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DESCRIPTION OF A NEW GENUS AND SPECIES OF PHILOSCIIDAE (ISOPODA, ONISCIDEA, CRINOCHAETA) FROM MALAYSIA

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Key words: Crustacea, Isopoda, Oniscidea, Philosciidae.

ABSTRACT

Loboscia shaji gen. et sp. n. from Sarawak (Malaysia), a species of Crinochaeta with unusual combination of primitive and derived characters, is described and its phylogenetic relations are discussed.

INTRODUCTION

In the present paper a new species of terrestrial isopod from the rainforest of Sarawak (Malaysia) is described, which, in the current classification, would be placed in the family "Philosciidae" (names of non-monophyletic taxa are set in "quotation marks") based on plesiomorphic characters. Although only two specimens were available, their description was considered worth being published, not only because they obviously represent a new species, but also because of its strange character combination. The description of these characters might incite a more thorough examination of other probably related species, in order to make some of their previously ignored characters available for phylogenetic analysis.

DESCRIPTIVE PART

Loboscia gen. n.

Type-species: ***Loboscia shaji* sp. n.**

Diagnosis

Identical with that of the type-species *Loboscia shaji* sp. n. (Fig.1). New species should only be included in this genus, if synapomorphies can be pointed out. The aim of this remark is to avoid rendering the genus non-monophyletic, which currently is the case for too many other genera of Oniscidea.

Material examined

1 male (holotype), 1 female (paratype), Malaysia, Sarawak, Mulu National Park (04° N 114° E) , on the way to Lang/Deer Cave, 25.12.1995 (both ZMA Is. 203.799).

Description

Male 4.2 x 1.6 mm; female 3.9 x 1.8 mm.

Cephalon with linea supra-antennalis present and linea frontalis absent. Neither lateral nor median lobe can be seen in dorsal or frontal view. Eyes composed of about 15 - 16 ommatidia.

Pereion slender, pleon distinctly narrower than the pereion, dorsal surface smooth. Dark brown with pale muscle insertion spots.

Noduli laterales present, their length is about half as long as the length of the tergites. Noduli 2 and 4 in a distinctly more medial position than 1, 3, 5, 6. Nodulus 7 near the posterior margin of tergite 7, distant from the lateral margin (Fig. 2). Lateral margins of the coxal plates with

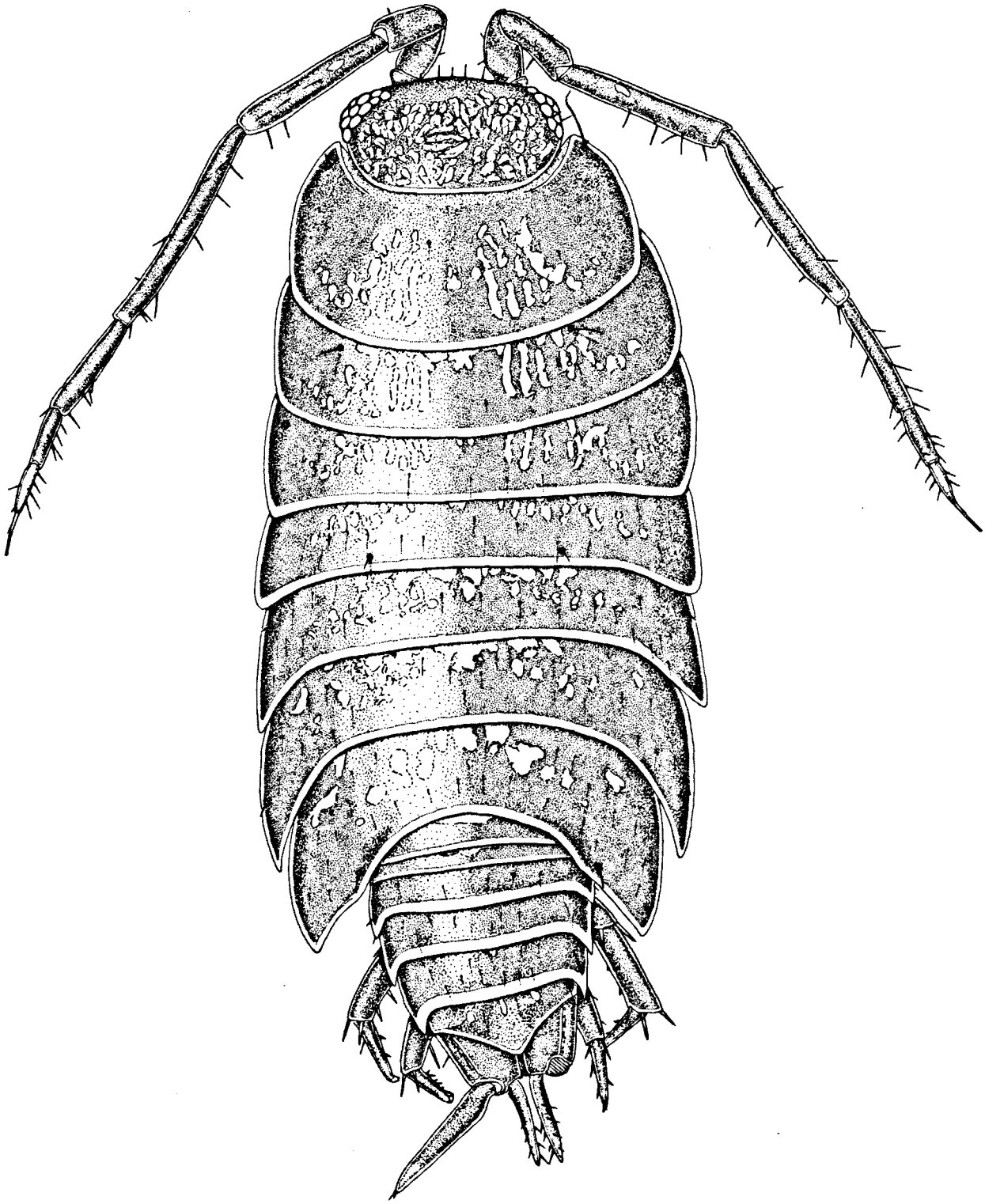

Fig. 1. *Loboscia shaji* sp. n., female (paratype), 3.9 x 1.8 mm, habitus dorsal

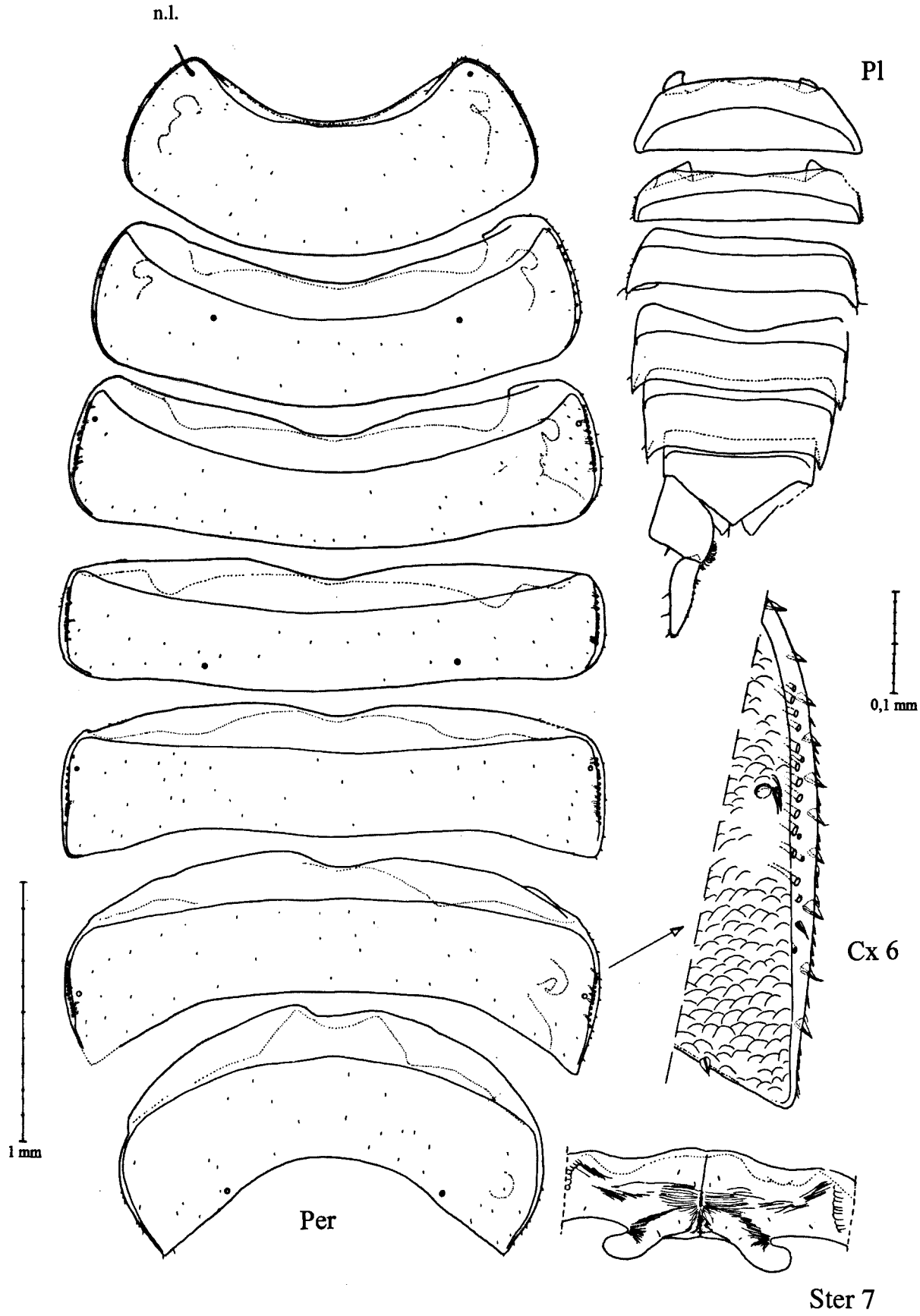

Fig. 2. *Loboscia shaji* sp. n., male (holotype), 4.2 x 1.6 mm, pereion-tergites 1-7, pleon-tergites 1-5 + pleotelson, sternite 7

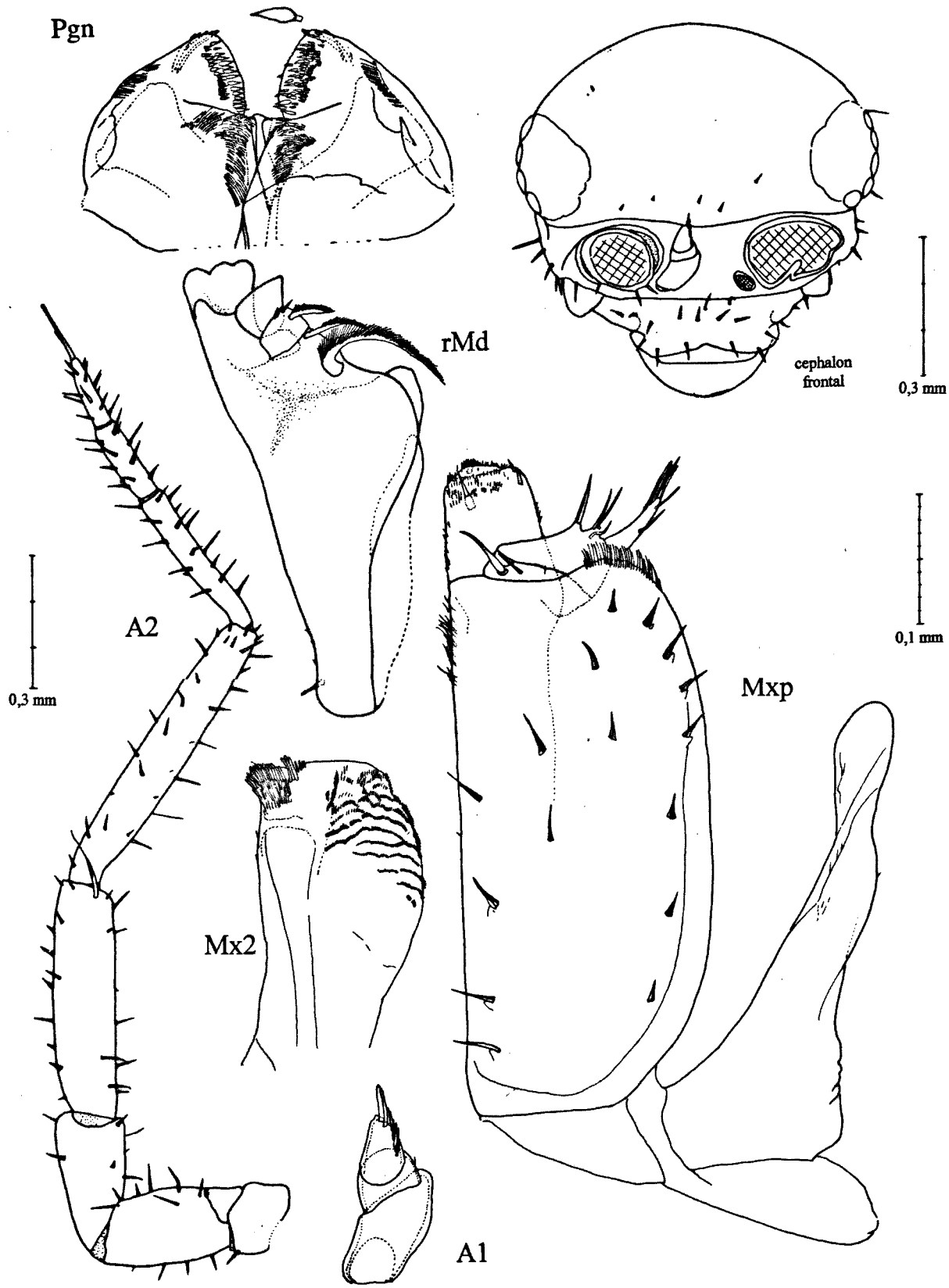

Fig. 3. *Loboscia shaji* sp. n., male (holotype), head, frontal; right mandible, paragnath, antennae 1 and 2, maxilla 2, maxillipede

few to numerous gland pores situated in the lateral furrow. In the male specimen, the first coxal plates have 1 and 3 pores on the left and right side; the second coxal plates have less than ten pores, coxal plates 3-6 are provided with approximately 10-20 pores, while no pores were observed on coxal plates 7.

Posterior margin of sternite 7 in males (Fig. 2) and of sternites 6 and 7 in females produced to a pair of laterally curved, rounded lobes.

Appendages: First antenna 3-jointed. The basal article is as long as the medial and apical article together; the medial article being the shortest. A row of aesthetascs is found on the medial face of the apical article.

Second antenna long and slender (Fig. 3). Peduncle and flagellum with numerous long setae. The long and slender apical organ is slightly shorter than the distal article of the 3-jointed flagellum.

Right mandible (Fig. 3): Pars incisiva with 4 'teeth', lacinia mobilis with straight apical margin, hairy lobe with a few spines and a penicil. Between the hairy lobe and the pars molaris one penicil. Pars molaris represented by a single, large, setulated seta.

Paragnathal lobes (Fig. 3) on the outer margin with a fringe of fine hairs, apical angle with some spine- or seta-like-structures and inner face covered with leaf-like spines (widest at about basal third of its length, apically and basally constricted.

First maxilla (Fig. 4) outer endite on its apical margin with an outer group of 4 stouter, simple teeth and an inner group of 6 more slender teeth, five of them cleft. A subapical small spine or seta could not be seen (might be absent or very small). Inner endite with two penicils and laterodistal corner rounded.

Second maxilla (Fig. 3) apically indistictly bilobate, the inner lobe narrower than the outer and bearing a tuft of sensilla. Basal to the tuft some fine hairs. On the outer lobe, the fine hairs are more or less regularly arranged in transverse rows.

Maxillipede (Figs. 3-4) composed of a large basipodite with scales and spines, a lobate epipodite, an endite and a 3-jointed palp (endopodite). The basal article of the latter bears a medial large seta and a slightly more lateral, smaller seta. From the second article arise two groups of several setae, and the apical article shows an apical tuft of setae and laterally 2 subapical setae. On the endite a variety of spiny structures and seta-like structures are found; the frontal (or dorsal) face bears a short penicil, on the caudal face a large subapical seta is located near the medial margin and two small setae (or lobes) on the laterodistal corner. In addition, pectinate scales (transverse rows of very fine hairs) and serrate spines are present (Fig. 4).

Pereiopods slender. Frontal surface of carpus 1 (Fig. 5) and of basal part of propodus with a brush for cleaning the second antennae. This brush consists of a field af more or less hirsute or brush-shaped scaly structures, which is surrounded by simple scales. The apical margin of the carpus bears a fringe of hyaline, membraneous scales between the insertion of the propodus and the large seta with a pectinate tip. The ventral face of the basal half of the propodus has a row of small spines. Fringes of hyalineous scales are found on apical and ventral margins of the carpus of P1-7 (Figs. 5-7) and on the ventral margins of merus of P1-6. The pereiopod 2 merus shows a ventral, subbasal protrusion covered with small spines. On the ischium of pereiopod 6 a ventro-caudal, triangular process with an apical tuft of spines can be seen. On the caudal face of pereiopod 6 merus and carpus and on the frontal face of pereiopod 7 basis and ischium there are grooves and/or rows of scales that resemble those of the water conducting structures present in Ligiidae, Tylidae, Synochaeta and basal Crinochaeta. In addition, grooves with a few pectinate scales are present on the frontal faces of the basipodites of pereiopods 2-6. The dorso-apical corners of P1-7 carpus and sometimes of the merus bears a small tuft of spines. The dactyli are slender, with a normally large outer claw and a very small inner claw, that does not surpass 0.2 the length of the outer claw. Between both claws there is a curved ungular seta that is distinctly longer than the outer claw (Fig. 7). Besides its base, a small accessory seta is present on the frontal face. In the apical half of the dactylus, there is a ventro-frontal and a ventro-caudal seta. Some more setae are located on or near the dorsal face of the dactylus; a distinct "dactylar organ" is not obvious, but one of the dorsal setae might be homologous to the dactylar organ of other Oniscidea. In addition to the setae, some scales are present.

Pleopods (Fig. 8). None of the pleopod exopodites is provided with lungs. The male exopodite 1 is triangular with a slightly concave lateral margin and a straight apical or medial margin. The exopodites 2-5 have some strong setae at their distal margin and some hairs on their inner margin. A single row of pectinate scales is present on the dorsal face of the exopodite 5. The male endopodite 1 is basally enlarged for the presence of the muscle M 49 (nomenclature after Erhard, 1995) and apically slightly twisted. Its apical half with a row of spines or spiniformous setae along the dorsal spermatic groove. The latter is provided with some small spines on the medial margin and a row of scales on the lateral margin, at the place, where the spermatophores leave the genital papilla and enter the spermatic furrow of the endopodite. At the corresponding site, the male endopodite 2 outer margin bears a small field of very small hairs. Endopodite 2 otherwise without any special characters, distally tapered.

The genital papilla is supported by a ventral shield.

The marsupium of the female specimen contains only two mancas or embryos, each of which has nearly one third of the length of the female (Fig. 4).

DISCUSSION.

Within the Crinochaeta, the new species belongs to a group characterized by the presence of noduli laterales.

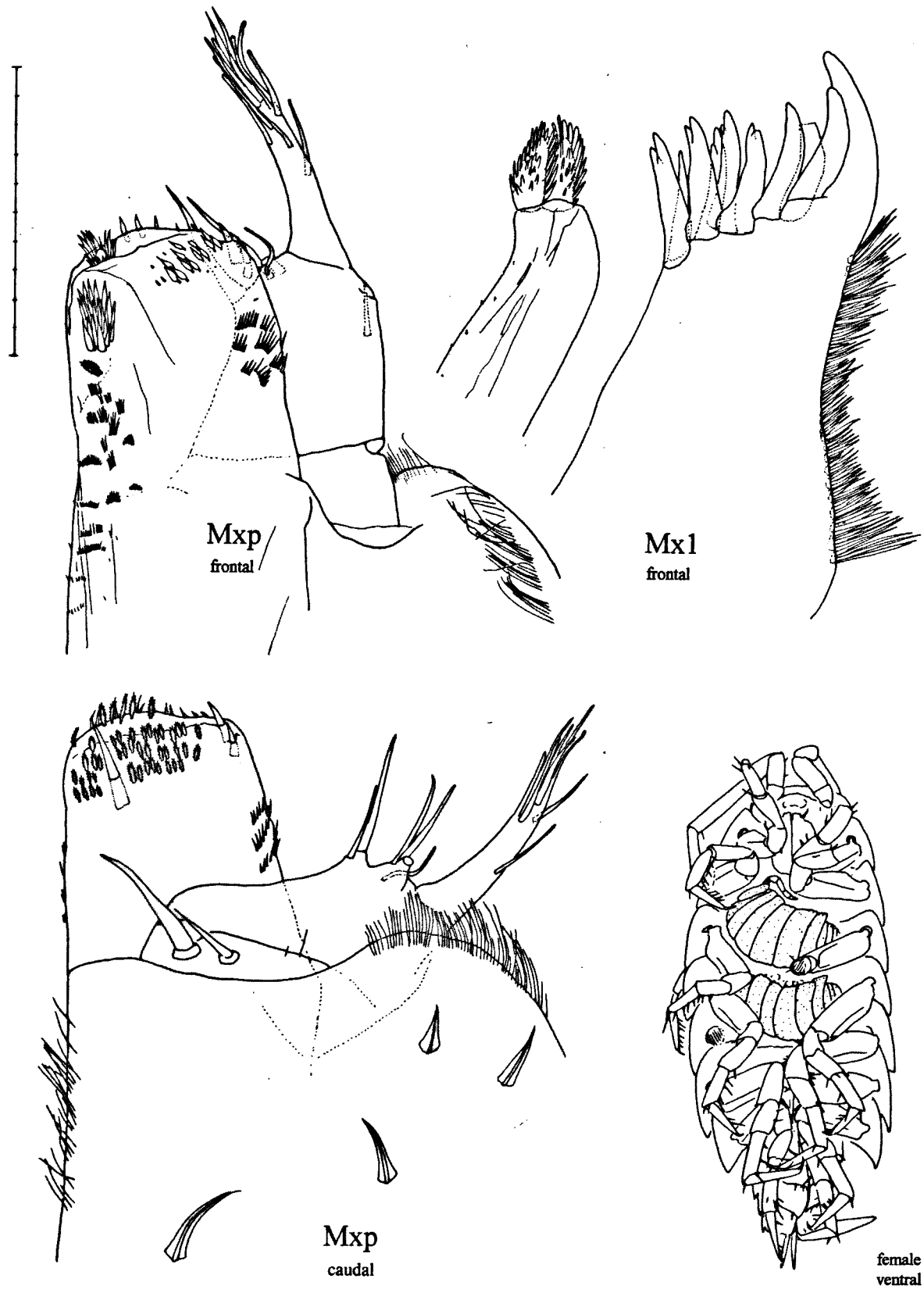

Fig. 4. *Loboscia shaji* sp. n., male (holotype), apical part of maxillipede, frontal and caudal, maxilla 1, female (paratype), habitus ventral

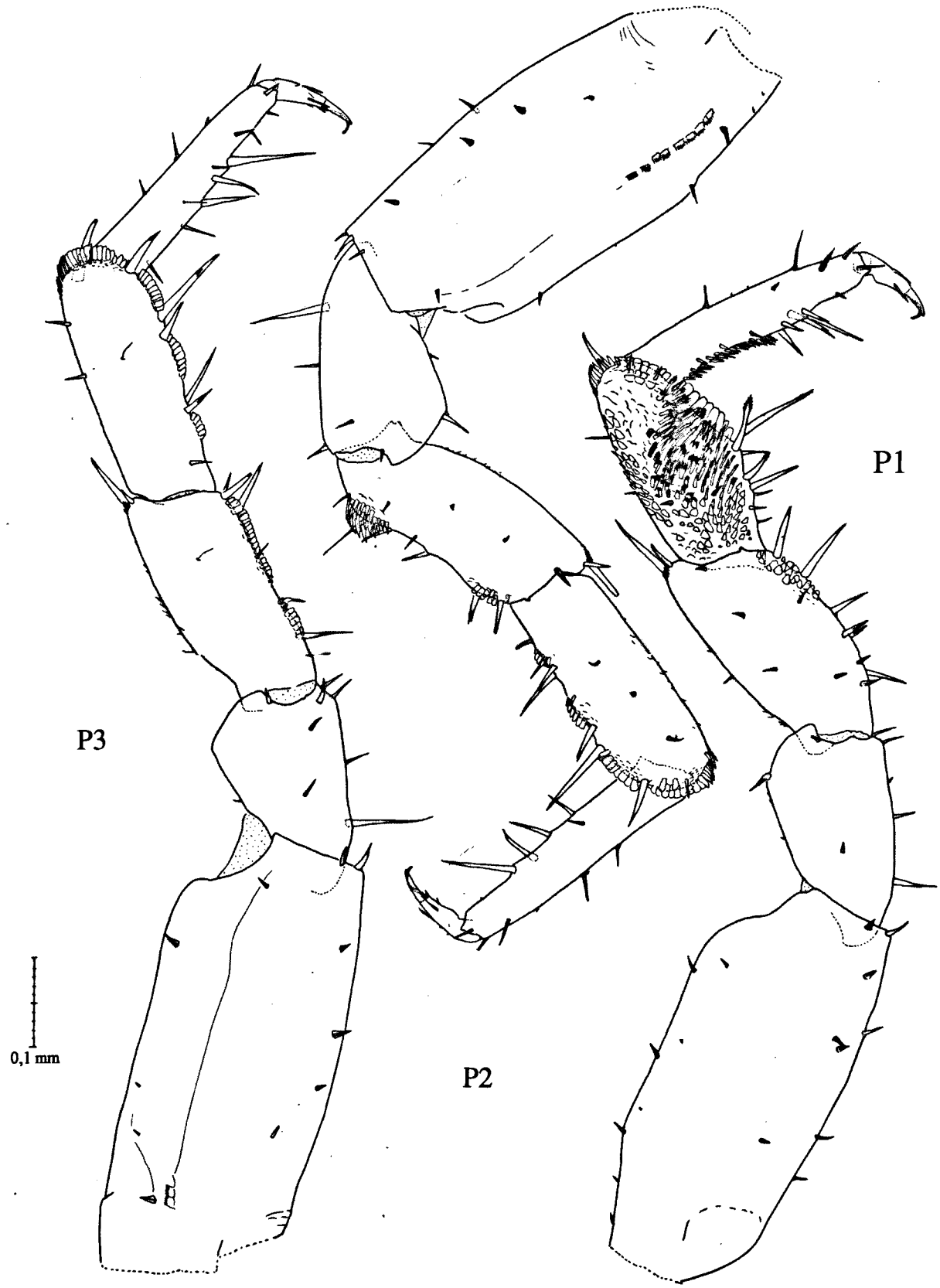

Fig. 5. *Loboscia shaji* sp. n., male (holotype), pereiopods 1-3, frontal

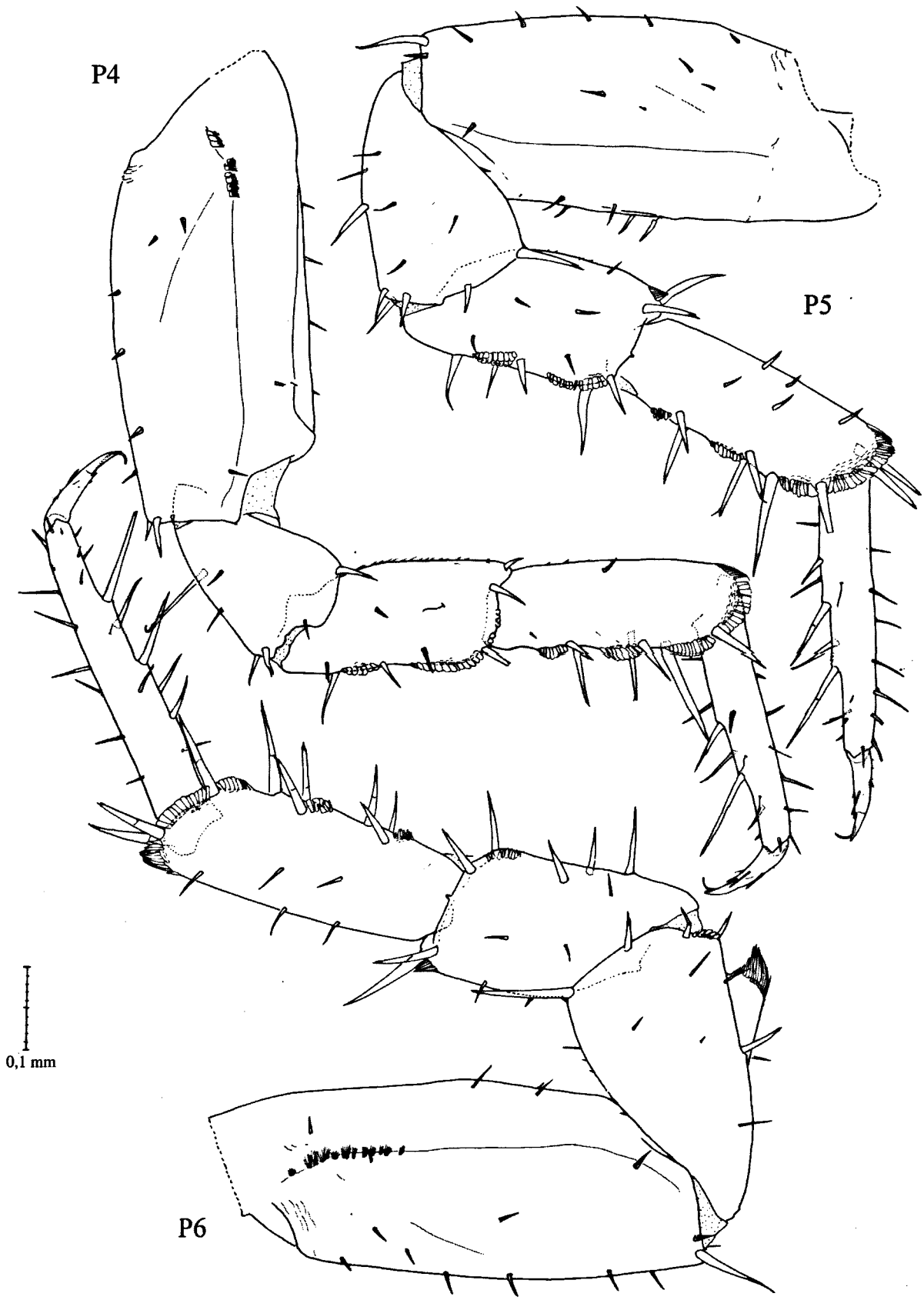

Fig. 6. *Loboscia shaji* sp. n., male (holotype), pereiopods 4-6, frontal

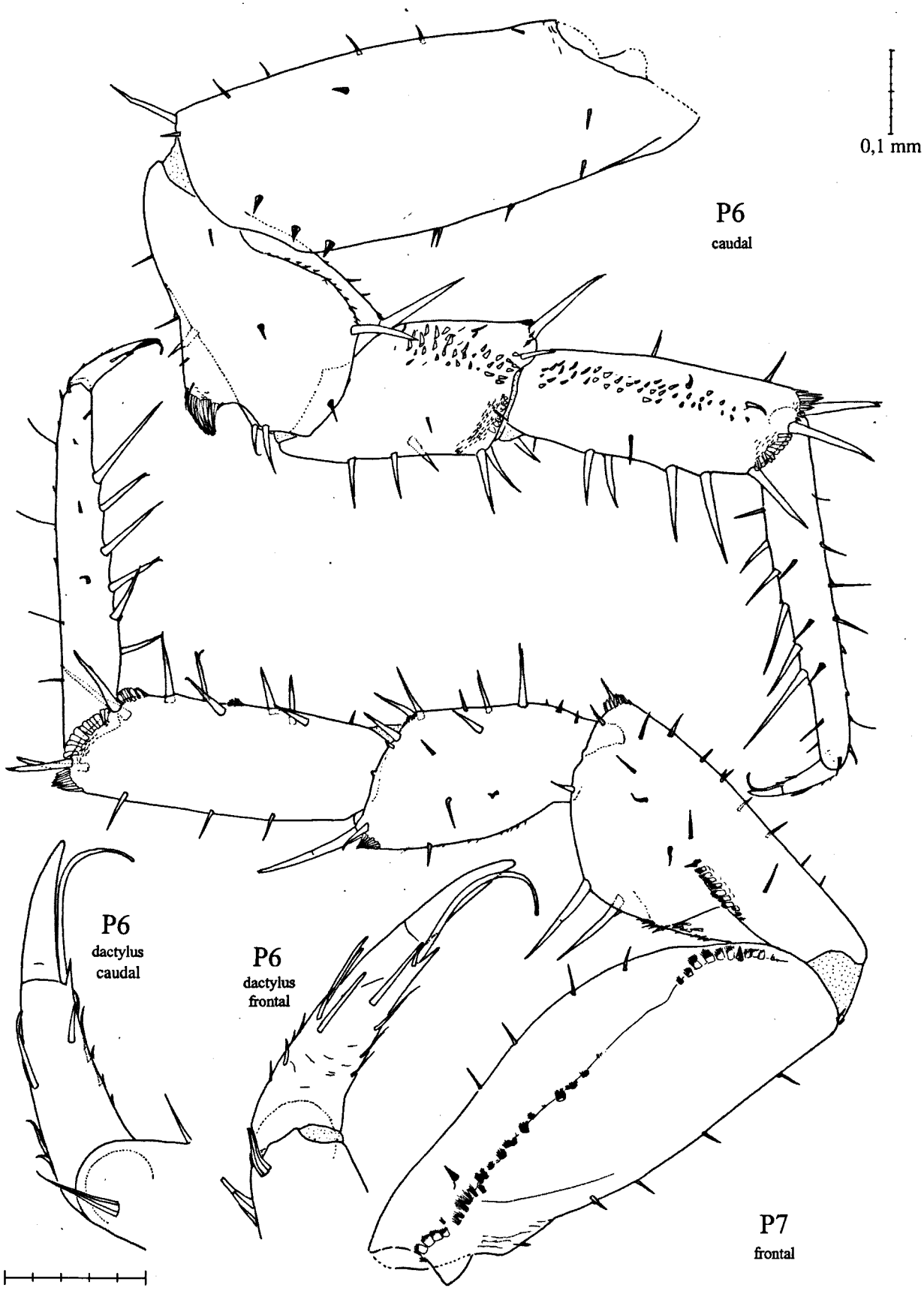

Fig. 7. *Loboscia shaji* sp. n., male (holotype), pereiopod 6 caudal, P6 dactylus caudal and frontal, pereiopod 7 frontal

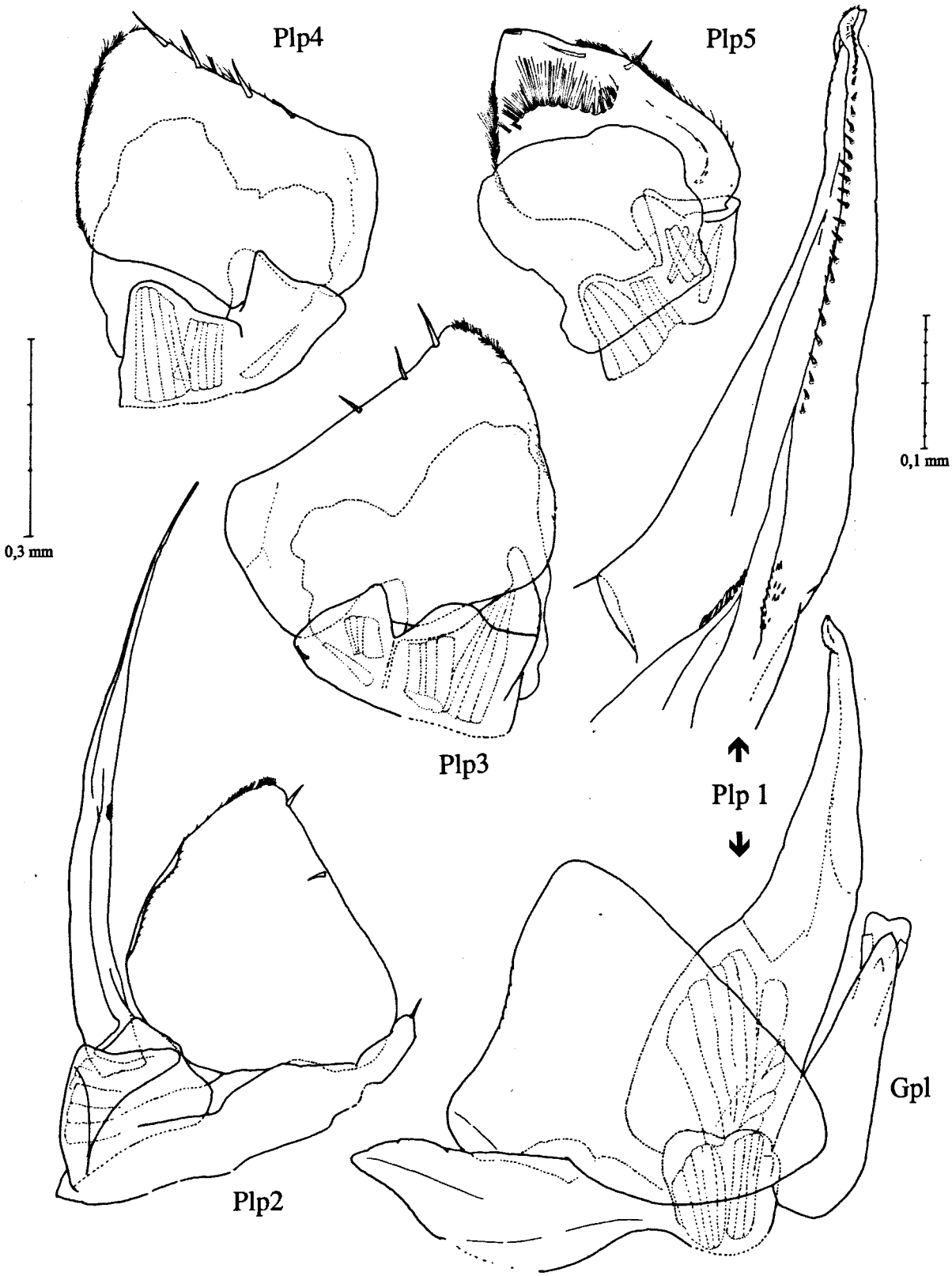

Fig. 8. *Loboscia shaji* sp. n., male (holotype), pleopods 1-4, frontal (pleopod 1 with genital papilla), pleopod 5 caudal, pleopod 1 endopodite caudal

This taxon includes the majority of the Crinochaeta, but excludes "Olibrinidae", "Scyphacidae", Scleropactidae p.p., *Actaecia* and part of the "Philosciidae". Within this group, it shows the 'Philosciid habitus' with pleon distinctly narrower than pereion, smooth surface and 3-jointed flagellum of second antennae. Together with the absence of lungs, these are plesiomorphies. The presence of vestiges of water conducting structures on the pereiopods 6 and 7 has not yet been described for any other species equipped with large, well developed noduli laterales. Further on, the presence of similar grooves on pereiopod 1-6 basipodites appears to be very exceptional within the Oniscidea. If the vestigial water-conducting structures on P 6 and 7 are ascribed to the ground pattern of the taxon with noduli laterales, a multiple convergent reduction has to be assumed, unless *Loboscia* is considered sistergroup of the remaining.

The latter assumption appears not to be supported by other characters. In contrast, with respect to the position of the noduli laterales and to the simple molar penicil, the nearest relative of the new species should be searched for among *Burmoniscus*, *Pseudotyphloscia* and similar genera (see descriptions in Green, Ferrara & Taiti, 1990, Taiti, Ferrara & Kwon, 1992, Kwon & Taiti, 1993) .

Very distinctive diagnostic features are the shape of pereiopod 2 and 6 ischium and of the sternite 7. However, this cannot easily be compared with literature data, because 'usually' not the second and sixth, but the seventh pereiopod of the male is displaying some odd shaped lobes or appendices. Therefore, the descriptions of most species do not include figures of the sixth pereiopod.

Concerning the sternite 7, Schmalfuss (1996) found a medial lobe on the posterior margin of male sternite 7 to constitute an autapomorphy of the Armadillidae. In other Oniscidea, only a short, triangular lobe is present or the posterior margin is straight. In contrast, in the new species, two lobes are present in a more lateral position, leaving the median part of the apical margin of the sternite straight. The presence of similar lobes on sternites 6 and 7 of the female implies a function not related to the male sexual apparatus.

Until the condition of the latter characters has been documented for more species of Crinochaeta, it may not be used for supporting hypotheses on the systematic position of the species described in the present paper.

The size of the mancas found in the marsupium of the female specimen is unusually large. offspring of a comparably large size has been reported from species of the genus *Exalloniscus*, where it is related with the myrmecophilous habits of these animals (Taiti & Ferrara, 1988). A close relationship between the new species and *Exalloniscus* can not be supported by synapomorphies. In contrast, it is assumed that the new species is more closely related to other "Philosciidae" taxa with large, well developed noduli laterales.

As already pointed out (Wägele, 1989; Schmalfuss, 1990), the "Philosciidae" clearly do not represent a monophyletic taxon. In contrast, it is suggested to consider the noduli laterales as a constitutive character of a still unnamed monophylum. Before the discovery of the new species, also the complete reduction of water conducting structures on pereiopods 6-7 would be ascribed to the ground pattern of this taxon. Those structures evolved in the stem lineage of the Oniscidea; within the Crinochaeta, they are still present, in more or less reduced state, in *Olibrinus*, *Actaecia*, "Scyphacidae", *Exalloniscus*, and Scleropactidae. The presence of this character in the new species, which without doubt is member of the taxon (with noduli laterales) might be explained in two ways: (1) vestigial water conducting structures are present in the ground-pattern of this taxon; in this case, they were reduced convergently in the members of this taxon excl. the new species and in *Alloniscus* and *Ischioscia* outside. As the new species is unlikely to be the sister-group of a taxon comprising all remaining species with noduli laterales, because species with a putative more primitive position of the noduli laterales are known (e.g. *Papuaphiloscia*), the water conducting structures on pereiopods 6 and 7 were lost more than 1 time inside this taxon. (2) It might be taken into consideration, whether or not the presence of those structures on P 6,7 and even on the basipodites 1-6 is due to a 'reappearance' of structures, that were already reduced in the ground pattern of the noduli-bearing taxon. Such a reappearance of characters might be caused by 'discontinuous activity' during evolution, of the genes responsible for the characters in question, a mechanism that was proposed and discussed in detail by Sturm (1994).

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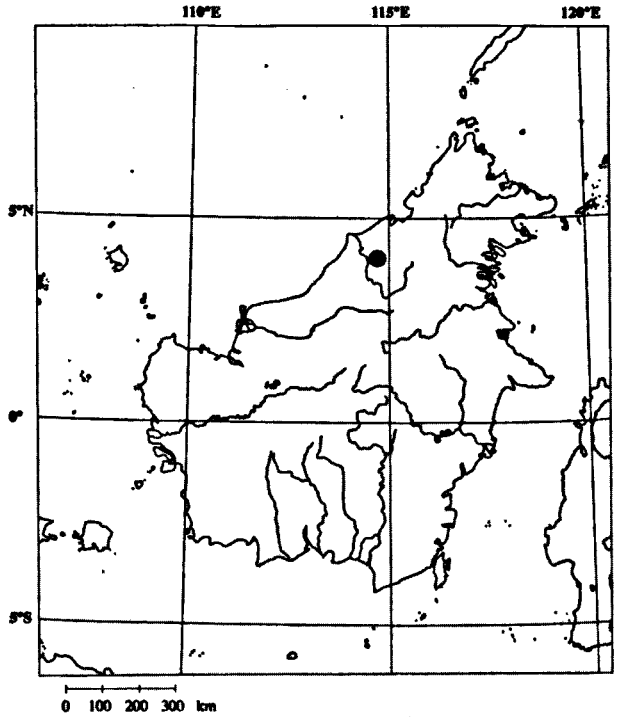

Fig. 9. Map of Sarawak / Kalimantan indicating the type locality of *Loboscia shaji* sp. n. in Sarawak.

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