

THE SYSTEMATIC POSITION OF THE MONOTYPIC FAMILY ISOTOGASTRURIDAE (COLLEMBOLA) WITH DESCRIPTION OF *ISOTOGASTRURA CORONATA* N. SP. FROM FUERTEVENTURA, CANARY ISLANDS

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The systematic position of the monotypic family Isotogastruridae (Collembola) with description of Isotogastrura coronata n. sp. from Fuerteventura, Canary Islands.— The second species of the recently established family Isotogastruridae, *Isotogastrura coronata* n. sp., is described from littoral habitats at Fuerteventura. Based on sensillary and tibiotarsal chaetotaxy, and details in antennal organs, the family is set in the section Poduromorpha near the family Hypogastruridae. The new species is characterised by simple guard sensilla in the antennal organ on segment III, and by presence of a macrochaeta m² on abdominal tergite IV

Key words: *Isotogastrura coronata* n. sp., Collembola, Isotogastruridae, Canary Islands.

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INTRODUCTION

THIBAUD & NAJT (1992) described the new genus and new species *Isotogastrura arenicola* from Caribbean littoral sands. According to these authors, the species has a set of morphological characters which gives it an intermediary position between the two large sections Poduromorpha and Entomobryomorpha among the arthropleone Collembola. A new family was erected, but its possible phylogenetic relationship to other families was left open.

A second species of *Isotogastrura* was found among roots of halophytes in coastal sand dunes on Fuerteventura, the Canary Islands.

The aim of this work is to describe this new species and to fix the position of the family Isotogastruridae.

RESULTS

Isotogastrura coronata n. sp. (figs. 1A - 1I)

Type material (all slide specimens from the same sample).

Holotype: ♀, from "Islas Canarias, Fuerteventura, Matorral del Jandia, 5. April 1988. Halophytes, sand dunes, littoral. A. Fjellberg leg.", deposited at British Museum of Natural History, London.

Paratypes: 4♂♂ and 3♀♀ (in five slides) together with holotype, 2♂♂ and 2♀♀ (in three slides) at Museo de Ciencias Naturales de Sta. Cruz de Tenerife.

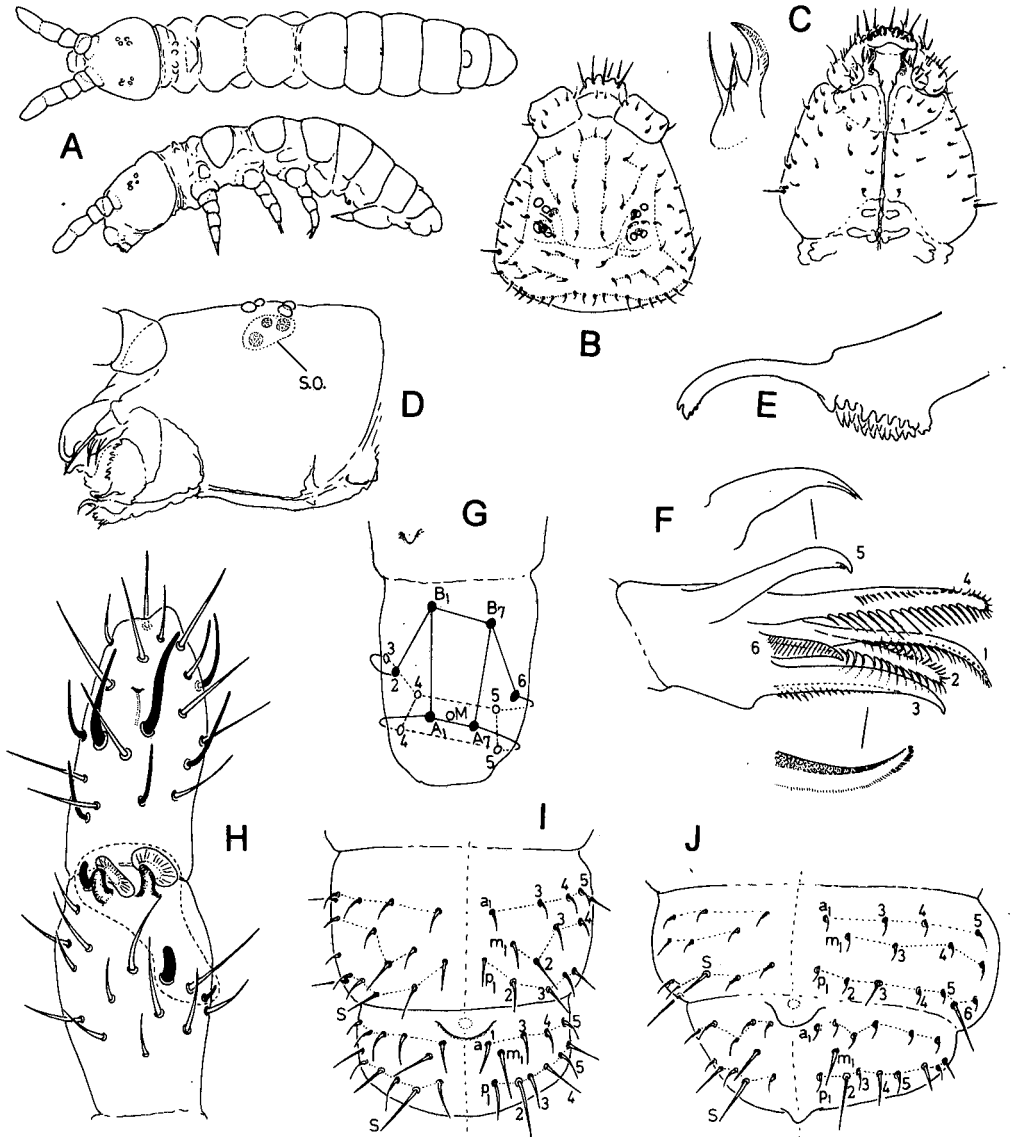


Fig. 1. *Isotogastrura coronata* n. sp.: A. General habitus, dorsal and lateral; B. Dorsal chaetotaxy of head; C. Ventral chaetotaxy of head, labial hooks enlarged; D. Position of subocular organ (s.o.) in head; E. Mandible; F. Maxilla; G. Chaetotaxy of left mesotibiotarsus; H. Right antennal segments III-IV, antennal organ III encircled; I. Chaetotaxy of Abd. IV-V. *I. arenicola*: J. Chaetotaxy of Abd. IV-V.

Description

Largest specimen 0.35 mm. Eyespots purplish brown, rest of body white or with diffuse pigment on head and anterior part of body. Body shape very slender, cylindrical (fig. 1A). Integument smooth, primary hexagones clearly visible. A secondary tuberculation is found ventrally between legs and at base of furca. Thorax I with four dorsal tubercles. One pair of similar tubercles are found at posterior edges of thorax II - abdomen II. Head strongly prognathous with swollen labrum and prominent mouthparts. Antennal organ on segment III with two integumental papillae partly covering two blade-like sensilla flanked by an inner guard sensillum. The outer guard sensillum and its associated microsensillum are laterally displaced (fig. 1H). Antennal segment IV with two sensorial setae larger than others. Antennal segment I with seven setae in dorsal half, no ventral sensilla. Segment II with 12 setae, of which one ventral microchaeta may be sensorial. Ocelli 4+4. Beneath each ocellar field, inside the head, is a "subocular organ" consisting of three globular bodies looking like fat droplets (fig. 1D). Postantennal organ absent. Labrum with four blunt apical lobes and 3-5-2 setae. Two prelabral microchaetae. Basal triangular fields of labium with four setae. Inner apical lobes with four ramifications of which one is hook-shaped with a hyaline lamella along the edge (fig. 1C). Maxillary outer lobe with simple palp and two sublobal hairs. Apical part of mandibles long, curved (fig. 1E). Maxilla (fig. 1F) strongly developed, chewing part (ungulum) with a single pointed processus, other teeth reduced. All six lamella present. In lateral view the lamella appear flattened with narrow backs. Lam. 1 with delicate ciliation along ventral edge and some shorter filaments in apical

part along dorsal edge. Lam. 2 with strong, coarse filaments along ventral edge and finer ciliation along dorsal edge. Lam. 3 with a delicate, fringed membraneous lamella along ventral edge. Lam. 4 with long filaments both along dorsal and ventral edges. Lam. 5 membraneous, split at apex, with no filaments. Lam. 6 short, weak, with no visible filaments or teeth.

Dorsal and ventral chaetotaxy of head as figures 1B and 1C. Number of setae along posterior edge of head 10+10. Dorsal and ventral chaetotaxy of thorax and abdomen are almost identical to *arenicola* (see THIBAUD & NAJT, 1992), except for Abd. IV-V (figs. 1I, 1J): in *coronata* the erect macrochaeta m2 is present on Abd. IV (absent in *arenicola*), and on Abd. V seta a2 is absent (present in *arenicola*). According to THIBAUD & NAJT (1992) *arenicola* has sensilla in position p3 and m7 on thorax II-III, and in position p3 on Abd. I-III (absent on Abd. IV) and in p2 on Abd. V. Although the sensilla are poorly differentiated from ordinary setae, *coronata* appears to have the same pattern. An erect seta in position p3 on Abd. IV is probably a sensillum (also present in paratypes of *arenicola*).

Number of setae on individual segments of legs as in table 1. The following setae are present on tibiotarsi: A1, A4, A5, A7, B1-7, M. On the hindleg seta B7 is absent. Clavate

Table 1. Number of setae on individual segments of legs in *Isotogastrura coronata*.

Segments	Legs		
	1	2	3
Precoxa 1	1	1	2
Precoxa 2	1	3	3
Coxa	4	7	9
Trochanter	6	6	6
Femur	11	11	10
Tibiotarsus	12	12	11

or differentiated tenet hairs absent. Due to the strong reduction, the interpretation of the chaetotaxy (fig. 1G) is tentative. Claws slender, unguis with a pointed dorsal extension. Other teeth absent. Unguiculus longer than unguis, basal lamella absent, apex filamentous. Manubrium with 16 setae and 5+5 in basal fields. Dens with four dorsal setae. Mucro slender, curved, with blunt apex. No teeth or visible lamellae. Tenaculum with 3+3 teeth, no setae. Ventral tube with 4+4 lateral (apical) setae. Posterior face with one or two setae. In addition there are two setae on each side at base. Thorax without ventral setae. Ventral channel open, distinct.

Discussion

The new species differs from *arenicola* in chaetotaxy of Abd. IV-V (see above). Also it does not have the dorsomedian posterior lobe on Abd. V which is found in *arenicola*. The most striking difference, however, is found in the sensillary organ on antennal segments III-IV: in *coronata* the organ has a normal position with simple guard sensilla at apex of Ant. III (fig. 1H), whereas *arenicola* has bifurcate guard sensilla and part of the organ moved to base of Ant. IV (THIBAUD & NAJT, 1992, figs. 5-6). In *coronata* the Ant. IV sensilla are more strongly differentiated than in *arenicola*.

SYSTEMATIC AFFINITIES OF *ISOTOGASTRURA*

The two species of *Isotogastrura* appear highly specialised (mouth-parts, Ant. III organ, tibiotarsal chaetotaxy). Similar adaptations in the mandible/maxilla complex are found in many marine littoral species and are clear convergencies without implying phylogenetic relationship.

The chaetotaxy gives conflicting evidences. Presence of only seven dorsal setae on antennal segment I (no ventral sensilla) points to Poduromorpha, while absence of dorsal setae on prothorax points to Entomobryomorpha. Some first instar Hypogastruridae, however, do not have prothorachal setae. In nonplurichaetotic Poduromorpha there are rarely more than 2+2 vertical (v) setae on head, so the 3+3 verticals in *Isotogastrura* may represent an entomobryomorph condition. Also, the presence of as much as 10+10 p-setae on head points to Entomobryomorpha. However, the absence of seta B7 on metatibiotarsus is a poduromorph character. On the other hand, no Poduromorpha has posterior setae on ventral tube, while they are generally present in Isotomidae (Entomobryomorpha).

The simple dorsal chaetotaxy on thorax and abdomen –with sensilla in positions p2 and p3– is typical Poduromorpha (DEHARVENG, 1979). According to THIBAUD & NAJT (1992) *Isotogastrura* is separated from all Poduromorpha by absence of the lateral microsensilla (s') on meso- and metathorax. These sensilla, however, are also absent in *Acheroxenylla* (FJELLBERG, 1991). The Ant. III organ in *Isotogastrura* could be derived both from Entomobryomorpha and Poduromorpha. But the finger-like integumental papillae are so far not observed outside Poduromorpha. Two characters are unique to *Isotogastrura*: a glandular organ opening dorsally on Abd. V and the “subocular organ” consisting of 3+3 globules inside the head under the ocellar fields (they were only observed in *coronata* cleared in lactic acid, and not in specimens of *arenicola* which were prepared in another medium).

Stressing the importance of sensillary chaetotaxy (as well as shape of Ant. III organ

and absence of B7 on Tib. III), it is concluded that *Isotogastrura* is a Poduromorpha with close affinity to the family Hypogastruridae.

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