

A description of a new species of the genus *Promesomachilis* from Spain (Insecta: Microcoryphia)

Carmen Bach de Roca

Unitat de Zoologia, Departament de Biologia Animal, de Biologia Vegetal i d'Ecologia, Universitat Autònoma de Barcelona. E-08193 Bellaterra, Barcelona, Spain

e-mail: Carmen.Bach@uab.es

Pietro Paolo Fanciulli

Dipartimento di Biologia Evolutiva, Università di Siena, Italy

Miguel Gaju-Ricart

Rafael Molero-Baltanás

Departamento de Zoología, Universidad de Córdoba, Spain

Manuscript received in September 2007

Abstract

A new Microcoryphian species is described from southern Spain. The new species belongs to the genus *Promesomachilis* and is named *P. intermedia* n. sp. because of the presence of intermediate characteristics in comparison with the other two species of the genus. The main features of the new species are: male maxillary palp with a field of spiralized setae on the ventral side of articles II-V, some setae also on article VI; second article of the male labial palp without a process on its distal part, though a little protuberant; labial palp also lacks a field of specialized setae, which are present in the two other species; each female gonapophysis with only 14-16 annuli, the lowest number ever found in the genus. The main feature that allow us to distinguish the three species is the presence of a sensorial field on femur II and III. In *P. intermedia* it is on the outer part of the femur, whereas in the other two species it is different.

Key words: Insecta, Microcoryphia, new species, *Promesomachilis*, Spain

Resumen. Descripción de una nueva especie de *Promesomachilis* de España (Insecta: Microcoryphia)

Se describe una nueva especie de *Microcoryphia* procedente del sur de España a la que denominamos *Promesomachilis intermedia* n. sp., por presentar caracteres intermedios entre las dos únicas que se conocían del género. La nueva especie puede caracterizarse por las siguientes particularidades: la parte ventral de los artejos II a V del palpo maxilar posee un campo de sedas espiraladas que también se encuentran, aunque en menor número, en el artejo VI; la parte dorsal del segundo artejo del palpo labial del macho no presenta ni la protuberancia (apenas perceptible en la nueva especie), ni el campo de sedas espe-

ciales que se hallan en las otras dos; las gonapófisis de la hembra constan de 14-16 divisiones, el menor número entre las tres especies. La principal característica que permite separar la nueva especie de las otras dos es la presencia, en los dos sexos, de un campo sensorial en la cara externa del fémur del segundo y tercer par de patas. En las otras especies, este campo está situado en otros pares de patas.

Palabras clave: *Insecta*, *Microcoryphia*, nueva especie, *Promesomachilis*, España.

Introduction

The genus *Promesomachilis* Silvestri, 1923 is endemic from the Iberian Peninsula and northwestern Morocco. Two species are known from the Iberian Peninsula: *P. hispanica* Silvestri, 1923 and *P. cazorlensis* Bach, 1983.

An allozyme electrophoresis analysis comparing three populations from southern Spain (Fanciulli et al., 1995), revealed the presence of remarkable genetic differentiation of the population collected in Alhaurín de la Torre (Málaga). Morphological investigations on other specimens from Alhaurín de la Torre also revealed some important differences that induced us to describe a new species: *P. intermedia* n. sp.

Material and methods

The specimens were dissected and mounted in slides following the standard procedure. A recent description of this method could be seen in Molero et al. (2004).

Micrographs were obtained by means of scanning electron microscopy. Material preserved in ethanol 80% was dehydrated in absolute ethanol, critical-point-dried in a Balzer CPD 030 apparatus, and coated with gold in a Balzers MED 010 sputter coater. Observations were performed with a Philips XL20 scanning electron microscope.

Systematics

We describe a new species of Microcoryphia: *Promesomachilis intermedia* n. sp.

Description of the male

Body length: 9 mm; Length of the antennae (broken): 4 mm; length of paracercus: 9mm; length of cerci: 4 mm.

Body and appendages are slightly pigmented. The head has pigmentation only around the median ocellus: the front, that protudes between the ocelli, has a tiny pigmentation. Ratio contact line/length of the eyes: 0.55, length/width of the eyes: 0.90 (Fig. 1A).

The antennae are longer than the body (as we have observed in another specimen), scapus ratio maximum length/maximum width: 1.5-1.6; the distal chain

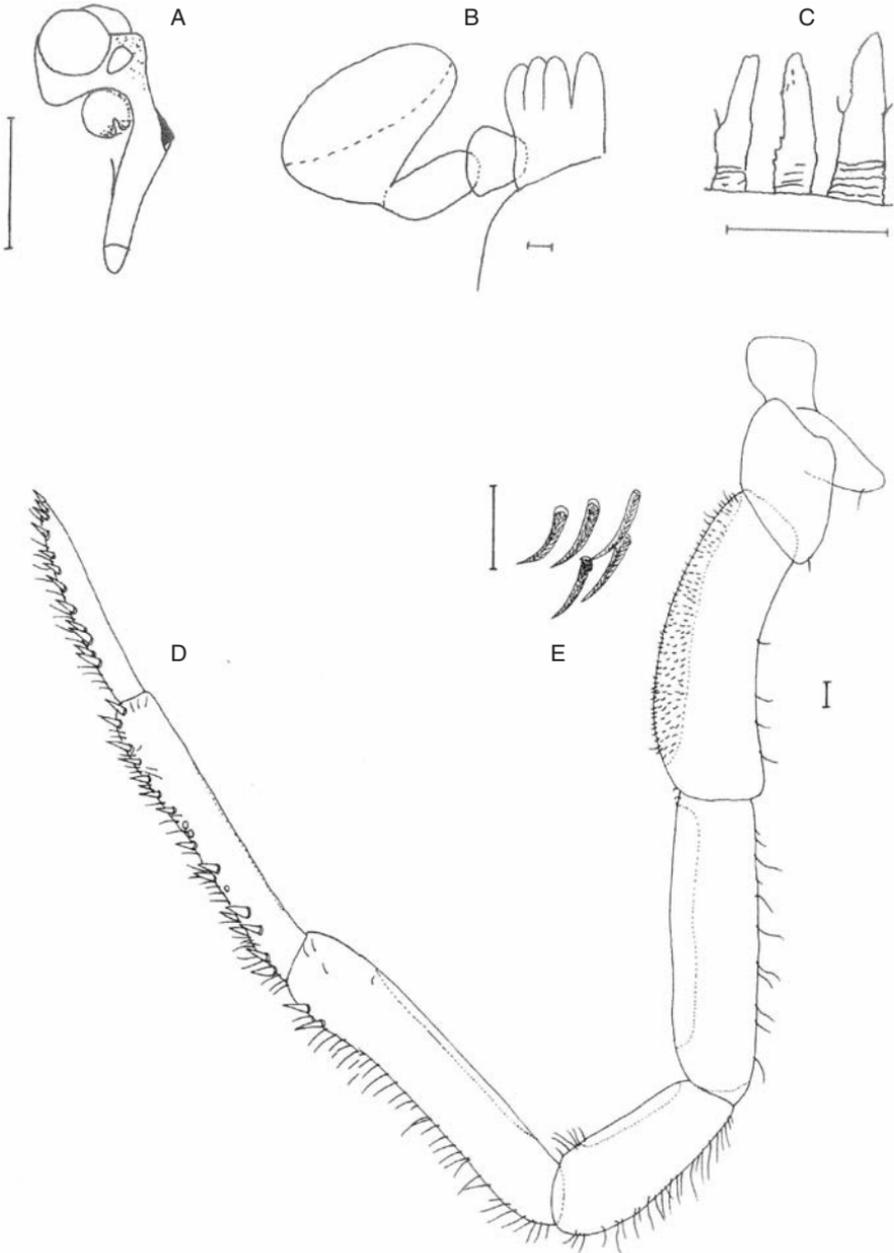


Figure 1. *Promesomachilis intermedia* n. sp. male. A: Head in lateral view. B: Outline of the labial palp. C: Sensory cones of the apex of third article of the labial palp. D: Maxillary palp in external view. E: Setae of the ventral field of the maxillary palp. Scales: 0.1 mm.

with 14 annuli, each one show two rows of bristles with sensilla showing irregular distribution. The flagellum has alternatively white and brown segments (Figs. 2 A,B).

The maxillary palp shows very little brown pigment; it has normal setae and a field of spiralized setae on the ventral side of articles II-V and some others on article VI. The distribution of the hyaline striated spines on the last three articles is: 5:3; 6:15; 7:12 (Figs. 1D, E, 2E). Ratio $n/(n-1)$: 0.69.

The apical part of the third article of the labial palp is widened (typical of the genus) and covered with normal bristles, sensory cones and small sensorial setae (Figs. 1B, C, 2C, D). The second article, a little protruded in the distal part, lacks special bristles or setae, as it occurs in the other two species.

The three pairs of legs show tiny macrochaetae on the coxa. The femur of the foreleg is broader than in the other legs. Midleg without coxal stylet; the femur has a row of sensilla in the outer ventral side. Hindleg with coxal stylet; femur with a field of sensilla on the outer ventral side. The femur also has ciliary bristles on his ventral side. In addition of the normal setae, all legs show spiniform setae on the trochanter, femur, tibia and tarsomeres that, sometimes, appear as spines. (Figs. 2F, 3A-C).

Urosternites II-V with acutangle sternite (Fig. 4A); VI-VII with rectangular one; coxites II-V with two pairs of eversible vesicles; urosternite VIII without parameres; urosternite IX bear the penis and parameres (Fig. 3D). Ratio coxite/stylet (without spine): II-VII: 1.5 -1.86; VIII: 1.21; IX:1.17; ratio spine/stylet (without spine): II-VII: 0.30 - 0.38; VIII: 1.21; IX: 0.19.

Paramera IX with 1+6-7 divisions covered with small spines on his inner side (Figs. 3D, 4B). Penis a little longer than the paramera, showing a circular opening with bristles around the circle a papillae inside (Figs. 3D, 4C). Ratio basal part/distal part: 1.12.

Cerci ending with two spines having different lengths (Fig. 3E).

Description of the female:

Body length: 10 mm; length of the antennae (broken): 4.5 mm; length of paracercus: 9 mm; length of cerci: 3.5 mm.

The head shows similar features as the male. Eyes ratio contact line/length of eyes: 0.52; length/width: 1.0.

Length and sensilla of the antennae as in the male.

The maxillary palp shows diffuse and uniform pigment. It lacks the field of spiralized setae. The outline is as on Fig. 5 A. The distribution of the hyaline spines on the last three articles is: 5:3; 6:16-20; 7:15-16. Ratio $n/(n-1)$: 0.72.

The last article of the labial palp is slightly widened. Shape of sensory cones as in the male (Fig. 5B).

All legs with macrochaeta on the dorsal side of the femur. Forelegs with a slightly widened femur. Midleg and hindleg have a sensory field as in the male. The three pair of legs bear spiniform setae on the ventral side of the femur, tibiae and tarsi (Figs. 5C-E, 6A-C).

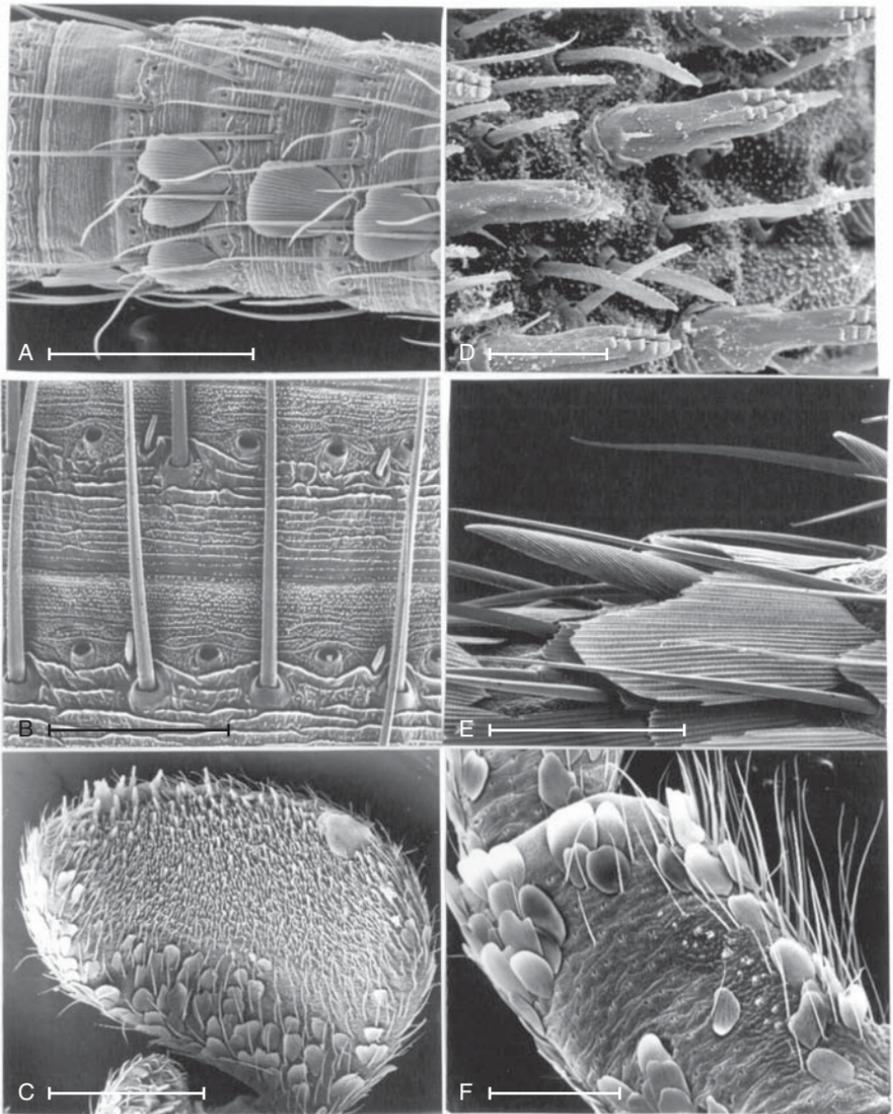


Figure 2. *Promesomachilis intermedia* n. sp. male. A: Annuli of the antennal chain. Scale: 100 μm . B: Row of setae and sensilla of the annuli. Scale: 50 μm . C: Third article of the labial palp. Scale: 200 μm . D: Sensory cones of the third article of the labial palp. Scale: 20 μm . E: Shape of the spines on the dorsal side of the 5th, 6th and 7th articles of the maxillary palp. Scale: 60 μm . F: Femur of the 2nd pair of legs showing the field of sensory sensilla. Scale: 200 μm .

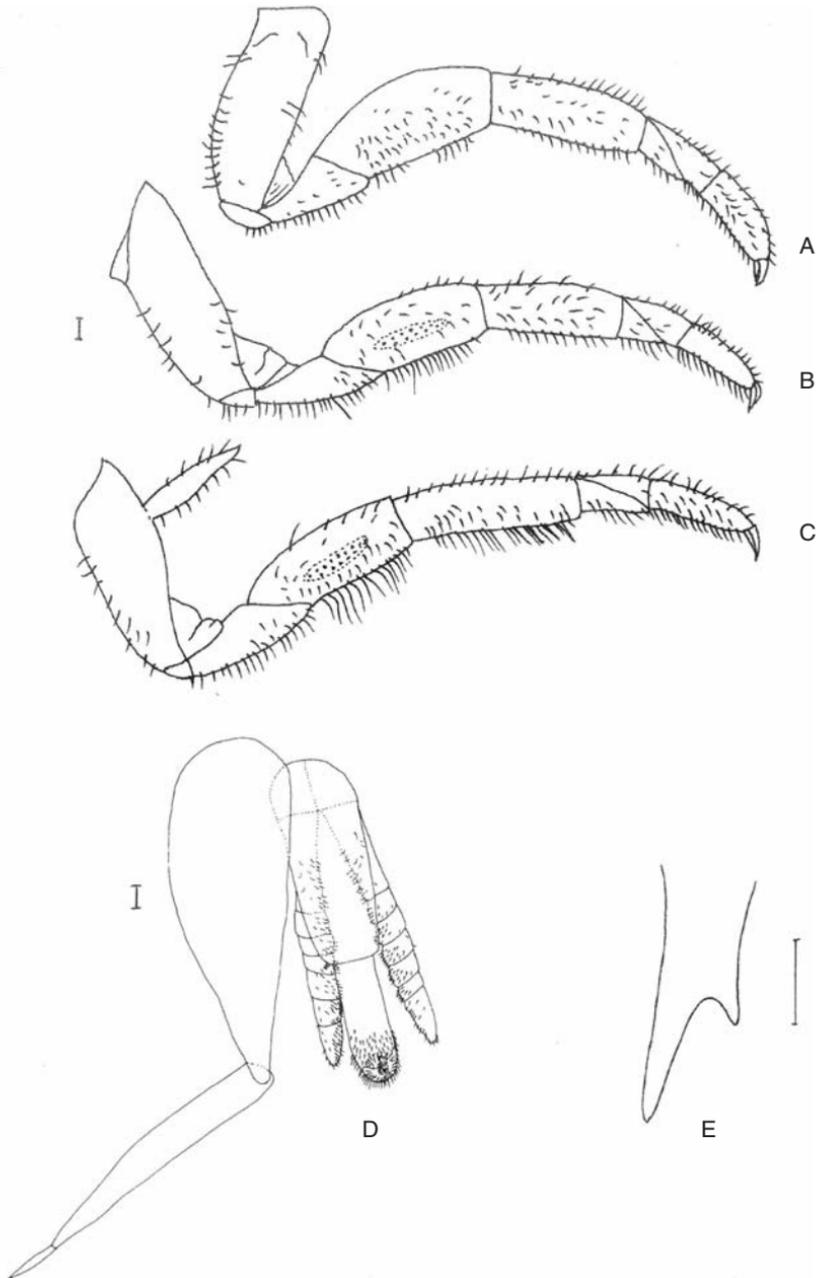


Figure 3. *Promesomachilis intermedia* n. sp. male. A. First pair of legs. B: Second pair of legs showing the sensorial field of sensilla on the femur. C: Id. third pair of legs. D: IX urosternite with penis and paramera. E: End of the cerci. Scales: 0.1 mm.

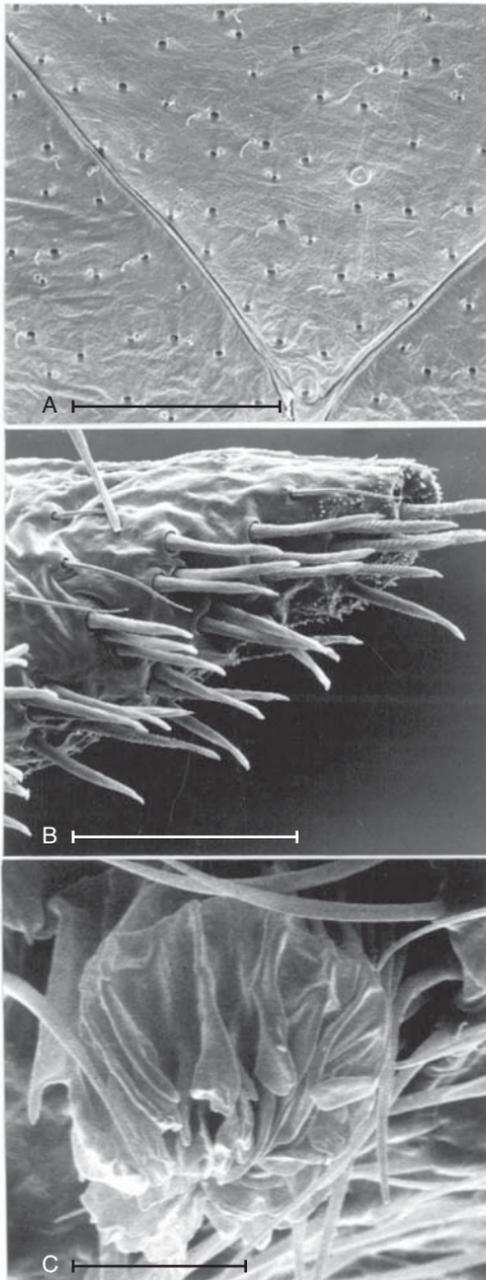


Figure 4. *Promesomachilis intermedia* n. sp. male. A: Coxite of the V urosternite. Scale: 100 μ m. B: Spines on the ventral side of paramera. Scale: 50 μ m. C: Papilla inside the penis opening. Scale: 20 μ m.

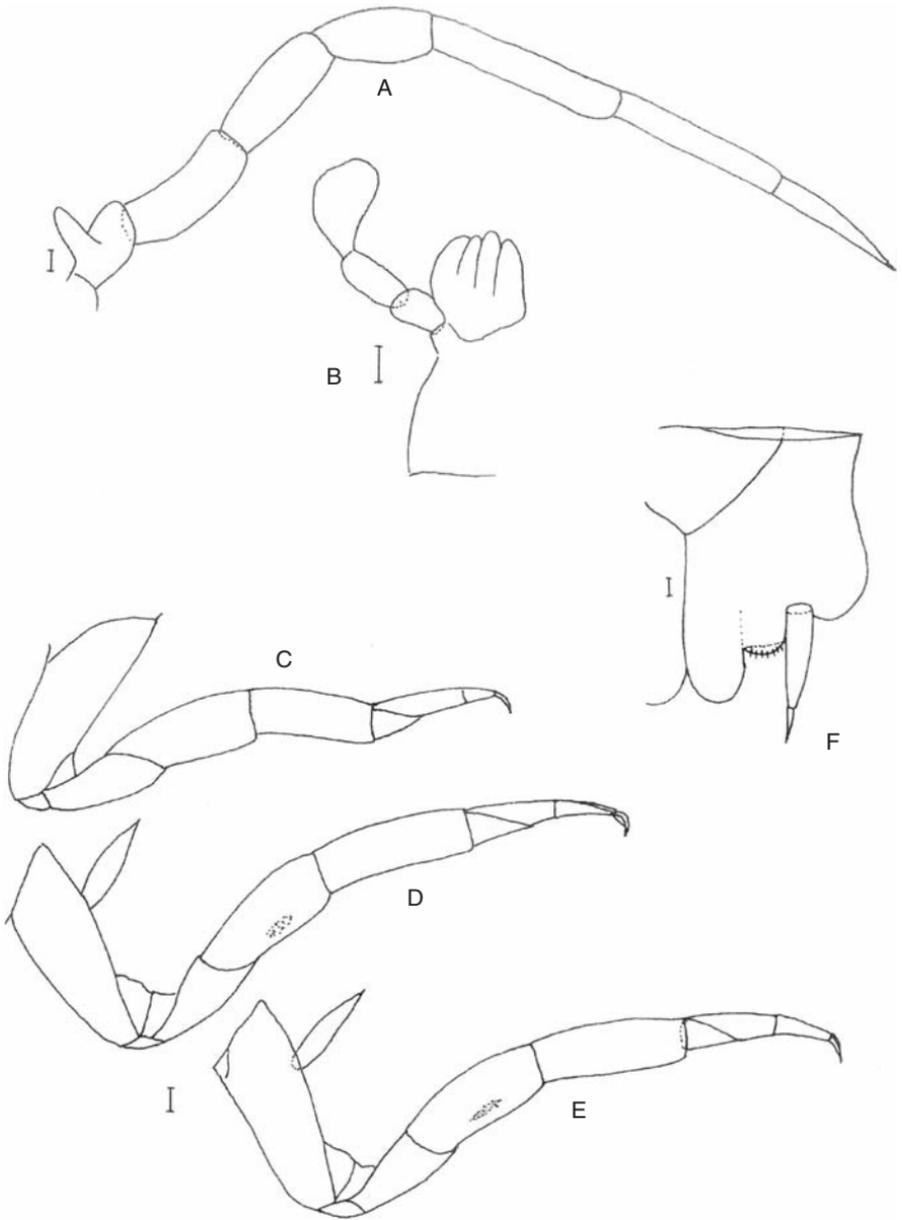


Figure 5. *Promesomachilis intermedia* n. sp. female. A: Outline of the maxillary palp. B: Id. labial palp. C: Id. first pair of legs. D: Id. second pair of legs showing the sensorial field of sensilla. E: Id. Third pair of legs. F: VII urosternite. Scales: 0.1 mm.

Urosternites as in the male. Sternites showing rectangular shape. Coxite VII is ventrally prolonged between the stylets (Fig. 5F). Ratio length of the stylet (without spine)/length of coxite: V-VII: 0.45-0.52; VIII: 0.71; IX: 0.61. Ratio length of spine/length of stylet (without spine): II-VII: 0.33; VIII: 0.29; IX: 0.23.

The ovipositor is of the primary type (Sturm and Bach de Roca, 1992) and is a little longer than the apex of the IX coxites. Gonapophysis VIII with 1+14-16 divisions all of them with long ciliary bristles as long as or longer than the width of the division. Last division with 4-5 conules, the other divisions, from the apex, have respectively 1-2, 1 and 1 conules (Figs. 6D-E, 7A).

Gonapophysis IX with 1+14-16 divisions all of them covered with ciliary bristles as long or a little longer than the width of the division. The gonapophysis end with a strong tooth. There are some spines on the ventral side (Figs. 6F, 7B). The number of conules from the apex are: 4-5, 1-2, 1, 1, and 1.

End of the cerci as in the male.

Derivation of the name:

The new species is named *Promesomachilis intermedia*, because it shows intermediate features in comparison to the other two species of the genus.

Type material:

Alhaurin de la Torre (Málaga) 1 male holotype + 6 males + 6 females paratypes. Reference: M 507 (2 males + 2 females do not exist because have been used in scanning electron microscopy), 29-03-93, Road C-344, Km 79 Arroyo Hondo; Alhaurin de la Torre (Ma), 2 males paratypes, 14-02-93. Reference: M 888

Discussion

The genus *Promesomachilis* gives its name to a group of Microcoryphia genera also including *Bachilis*, *Catamachilis* and *Pseudocatamachilis* (Sturm & Bach de Roca, 1993). All of them are endemic in the Iberian Peninsula except *Promesomachilis* that was also found in the North Africa.

The presence of a sensorial field on the legs, observed for the first time in the new species, led us to review also *P. hispanica* and the types of *P. cazorlensis*, the other two species of the genus. This sensory field is also present in these species, both in the males and in the females but it appears located in different legs in each species (though it always exist on the P. II). On the basis of this character we can distinguish the three species one from another (Table 1). In addition to this important character, the males also show other important morphological differences on the maxillary and labial palps (see Table 1).

The following key can be used to distinguish the three species:

1.- Sensorial field present only on the external-ventral side of the femur of the second pair of legs *Promesomachilis hispanica* Silvestri, 1923

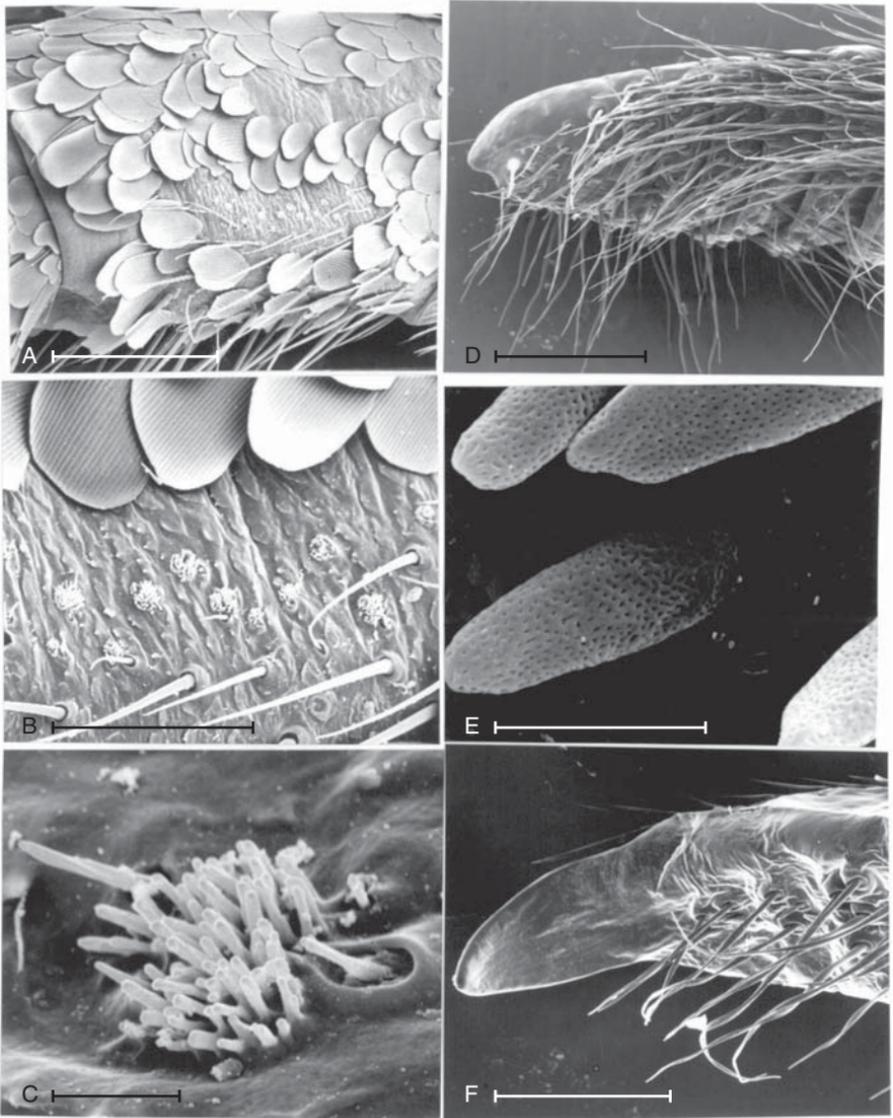


Figure 6. *Promesomachilis intermedia* n. sp. female. A: Femur of the third pair of legs showing the field of sensory sensilla. Scale: 200 μm . B: Sensory sensilla of the femur III. Scale: 50 μm . C: One sensilla of the femur III. Scale: 5 μm . D: End of the VIII gonapophysis. Scale: 100 μm . E: Special conules of the last annuli of the VIII gonapophysis, Scale: 5 μm . F: End of the IX gonapophysis. Scale: 50 μm .

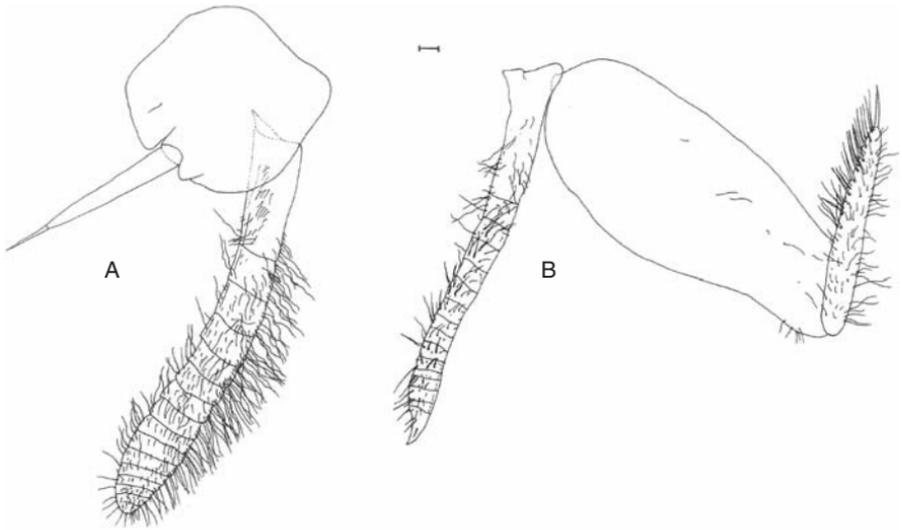


Figure 7. *Promesomachilis intermedia* n. sp. female. A: VIII urosternite with gonapophysis. B: IX urosternite with gonapophysis. Scale: 0.1 mm.

- 1'.- Sensorial field present on femur of leg II and on another leg 2
 2.- Sensorial field on femur leg I *Promesomachilis cazortensis* Bach, 1982
 2'.- Sensorial field on femur leg III *Promesomachilis intermedia* n. sp.

Aknowledgements

This work has been supported by the Project “Fauna Ibérica VII” (REN2001-1956-C17-05).

References

- Fanciulli, P. P.; Bach, C.; Gaju, M.; Frati, F. 1995. Genetic differentiation within two genera of Microcoryphia (Insecta Apterygota): *Promesomachilis* and *Praemachiloides*. Bull. Entomol. Pologne. 64: 33-40.
- Molero-Baltanás, R.; Gaju-Ricart, M.; Bach de Roca, C. 2004. Hexápodos no insectos, microcorifios y zigentomados. In: Barrientos, J. A. (ed.) Curso práctico de Entomología. Asociación española de Entomología, CIBIO, Manuals de la Universitat Autònoma de Barcelona, 41: 471-496.
- Sturm, H.; Bach de Roca, C. 1992. New American Meinertellidae (Archaeognatha, Machiloidea). Pan-Pacific Entomol. 68: 174-191.
- Sturm, H.; Bach de Roca, C. 1993. On the systematics of the Archaeognatha (Insecta). Entomol. Gener. 18: 55-90.

Table 1. Main differences between the three species of *Promesomachilis*.

Character	<i>P. hispanica</i>	<i>P. cazorlensis</i>	<i>P. intermedia</i> n.sp.
Number of annuli of distal antennae chain	15-20	14	14
Ratio n/n-1 in maxillary palp	0.80	0.52	0.69-0.72
Field of setae in the ventral side of maxillary palp	Small setae on II-VI	Long ciliar bristles on II-VI	Spiralized setae on II-VI
Shape of 2 nd article of labial palp of male	With a a process and a field of setae on it	Without process and with a field of setae	Without process but a little protruded and without a field of setae.
Femur leg I in males and females	Without a sensorial field	With a sensorial field	Without a sensorial field
Femur leg III in males and females	Without a sensorial field	Without a sensorial field	With a sensorial field
Number of annuli in paramera IX	1+5-7	1+7-8	1+6-7
Ratio basal part of the penis/ distal part	1.12	1.18	1.12
Ovipositor length	Longer than coxite IX	Shorter than coxite IX	Longer than coxite IX
Number of divisions of VIII gonapophysis	19-20	21-23	14-16
Number of divisions of IX gonapophysis	19-20	21-23	14-16
Geographical distribution	South of Iberian Peninsula and North Africa	Cazorla Mountains (Jaen)	Malaga province