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DESCRIPTION OF TWO NEW SPECIES OF MICROCORYPHIA IN SPAIN : *MACHILINUS SPINIFRONTIS* N. SP. AND *PROMESOMACHILIS CAZORLENSIS* N. SP.

by

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SUMMARY

The author, having examined a small collection of Microcoryphia from on a calcareus region of the Sierra of Cazorla (Jaén, Spain), describes two new species : *Machilinus spinifrontis* n. sp. and *Promesomachilis cazorlensis* n. sp.

In addition, from *Machilinus* are presented the dichotomic keys.

Key words : *Machilinus*, *Promesomachilis*, Microcoryphia.

Description de deux nouvelles espèces de Microcoryphia de l'Espagne : *Machilinus spinifrontis* n. sp. et *Promesomachilis cazorlensis* n. sp.

RÉSUMÉ

Dans ce travail l'auteur présente le résultat de l'étude d'une petite collection de Microcoryphia, provenant de la région calcaire du Sierra de Cazorla (Jaén, Espagne), en donnant la description de deux nouvelles espèces : *Machilinus spinifrontis* n. sp. et *Promesomachilis cazorlensis* n. sp.

Une correction des clés sur *Machilinus* est aussi présentée à fin d'inclure la nouvelle espèce.

Descripción de dos nuevas especies de Microcoryphia de España : *Machilinus spinifrontis* n. sp. y *Promesomachilis cazorlensis* n. sp.

RESUMEN

En este trabajo, se estudia una pequeña colección de Microcoryphia, recogida en una zona calcárea de la Sierra de Cazorla Jaén, España). El resultado es la descripción de dos nuevas especies : *Machilinus spinifrontis* n. sp. y *Promesomachilis cazorlensis* n. sp.

Se modifican las claves dicotómicas de los ♂♂ del género *Machilinus* a fin de completar las mismas, incluyendo la nueva especie.

INTRODUCTION

The knowledge of the fauna of the Order of Microcoryphia in Spain, is still incomplete. With each field excursion, further knowledge is accumulated, but

still much more investigation is necessary, because the Spanish fauna offers a rich and varied material of interest for the study of the Order.

During a short stay in the Sierra of Cazorla, situated in the East of the Jaén province, the author picked up a small collection of Microcoryphia, which made possible the study of the two species below. This work is especially interesting because the South of the Iberian Peninsula is almost an unexplored region with regard to Microcoryphia, in spite of the great importance of its geographical situation. Until now this region has not been cited for the species even though this area is ideal for the study of this group.

MATERIAL AND METHODS

The material was collected in the Cazorla Mountains (Sierra de Cazorla), situated in the East of the Jaén province. The Cazorla mountains start at 600 m and rise to a maximum of 2106 m and they have a series of parallel creases all of them natural calcareous. The climate in these mountains can be classified as xerophytic-mesophytic.

The studied specimens were found near Linarejo creek in a thin forest of *Pinus halepensis* and some *P. pinea*, under stones. The UTM coordinates of said place, within an approximation of 100 m, are 30S WG 075 976; there we found 1 ♂ holotype, 1 ♀ allotype and 2 ♂♂ paratypes of *Machilinus spinifrontis* along with 1 ♂ holotype, 1 ♀ allotype and 1 ♂ and 2 ♀♀ paratypes of *Promesomachilis cazorlensis*, 30-VI-81, C. Bach leg. In the town of El Vadillo and near the town, also under rocks, we found 2 ♂♂ of *M. spinifrontis*, 1-VII-81, C. Bach and M. Ferreras leg. At the head of the Guadalquivir river we found 1 ♂ and 1 ♀ of *M. spinifrontis*, 26-VI-82, M. Gaju leg.

The specimens were collected with the aid of an entomological aspirator and were fixed in 70 % alcohol.

The appendices were removed with fine jewellers tweezers under a Nikon SMZ stereoscopic microscope. The appendices were mounted in a preparation of Hoyer fluid. The microscopic observations were preformed under a Nikon SFR-KT-II microscope and the drawings were made with a clear camera incorporated in the above mentioned microscope.

RESULTS

1) Description of *Machilinus spinifrontis* n. sp.

a) *The male* : the description and pattern of the scales of the male holotype are based on S. de Cazorla (Jaén, Spain) specimens (see : material and methods).

Body length = 7.5 mm; filamentum terminale length = 7 mm (broken!); total length = 14.5 mm; cerci length = 3 mm; antennae length = 6 mm (broken!).

The drawing of the scales observed in the field shows a shiny dark brown colour with a bright dorsal stripe running from the prothorax to the last abdominal segment. However, within the middle of this bright stripe there is a dark line that is continuous in the thorax and in the first two abdominal segments. This line becomes discontinuous in the rest of the abdominal segments and it appears only in the central part of each segment.

The compound eyes have a light background dotted with brown spots and

pierced by one oblique line. Relation Lc/l = 0.75; l/a = 0.88. Red-brown oval ocelli, surrounded by a white ring. The cephalic pigmentation is not very heavy. Inside of the ocellus there are two dark spots and between them, there are two longitudinal lines running down to the median ocellus which is surrounded by a black ring. The clypeus and labrum are colorless. The antennal projection is pigmented. The front has 12-14 black spines. The labrum is covered with several small bristles (Fig. 1).

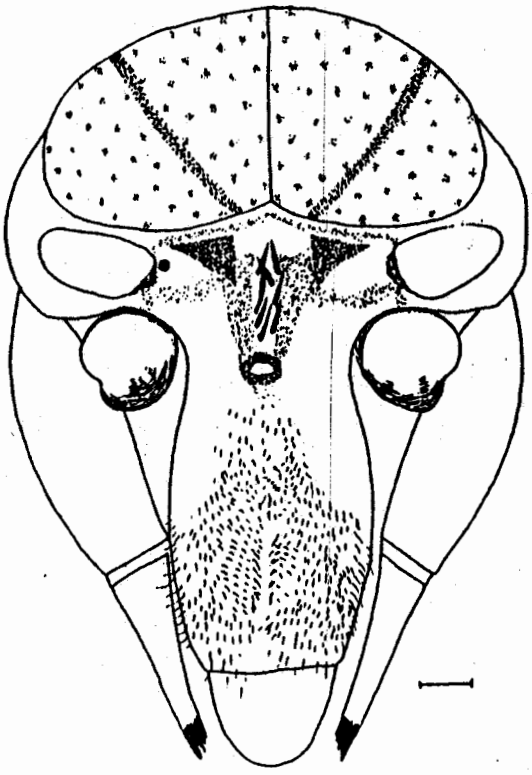

Fig. 1. — *Machilinus spinifrontis* n. sp., cephalic pigmentation of male in frontal view. Scale 0.1 mm.

The antennal scape has an oblique line of bristles (Fig. 2 : 5). The pedicel has also a distal line of bristles. The flagellum is apparently of uniform brown colour. The distal segments have light subsegments, each of them with two lines of bristles.

The maxillary palp is weakly pigmented on the internal surface of the first and second segments. The first segment has a longer dorsal apophysis than the internal spiral one. The apophysis of segment 2, black on its top, ends in a blunt point that slants towards the external part. This segment has a group of dark bristle-like setae, and another group of setae that stop just at the beginning of the apophysis. On the ventral side there are long setae. The third segment has 20-24 spines arranged in 2-3 rows (Fig. 2 : 6-8). The fourth segment has long setae on the ventral side. The bristles on the palp are dark in colour. The dorsal surface of the 5th, 6th and 7th segments have dark spines. The distribution is as follows : segment 5 = 3-4; 6 = 14-16; 7 = 9-10. The terminal spine is longer than the others. Relation $a/a - 1 = 0.45$

The labial palp has no pigmentation. The second segment has an oblique line of bristles. The third segment is extended at the apex where there is a group of sensory cones. All the segments of the palp are provided with bristles which cover it (Fig. 2 : 3-4).

The shape and pigmentation of the legs of the male are shown in Fig. 2 : 2 and 9. The first two pairs have three ciliar setae on the dorsal side of the coxa, two on the trochanter and one on the femur. On the ventral side of the legs numerous dark, brown spines accompanied by a number of long, dark setae can be observed. The distribution of the spines is shown on Table 1.

TABLE 1

Distribution of the spines on the ventral part of the leg segments

	trochanter	*femur*	*tibia*	*tarsus*
Leg I	—	4	8	4 + 8-9 + 4-5
Leg II	3	16-17	18-19	6-8 + 8 + 4-5
Leg III	—	7-10	14-18	8-10 + 10 + 4-6

Tibia length leg I = 0.32 mm; idem leg II = 0.30 mm; idem leg III = 0.41 mm.

Typical urosternites. Each coxite has an external group of bristles. The stylets are provided with an apical spine longer than half the length of the stylet. The setae of the abdominal stylets are pigmented and almost spinous (Fig. 2 : 10). The relative length of stylet / coxite on segments is : V = 0.56; VIII = 0.58; IX = 0.46. The penis is of the usual type.

Apex of cerci with one spine.

b) *The female* : body length = 7.5 mm.

Pigmentation and shape of the head, and colouring of eyes : as in the male. Ratio Lc/l = 0.90; l/a = 0.95.

Shape and pigmentation of the maxillary palp as in Fig. 3 : 12. The spines, dark on the top, are distributed as follows : 5 = 3; 6 = 14; 7 = 14. Ratio $n / n - 1 = 0.61$.

The labial palp is without pigment and only the third segment is enlarged on the top. The sensory cones are few in number (Fig. 3 : 13).

The first pair of legs has pigment on the coxa, as in the male. The femur has a swollen dorsal and a row of dark setae. The second pair of legs has ciliar setae on the dorsal side of the coxa and femur. The third pair of legs has ciliar setae on the dorsal side of the coxa (Fig. 3 : 14). The dark spine bristles on the ventral side of the legs are distributed as shown the Table 2 :

TABLE 2

Distribution of the spines on the ventral part of the leg segments

	femur	*tibia*	*tarsus*
Leg I	5	9	7 + 16 + 9 (in three rows)
Leg II	4	11	6 + 15 + 8
Leg III	7	12	9 + 8 + 7

Length of tibia leg I = 0.35 mm; idem leg II = 0.32 mm; idem leg III = 0.46 mm.

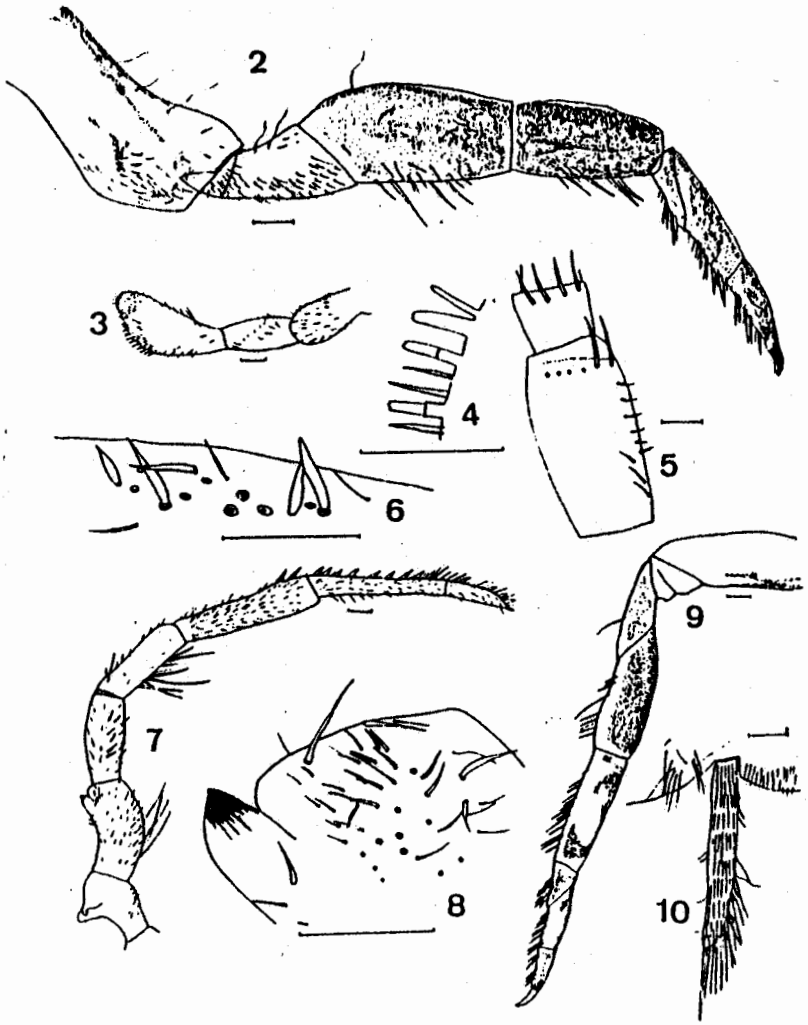

Fig. 2 (2-10). — *Machilinus spinifrontis* n. sp. ♂ : 2, first pair of legs; 3, labial palp; 4, sensory cones of the labial palp; 5, scapus and pedicel of antenna; 6, spines of the ventral side of the third article of the maxillary palp; 7, maxillary palp in external view; 8, apex of 2nd article of maxillary palp; 9, third pair of legs; 10, stylet of V sternum. Scale 0.1 mm.

Each coxite has an external group of bristles and an internal one. The apical spine of stylets is long and coloured. The ventral side of the stylet has numerous dark bristles (Fig. 3 : 11). Ratio of length of stylet (without spine) / length of coxite : V = 0.71; VIII = 0.76; IX = 0.56. Ratio of the length of spine / length of stylet : V = 0.04; VIII = 0.53.

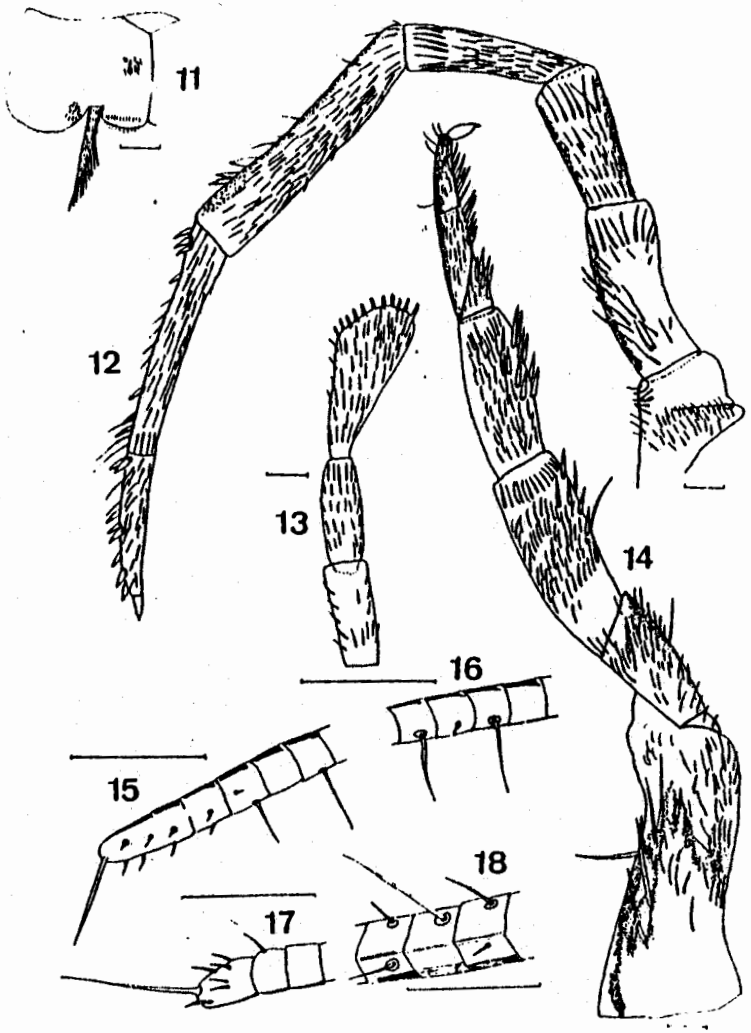

Fig. 3 (11-18). — *Machilinus spinifrontis* n. sp. ♀ : 11, V urosternite; 12, pigmentation and setae of the maxillary palp; 13, labial palp; 14, third pair of legs; 15, apex of gonapophysis VIII; 16, medial segments of VIII gonapophysis; 17, IX gonapophysis; 18, medial segments of IX gonapophysis. Scale 0.1 mm.

The ovipositor surpasses the apex of the IX stylet. The VIII gonapophysis has 62-64 segments and only the 32 distal have bristles. The terminal segment has an apical bristle as long as the last three articles and 6-8 setae and 2-3 spinules. These spinules are to be found on the distal articles but in fewer number. The setae are to be found on the ventral side of the article. On the 12-14 articles they are reduced to one. On the lateral-dorsal side every 3-4 articles there is one long bristle (Fig. 3 : 15-16).

The IX gonapophysis has 68-70 segments. The terminal bristle is as long as the last three segments. The terminal segment has three rows of the short bristles

and 1-2 spinules. The remaining segments have a row of bristles and the last ones 1-2 spinules. On the ventral side there is a long bristle every two segments, as long as the width of the segment. On the dorsal side of every segment there is also a long bristle (Fig. 3 : 17-18).

Derivation of the name : this new species is named *M. spinifrontis* because there are in its front a number of dark spines present in both sexes.

DISCUSSION

This species is a part of those whorein the third article of the maxillary palp in males has spiniform bristles or spines.

This species can be easily distinguished from the « *helicopalpus* » group (MENDES, 1977) which includes *M. helicopalpus*, *M. gredosi*, *M. cisatlanticus* and *M. valencianicus* because the second article has the very apparent swelling on the ventral side of the maxillary palp.

M. spinifrontis is a part of the « *bejarensis* » group, including *M. bejarensis* *M. rocai* and *M. kleinenbergi*, whorein the third article of the maxillary palp of the male has spiniform bristles or spines, as is the case in « *helicopalpus* », but it has the second article without the very apparent swelling on the ventral side.

M. spinifrontis can be easily distinguished from *M. rocai* by the special morphology of the third article of the maxillary palp in the male. It can be separated from *M. kleinenbergi* by the number of spines on the trochanter in the second pair of legs and by having a fewer number of spines on the femur and tibia of the third pair of legs. Also by the pigmentation and bristles of the second and third articles of the maxillary palp. It can be distinguished from *M. bejarensis* by the spiniform bristles of the third article of the maxillary palp, the dorsal apophysis on the second article of the maxillary palp and the pigmentation.

M. spinifrontis is the only species of *Machilinus* that has black spines on the front present in both male and female. This characteristic is good enough to distinguish this species easily from the others.

We can complete the key-notes of the species (see MENDES, 1977 and MENDES and BACH, 1981) as follows :

11 The last segment of the labial palp is only a little bit, if at all, extended at the apex; the sensory cones are fewer in number 11B

11B. The spines on the ventral side of the legs are short and strong. On the trochanter of the second pair of legs there are 12 to 20. They are also numerous on the tibia and the femur of the third pair of legs (14-16 and 20-26 respectively) . . . . . *M. kleinenbergi* (GIARDINA, 1900)

11B' The spines on the ventral side of the legs as well as the spiny bristles are dark. In the trochanter of the second pair of legs, the spines are fewer in number (3). On the femur and the tibia of the third pair of legs, their number is between 7-10 and 14-18 respectively. The head has dark spines on its front . . . . . *M. spinifrontis* n. sp.

11' As in the keys (MENDES and BACH, 1981).

2) Description of *Promesomachilis cazorlensis* n. sp.

a) *The male* : body length = 10.5 mm; filamentum terminale length = 11 mm; cerci length = 4 mm; antennae length = 12 mm (broken!).

The body and appendices are without pigmentation. The male head has pigmentation around the median ocellus and in the front, and also on the border of clypeus. It has short bristles in the front and shorter ones on the clypeus. There are two small bristles on the labrum. It has compound eyes with a light background

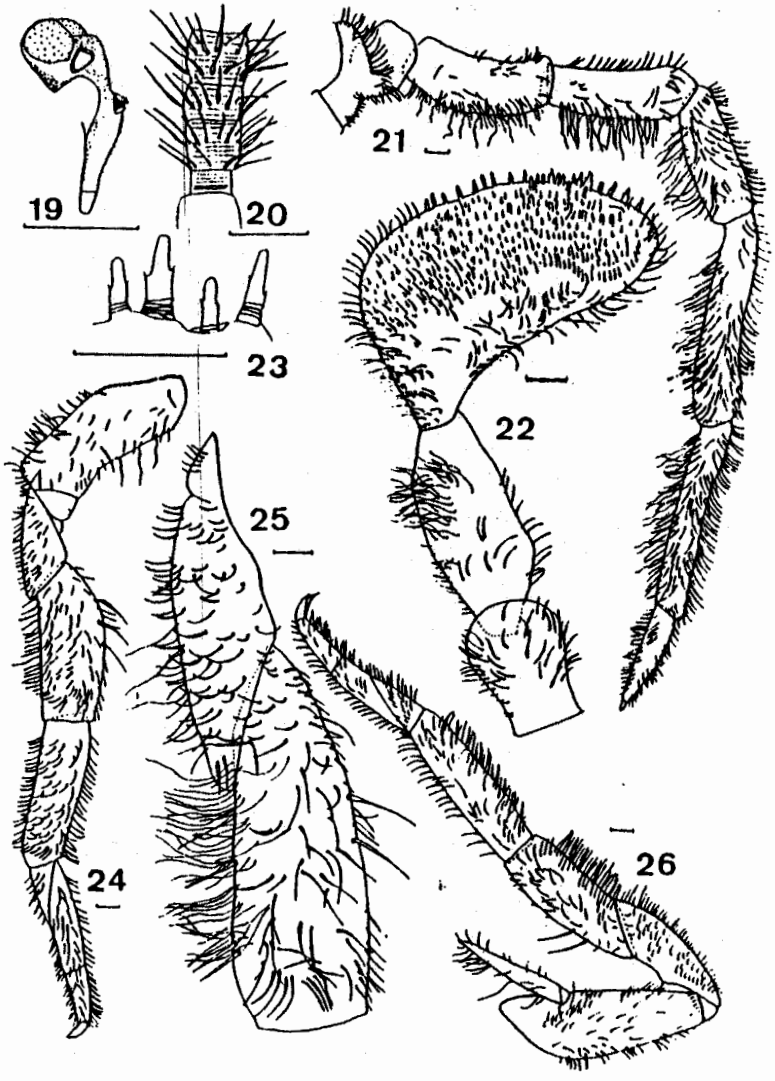

Fig. 4 (19-26). — *Promesomachilis cazorlensis* n. sp. ♂ : 19, head in lateral view; 20, distal articles of antenna; 21, maxillary palp, external view; 22, labial palp; 23, sensory cones of the third article of the maxillary palp; 24, first pair of legs, external view; 25, trochanter and femur of third pair of legs; 26, third pair of legs, external view. Scale 0.1 mm.

dotted with brown spots. The relation Lc/l = 0.52; l/a = 0.85. The ocelli are subtriangular, situated medially before the eyes. They are red-brown in colour and surrounded by a light white band (Fig. 4 : 19).

Its antenna is longer than its body. The scapus has a line of bristles in its distal part. The distal articles of the flagellum are subdivided into 14 distal subarticles. The 3-6 basal ones are dark and the remainder white. Each of these subarticles has 1-2 rows of bristles (Fig. 4 : 20).

The maxillary palp has normal setae and ciliar bristles on the ventral side of articles 2-6. The distribution of the hyaline spines on the last three articles is as follows : article 5 = 3; 6 = 20; 7 = 12. The terminal spine has the same length as the neighbouring ones. Ratio $n/n-1 = 0.52$ (Fig. 4 : 21).

The labial palp has the second article with a group of dorsal ciliar bristles. The third article is widened apically and covered with normal bristles, sensory cones and little sensorial setae (Fig. 4 : 22-23). The first pair of legs has ciliar bristles on the dorsal side of the coxa, three macrochaeta on the dorsal side of the femur. On the ventral side there are normal setae and dark spines on tarsus. Tibia length = 0.81 mm (Fig. 4 : 24). Leg II are without coxal stylet and with three ciliar bristles on the dorsal side of the coxa and three macrochaeta on the dorsal side of the femur. On the ventral side besides the normal setae there are spines on the tibia and tarsus. Tibia length = 0.62 mm. Leg III with coxal stylet, two macrochaeta on the dorsal side of the femur. On the ventral side, there are ciliar bristles on the trochanter and they are more numerous on the femur (Fig. 4 : 25-26). Hyaline spines on tibia and tarsus. Tibia length = 0.85 mm. The distribution of the spines is shown on Table 3.

TABLE 3

Distribution of the spines on the ventral part of the leg segments

	tibia	*tarsus*
Leg I	—	6 + 5 + 3
Leg II	16	11 + 10 + 8
Leg III	18	14 + 10 + 10

The abdominal urosternites II-V have two pairs of vesicles. Coxites II-VII have 2-3 short bristles on the median part and 1-2 on the external side (Fig. 5 : 27). The stylets are short. The VIII coxite has not those bristles and parameres (Fig. 5 : 28). The IX coxite has bristles on the external and internal side, and the coxite is extended towards the stylet (Fig. 5 : 29). The ratio length of stylet (without spine) / length of coxite : V = 0.53; VIII = 0.85; IX = 0.12. The IX parameres have 1 + 7-8 articles, the terminal one is longer than the others. All articles have spines on the internal side (Fig. 5 : 30). The penis is long or a little longer than the parameres, its opening is oval and lies subterminal, with numerous bristles around it and a papilla in its center. Ratio portion basal / terminal = 1.18 (Fig. 5 : 30).

The filamentum terminale is longer than the body ending with two spines (Fig. 5 : 31). The apex of the cerci has one long spine and another short one (Fig. 5 : 32).

b) *The female* : body length = 11 mm; filamentum terminale length = 12 mm; cerci length = 5 mm; antenna length = 13 mm (broken!).

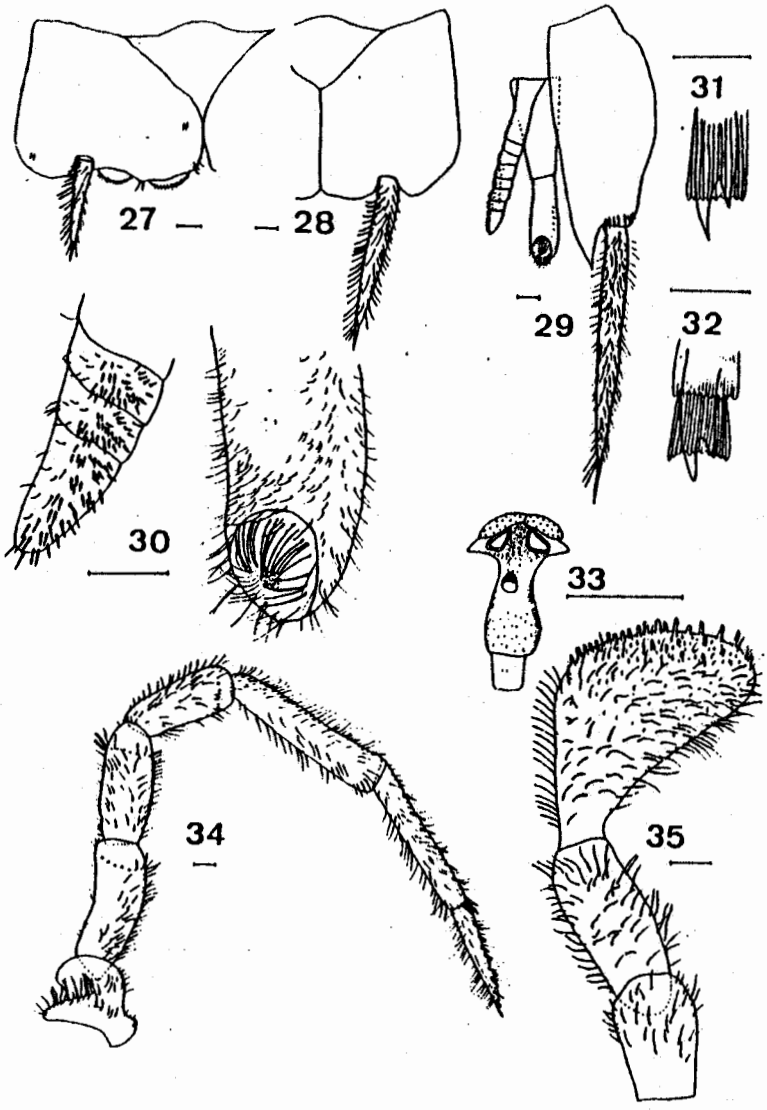

Fig. 5 (27-35). — *Promesomachilis cazorlensis* n. sp. ♂ : 27, V urosternite; 28, VIII urosternite; 29, IX urosternite with penis and parameres; 30, apex penis and parameres; 31, apex of filamentum terminale; 32, apex of cerci; *P. cazorlensis* n. sp. ♀ : 33, head, frontal view; 34, maxillary palp, external view; 35, labial palp. Scale 0.1 mm.

The pattern of the head of the female is figured Fig. 5 : 33. It differs from the male by the sagittal line on the front without pigment. The compound eyes and ocelli are as in the male. Ratio Lc/l = 0.49; l/a = 1.08.

The maxillary palp is without ciliar bristles. The distal part of the fourth and fifth articles are covered with setae bigger than the normal ones. The distribution of hyaline spines in the last three articles is as follows : article 5 = 4; 6 = 16-18; 7 = 12-14. Ratio $n/n - 1 = 0.67$ (Fig. 5 : 34).

The labial palp has the last article widened. Its chaetotaxy is the same as in the male. The second article does not have the field of ciliary bristles (Fig. 5 : 35).

Only the first pair of legs has ciliar bristles on the dorsal side on the coxa. On the femur there are six macrochaetas in the first pair, three on the second and three on the third. On the ventral side, there are spines rather than normal setae. There are also spines on the femur, tibia and tarsus, and spiniform setae on the trochanter (Fig. 6 : 36-37). The distribution is shown on Table 4 :

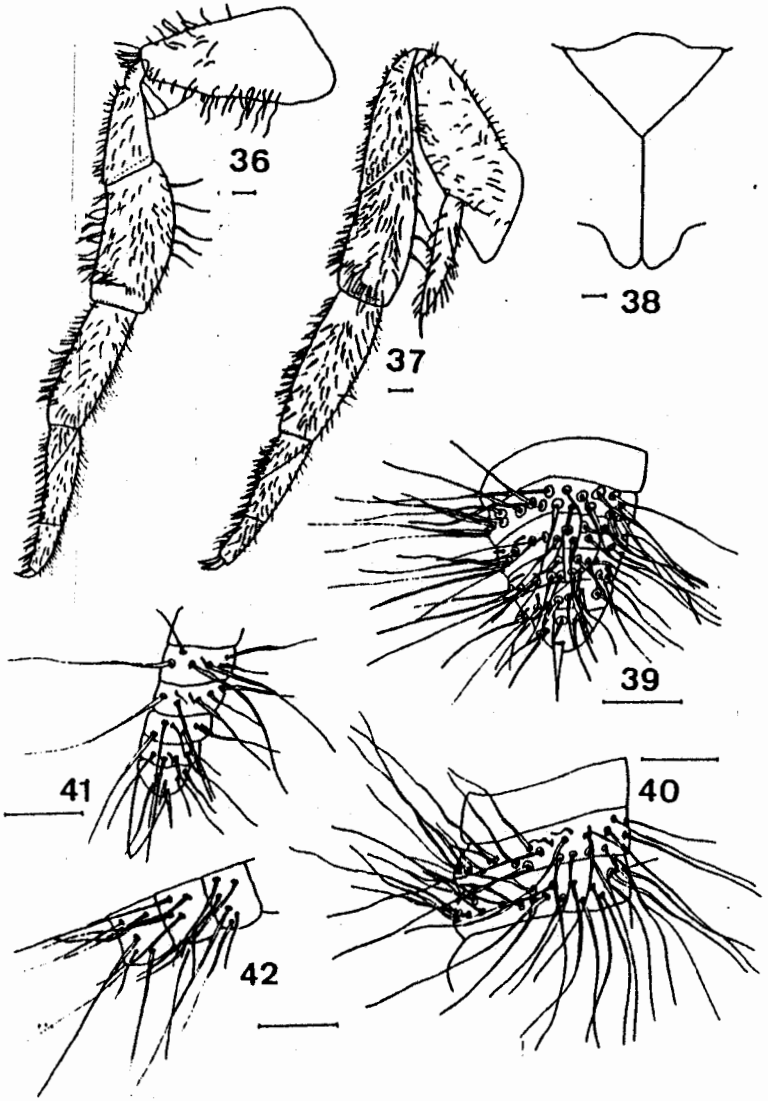

Fig. 6 (36-42). — *Promesomachilis cazorlensis* n. sp. ♀ : 36, first pair of legs, external view; 37, third pair of legs, external view; 38, portion central of the VII urosternite; 39, apex of VIII gonapophysis; 40, articles 12 and 13 of the VIII gonapophysis; 41, apex of IX gonapophysis; 42, articles 10 to 12 of the IX gonapophysis. Scale 0.1 mm.

TABLE 4

Distribution of the spines on the ventral part of the leg segments

	femur	*tibia*	*tarsus*
Leg I	—	4	8 + 9 + 5
Leg II	8	12	10 + 7 + 6
Leg III	18	20	8 + 6-7 + 6

Length of tibia leg I = 0.7 mm; idem leg II = 0.6 mm; idem leg III = 0.8 mm.

Urosternites as in the male. The VII urosternite has ventrally prolonged coxites (Fig. 6 : 38). Ratio length of stylet (without spine) / length of coxite : V = 0.57; VIII = 1.00; IX = 0.87.

The ovipositor reaches the apex of the IX coxites and is covered by them. Gonapophysis VIII with 21-23 articles, all of them with long ciliar bristles, longer than the width of the article and with one row on the external side and two on the internal one. The last article ends with a short hyaline spine and there is in its top a little tooth. On the external side there is, on each of the final articles, a spine rather than ciliar bristles. Dorso-ventrally there is a row of spines in all articles. The number of spines is 1 in the last article, but this number increases to 6-7 in the others except in the first (where there are 16-19 spines without ciliar setae) (Fig. 6 : 39-40).

The IX gonapophysis has 21-23 articles, all of them, except the first, covered with very long ciliar setae, longer than twice the width of the article. The gonapophysis ends in a strong tooth. On its base there are two spines : a normal sized and a little one. On the ventral side of gonapophysis there are many spines (Fig. 6 : 41-42).

The ending of the filamentum terminale and the cerci is as in the male.

Derivation of the name : this species is named after the locality of collection : *Promesomachilis cazorlensis*.

DISCUSSION

SILVESTRI (1923) described *Promesomachilis* n. g., with *hispanica* n. sp.; BITSCH (1966) gives a redescription; WYGODZINSKY (1941) describes *P. handschini* and the same author (1945) *P. costai*; JANETSCHEK (1954) describes *P. costai* var. *diversipalpa*.

This genus is only known in the South of the Iberian Peninsula and the N. of Africa. All species are very similar and only the first one is known to contain both sexes. Perhaps *P. handschini* (known only in the female) and *P. hispanica* is the same species. Their characters are apparently quite similar, but the lack of males allows no final decision. The material from Cazorla differs from the species known until now.

The *P. hispanica* differs by the pigmented pattern of the head, the lack of the field of the small setae in the 2-7 articles of the maxillary palp and by the presence in *P. cazorlensis*, of the long ciliar bristles in the 2-6 articles of the maxillary palp. The last article of this palp is half as short as the penultimate (0.52). In *P. hispanica* this relation is 0.80. *P. cazorlensis* lacks the process in the second article of labial

palp and the field of the small setae on it. This differs from *P. hispanica* because of the widening of the third article of the labial palp. The ovipositor is shorter and the number of articles is larger. The VIII gonapophysis has a tooth in its apex and the chaetotaxy is different. The tooth of the terminal article of the IX gonapophysis is not dark in colour and the hyaline spines on its base are not of the same height.

The *P. costai* and *P. costai* var. *diversipalpa*, only known by the male, differs from our species in the shape of the appendices, in the lack of the field of small setae on the ventral side of the maxillary palp, and in details of the spines on the legs, among other characteristics.

P. handschini, known also by the female, has the greatest difference between the two species because of the ovipositor. The end tooth on the top of the VIII gonapophysis in *P. cazorlensis* is not chitinous and the setae that cover the gonapophysis are longer and present in a larger number. The terminal tooth of the IX gonapophysis is also not chitinous and there are more and longer setae.

We consider that the second article of the labial palp of the male is also a good specific characteristic for the diagnosis of *Promesomachilis*.

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