baleares.

### Abstract

The genus *Folsomides* Stach, 1922 is represented by nine species in the Ibero-balearic fauna, one of which is new to the science. *Folsomides mediterraneus* n. sp. is found in Northern Spain (Navarra and Zaragoza) and Central Spain (Madrid). The new species is related to the *Folsomides angularis* (Axelson, 1905) group and it is easily distinguishable from other species by the chaetotaxy of microsensilla. A key for the identification of Ibero-balearic species of *Folsomides* is given.

**Key words:** Collembola, Isotomidae, new species, Iberian Peninsula, Balearic Islands.

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1. Contribution to the Project "Fauna Ibérica II" supported by the DGICYT (PB89-0081) and coordinated by the National Museum of Natural Sciences

## Introduction

The first record of the *Folsomides* genus of the Ibero-balearic fauna was *Folsomides parvulus* Stach, 1922, a common cosmopolitan species present in the Iberian Peninsula (Jordana, Arbea & Ariño 1990). Later *F. angularis* (Axelson 1905) and *F. portucalensis* (Gama 1961) were described from Portugal as *Folsomides variabilis portucalensis* by Gama (1961), also *F. cf. petiti* (Delamare, 1951) and *F. ayllonensis* Simón & Lucíañez, 1990 were recorded and described respectively from the Macizo de Ayllón. Fjellberg (1993) cited these last four species from the Ibero-balearic fauna in his paper on the revision of the genus *Folsomides*. Three more species have been found more recently: *F. almanzorensis* Lucíañez & Simón, 1991 described from Sierra de Gredos, *F. pocosensillatus* Fjellberg, 1993 and *F. xerophilus* Fjellberg, 1993 both from Portugal (Gama *et al.* 1997).

The study of Ibero-balearic specimens of *Folsomides* in the "Fauna Ibérica II" project has revealed a new species besides the eight already mentioned, and is described in this paper. An identification key of this genus in the Ibero-balearic fauna is also provided. The main diagnostic characters to classify the different species are given in Table II.

## Methods

Specimens have been mounted using Hoyer medium to facilitate observation with optical microscopy. Some specimens were dehydrated using ethyl alcohol series increased to 100% and subsequently dried to the critical point with CO<sub>2</sub>. The specimens were set on an aluminium stub and coated with 16 nm of gold in Argon atmosphere with a sputter coater K550 (Emitech). These specimens were observed with a SEM (Scanning Electron Microscope, DSM 940 A Zeiss). SEM microphotographs were taken by R. Jordana and E. Baquero.

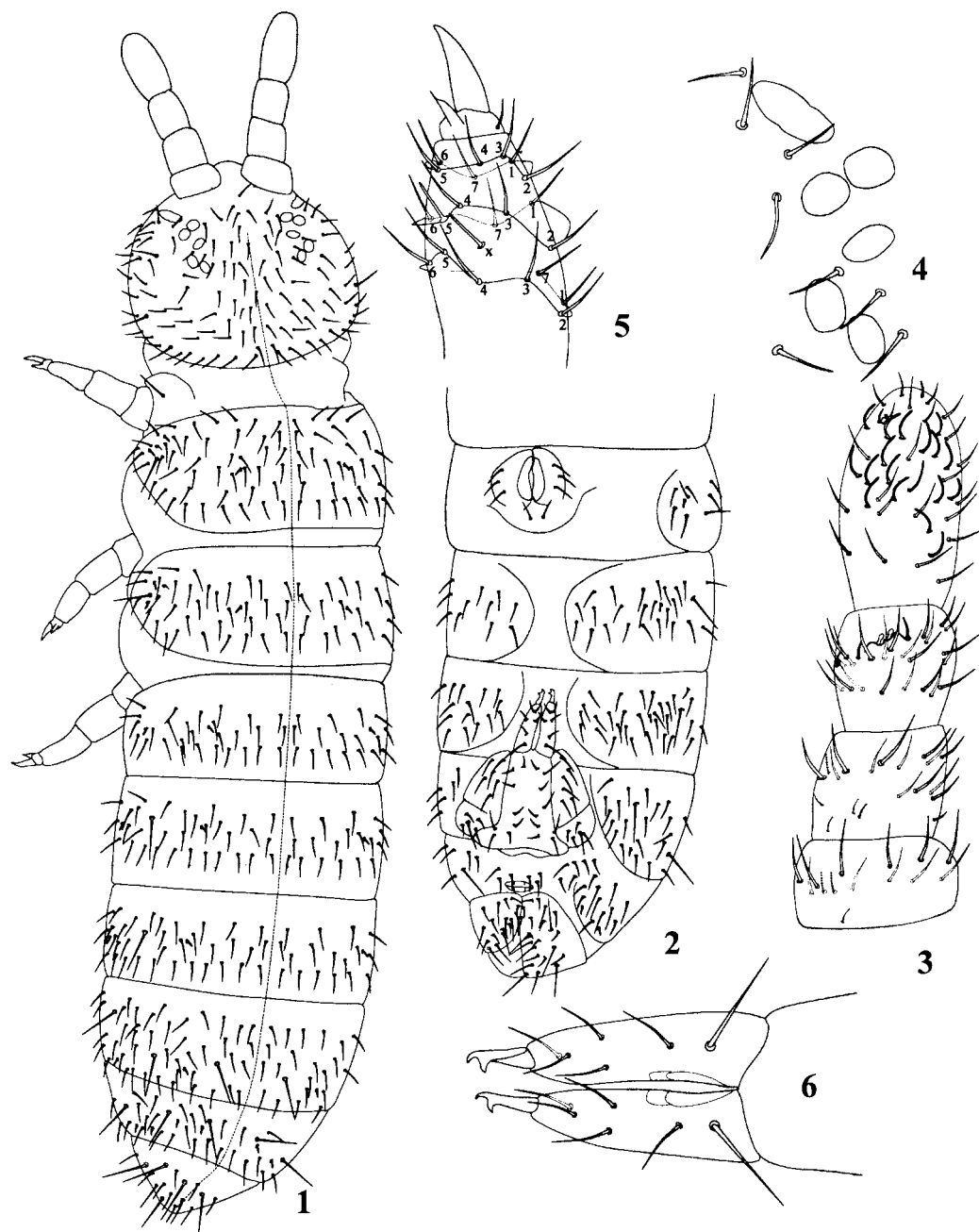
Description terminology follows Fjellberg (1993).

## Species description

### *Folsomides mediterraneus* n. sp.

(Figs. 1-9)

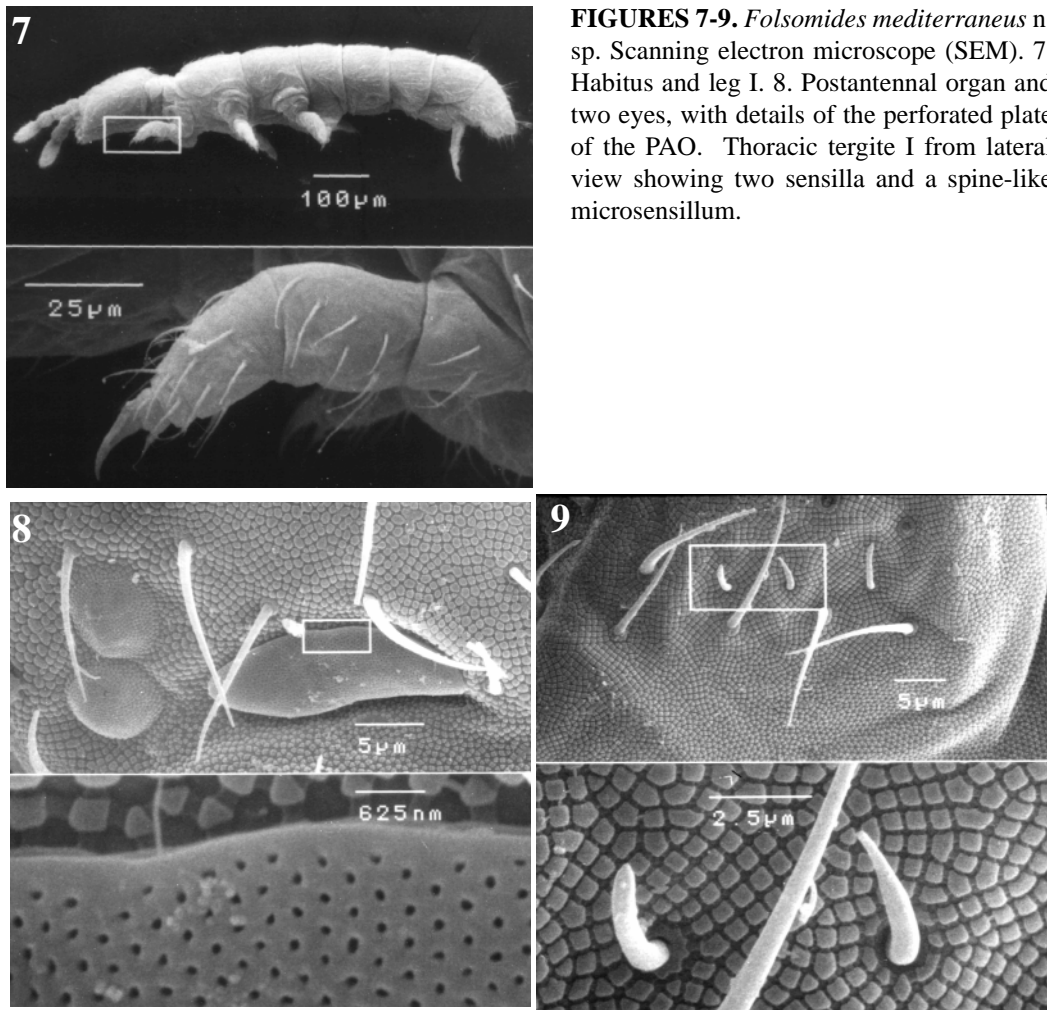
Size: 0.7-0.9 mm males, 0.8-1.0 mm females. Colour: blue greyish; pigment more concentrated in eye fields. Body long and slender (Fig. 7). Dorsal mesochaetae smooth and pointed. Subaxial SA macrochaeta on abdominal tergite IV 0.4 times tergite length (Fig. 1).



**FIGURES 1-6.** *Folsomides mediterraneus* n. sp. 1. Dorsal chaetotaxy. 2. Ventral chaetotaxy. 3. Antenna. 4. Postantennal organ and eye. 5. Tibiotarsus and claw of leg III of a male. 6. Furcula.

Antennae shorter than cephalic diagonal. Antennal segment IV with some 21 dorsal cylindrical sensilla, a dorso-external microsensillum and a subapical pit organ. Sensory organ of antennal segment III with a pair of small and rounded microsensilla and two short

sensilla, one on each side. Another sensillum found in a ventrolateral location. Antennal segment III with 22 normal chaetae. Antennal segment II with a small subcylindrical ventral sensillum and 18 normal chaetae, and some of the basal ones short and fine. First antennal segment with two subcylindrical ventral sensilla and 12 normal chaetae; one of the basal chaetae smaller than the others (Fig. 3).



**FIGURES 7-9.** *Folsomides mediterraneus* n. sp. Scanning electron microscope (SEM). 7. Habitus and leg I. 8. Postantennal organ and two eyes, with details of the perforated plate of the PAO. Thoracic tergite I from lateral view showing two sensilla and a spine-like microsensillum.

Five corneola on each side of head. Postantennal organ long and narrow, 2.5 times corneolae diameter and width of a corneola, with two posterior chaetae (Figs. 4 & 8). Clypeolabral chaetae formula: 2/5,5,4. Maxillary palp bifurcate with three sublobal chaetae.

Dorsal chaetotaxy represented in Figure 1. Axial chaetotaxy of thoracic tergites II-III and abdominal tergites I-V have 5,3/3,3,3,4,2 pairs of mesochaetae respectively. Macrochaetotaxy: 1,1/0(1),1,1,3,3; type 3 of Fjellberg (1993), but lateral macrochaeta (L) of abdominal tergite I similar in length to normal chaetae. Microsensillar chaetotaxy: 1,1/

0,0,0. Sensilla short, smooth and blunt (Fig. 9), half as long as mesochaetae. Two lateral sensilla on abdominal tergite V subequal, slightly smaller than the two medial sensilla.

Tibiotarsi of legs I, II and III with 20, 20 and 22 pointed chaetae respectively. Chaetae *A1-A7*, *B1-B7*, *C1-C7* and *x* present on tibiotarsus of leg III. Tibiotarsi of legs I and II with single chaeta *B4/5*. *B5* and *x* chaetae of legs III in males rod-like modified (Fig. 5). Claw with no teeth on inner edge. Empodial appendage sharp; its length less than half internal edge of claw.

Ventral abdominal chaetotaxy represented in Figure 2. Ventral tube with 3+3 distal chaetae and 1+1 basal ones. The retinacle with 3+3 teeth and one chaeta on corpus. Sub-coxa of furca with six chaetae on anterior side and five on posterior side.

Furca well developed. Manubrium usually with 9+9 dorsal and no ventral chaetae. Dens with five dorsal chaetae and one chaeta in ventro-apical location (Fig. 6). The mucro with two teeth, with a small lateral lamella from base to subapical tooth.

Types Locality: Caparroso, Bardenas (Navarra), Spain. Mediterranean shrub of *Rosmarineto-Linetum* of the association of *Rosmarino-Ericion*. Soil on gypsy rock (torriorthent typical), altitude 300 m, UTM: 30TXM1184, date: 20-VII-1982. leg. Jordana.

**TABLE 1.** Comparison of *Folsomides mediteraneus* n. sp. with the species of *F. angularis* group, which are present in Europe, north Africa and the Canary Islands.

Species	ms (1)	Mc (2)	Dens (3)	Mucro (4)	Retinacle (5)	maxillary Palp.	Distribution
<i>F. petiti</i> (Delamare, 1951) sensu Fjellberg, 1993	10/000	11/11133	2/0	2	3/0	bifurcate	Iberian Peninsula, Canary Islands, France
<i>F. pocosensillatus</i> Fjellberg, 1993	10/000	11/11133	2/1	2	3/1	simple	Iberian Peninsula, Canary Islands
<i>F. vinosus</i> Fjellberg, 1993	10/001	11/11133	3/1	2	3/1	bifurcate	Canary Islands
<i>F. angularis</i> (Axelson, 1905)	10/001	11/11133	3(2)/1	2	4/1	bifurcate	Iberian Peninsula, Europe
<b><i>F. mediterraneus</i> n. sp.</b>	<b>11/000</b>	11/01133 11/11133	<b>5/1</b>	2	3/1	bifurcate	Iberian Peninsula
<i>F. terrus</i> Fjellberg, 1993	<b>11/000</b>	11/11133	2/0	2	3/0(1)	simple	Canary Islands
<i>F. unicus</i> Fjellberg, 1993	11/100	11/11133	2/0	2	3/1	bifurcate	Canary Islands
<i>F. portucalensis</i> Gama, 1961	11/111	11/12233 11/11133	<b>4-6/1</b>	2	3/1	bifurcate	Iberian Peninsula, Canary Islands, South of Europe, Morocco
<i>F. xerophilus</i> Fjellberg, 1993	11/111	11/11133	5(3-5)/0	2	3/1	bifurcate	Iberian Peninsula, Canary Islands, South of Europe, Morocco
<i>F. cumbrosus</i> Fjellberg, 1993	11/111	11/12233 11/11133	2/0	1	3/1	bifurcate	Canary Islands, Morocco

(1): Number of microsensillae from Thor. II to Abd. III. (2): Macrochaetae from Thor. II to Abd. V. (3): Dens: Number of dorsal chaetae/ventro-apical. (4): Mucro: 1 or 2 (with 1 or 2 tooth). (5): Retinacle: Number of tooth/chaetae.

**Holotype** female on slide CA0144-05. Number of paratype specimens in the slides: 5 in CA0144-06, 1 in CA0144-07, 1 in CA0144-09, 7 in CA0144-10, 5 in CA0144-11, 2 in CA0144-12, 7 in CA0144-13, 3 in CA0145-04, 1 in CA0145-05 and 196 in ethyl alcohol. All specimens are deposited in the Zoology Museum at the University of Navarra.

Other specimens: Specimens from the same locality and biotope: 234 from 27-X-1982 (samples CA0276 & CA0279). 27 from 1-III-1983 (samples CA0539 & CA0542). Specimens from the same locality and biotope but occurring in *Pinus halepensis* litter: 1 from 20-VII-1982 (sample CA0147), 3 from 27-X-1982 (sample CA0282). All these specimens were cited as *Folsomides angularis* (Jordana et. al., 1987).

Madrid: Aranjuez, grass on soil of gypsy Serosem, HA, 21-III-1954, leg. W. Steiner (sample T72a). Vallecas, UTM: 30TVK4770, soil of gypsy Serosem, HA, 4-IV-1954, leg. W. Steiner (sample T73), deposited in the Museo de Ciencias Naturales in Madrid, labelled by Steiner as *Folsomides* n. sp.

Zaragoza: Retuerta de Pina, Pina de Ebro, UTM: 30TYL75, Mediterranean shrub of the *Ononidetum tridentatae* association, on moss (*Pleurochaete squarrosa*) and gypsy soil, numerous specimens of different dates between 1987-1992, leg. J. Blasco Zumeta. Deposited in the private collection of J.I. Arbea.

Discussion: Following Fjellberg (1993), *Folsomides mediterraneus* n. sp. belongs to the species group of *Folsomides angularis* (Axelson, 1905) as it has 5+5 corneolae and dens with mucro. The new species is close to *F. terrus* Fjellberg, 1993 which has identical microsensillar chaetotaxy (11/000), but it is very different according to some other characteristics (Table 1). According to its dental chaetotaxy (5/1) it is close to *F. portucalensis* Gama, 1961, but it differs in the microsensillar distribution.

The main diagnostic characteristics are summarised in Table 1.

Biology: *Folsomides mediterraneus* n. sp, lives in a very dry area of Spain characterised by gypsy soils, and typical mediterranean shrub.

*Derivatio nominis*: Its name refers to the broad distribution of the specimen in the Mediterranean area of Spain.

### Key of *Folsomides* species in the Ibero-balearic fauna

(A summary of the main diagnostic characteristics of the species is given in Table 2)

1. Mucro absent (*F. nanus*-group) ..... 2
- Mucro present ..... 3
2. With 5+5 corneola. Microsensilla: 11/111. Dens with 2 dorsal chaetae and 1 ventro-apical chaeta. Retinacle with 3+3 teeth and 1 chaeta on the corpus .....  
..... *F. ayllonensis* Simón & Lucíañez, 1990
- With 2+2 corneola. Microsensilla: 10/000. Dens with 2 dorsal chaetae and no ventro-apical chaeta. Retinacle with 2+2 teeth and 1 chaeta on the corpus .....  
..... *F. almanzorensis* Lucíañez & Simón, 1991
3. With 1-2+1-2 corneoles. Long and very narrow postantennal organ. Microsensillae: 10/001.

- Dens with three dorsal chaetae and no ventro-apical chaeta ..... *F. parvulus* Stach, 1922
- With 5+5 corneoles. Short and rounded postantennal organ (*F. angularis*-group) ..... 4
- 4 Microsensilla: 10/000. Dens with 2 dorsal chaetae ..... 5
- Microsensilla: 10/001. Dens with 3 dorsal chaetae and 1 ventro-apical chaeta .....  
..... *F. angularis* (Axelson, 1905)
- Microsensilla: 11/000. Dens with 5 dorsal chaetae and 1 ventro-apical chaeta .....  
..... *F. mediterraneus* n. sp.
- Microsensilla: 11/111 ..... 6
5. Dens without ventro-apical chaeta ..... *F. petiti* (Delamare, 1951) sensu Fjellberg, 1993
- Dens with 1 ventro-apical chaeta ..... *F. pocosensillatus* Fjellberg, 1993
6. Dens without ventro-apical chaeta and with 5 dorsal chaetae ..... *F. xerophilus* Fjellberg, 1993
- Dens with 1 ventro-apical chaeta and 4-6 dorsal chaetae ..... *F. portucalensis* Gama, 1961

**TABLE 2.** Main diagnostic characteristics of the *Folsomides* species present on the Iberian Peninsula and the Balearic Islands.

Species Group	Species	Size mm	Eyes	ms (1)	Ms (2)	Dens (3)	Mucro (4)	Retinacle (5)	PAO (6)	Maxillary palp	Distribution
<i>parvulus</i> group <sup>a</sup>	<i>F. parvulus</i> Stach, 1922	0,9	2 (1)	10/001	33/33333	3/0	2	3/0	narrow/3	bifurcate	Cosmopolite
<i>intermedius</i> group <sup>b</sup>	<i>F. almanzorensis</i> Lucíañez & Simón, 1991	0,53	2	10/000	11/11133	2/0	0	2/1	oval/2	bifurcate	Iberian Peninsula
<i>angularis</i> group <sup>c</sup>	<i>F. portucalensis</i> Gama, 1961	0,8-0,9	5	11/111	11/12233 11/11133	4-6/1	2	3/1	elongated/2	bifurcate	South of Europe, Iberian Peninsula, Morocco, Canary Islands
	<i>F. xerophilus</i> Fjellberg, 1993	0,75	5	11/111	11/11133	5(3-5)/0	2	3/1	elongated/2	bifurcate	South of Europe, Iberian Peninsula, Morocco, Canary Islands
	<i>F. mediterraneus</i> n. sp	0,7-1	5	11/000	11/01133 11/11133	5/1	2	3/1	elongated/2	bifurcate	Iberian Peninsula
	<i>F. angularis</i> (Axelson, 1905)	0,6	5	10/001	11/11133	3(2)/1	2	4/1	elongated/2	bifurcate	Europe

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Species Group	Species	Size mm	Eyes	ms (1)	Ms (2)	Dens (3)	Mucro (4)	Retinacle (5)	PAO (6)	Maxillary palp	Distribution
	<i>F. petiti</i> (Delamare, 1951) sensu Fjellberg, 1993	0,6	5	10/000	11/11133	2/0	2	3/0	elongated /2	bifurcate	France, Iberian Peninsula, Canary Islands
	<i>F. pocosensillatus</i> Fjellberg, 1993	0,85	5	10/000	11/11133	2/1	2	3/1	elongated /2	simple	Iberian Peninsula, Canary Islands
<i>nanus</i> group <sup>d</sup>	<i>F. ayllonensis</i> Simón & Lucíañez, 1990	0,6-0,9	5	11/111	11/11133	2/1	0	3/1	elongated /2	bifurcate	Iberian Peninsula

a. Anterior sensilla of Abd IV close to SA. 2+2 eyes. Dens with mucro.

b. Anterior sensilla of Abd IV separated from SA. Fewer than 5+5 eyes. Dens without mucro.

c. Anterior sensilla of Abd IV separated from SA. 5+5 eyes. Dens with mucro.

d. Anterior sensilla of Abd IV separated from SA. 5+5 eyes, Dens without mucro.

(1): number of microsensilla of Thor. II to Abd. III. (2): Macrochaetae of Thor. II to Abd. V. (3): Dens: number of chaetae dorsal/ventro-apical. (4): Mucro: 0 (absent), 1 or 2 (with 1 or 2 teeth). (5): Retinacle: teeth number /chaetae. (6): postantennal organ: shape/chaetae number on the posterior margin.

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