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SOME COLLEMBOLA FROM IBIZA WITH DESCRIPTIONS OF THREE NEW SPECIES, AND A NOTE ON *HYPOGASTRURA SERRATA* (ÅGREN, 1904)

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ABSTRACT

A first list of Collembola from Ibiza is presented, based on material extracted from two soil samples in midwinter. Out of the 13 species that are recorded three are new to science, viz.: *Hypogastrura pityusica, Lathriopyga ibicensis* and *Neosminthurus natalicius*. The latter species forms the first European record of the genus *Neosminthurus* Mills, 1934. Another interesting discovery was that of *Folsomides marchicus* (Frenzel, 1941); arguments are brought forward that this species is a senior synonym of *Subisotoma petiti* Delamare Deboutteville, 1948.

The holotype of *Hypogastrura serrata* (Ågren, 1904) has been studied and some additions to the original description are presented. It is found that the specimen was heavily infected by Sporozoa; it is suggested that some characters reported as differentiating this taxon, in particular the serrated setae, might be caused by ecomorphic processes triggered by this infection.

INTRODUCTION

A short visit to the mediterranean island of Ibiza in the winter of 1970/71 permitted me to collect two soil samples that were extracted for Collembola. So far as I am aware, the thirteen species which were recognized form the first fauna list of Collembola of this island. It turned out that among those few species not less than three were new to science. One of the new species, moreover, means the first European record of the genus *Neosminthurus* Mills, 1934. The two samples were collected in the immediate vicinity of the small coastal village of Santa Eulalia, under a relatively undisturbed vegetation of sparse *Pinus halepensis* Miller, with an undergrowth of mainly *Erica multiflora* L. and *Rosmarinus officinalis* L. The samples were taken December 25, 1970, and extracted on the same day. Sample numbers are 970.004 and 970.007. The material, including the types, is preserved in the Zoölogisch Museum, Amsterdam.

Hypogastrura pityusica n. sp.

Material: 1 ♂ holotype, 1 ♂ paratype, from sample 970.007. Specimens mounted separately on slides in Marc André II; the pigmentation of both is left intact.

Discussion.- By the structure of the posterior face of the dens, which is warty and bears 6 setae, the slender unguiculus and the absence of clavate tenent hairs, the new species comes close to *Hypogastrura vernalis* (Carl, 1901), *H. serrata* (Ågren, 1904) and *H. tianshanica* Martynova, 1970. *H. pityusica* and *serrata* differ from *H. vernalis* in a clear chaetotactic detail (viz. the absence of seta m_4 on abd_5 - for a study of the chaetotaxy of *H. vernalis* I refer to Da Gama, 1964), and in the fact that the warts on the dens are not so highly conical as in that species. Moreover, the shape of the mucro is different. *H. pityusica* shares with *H. serrata* and *tianshanica* the possession of serrate hairs, which is a rare character within the genus *Hypogastrura*. However, as will be demonstrated by a study of the type specimen of *Hypogastrura serrata* (Ågren), this character must be approached with caution. *H. serrata* and *H. pityusica* both have a quadridentate retinaculum, which is tridentate in *H. tianshanica*. *H. tianshanica* moreover, has the same chaetotaxy of abd_5 as *H. vernalis*, which forms an additional distinction.

Hypogastrura pityusica differs from *H. serrata* in having 6 instead of 7 setae on the dens, in the shape of the mucro which has a small distal internal lamella and no distal tooth (in *serrata* there is no internal lamella but a distinct apical knob), in the much shorter anal spines, in the smaller overall size and maybe also in the chaetotaxy of abdominal segment 4. If my interpretation is correct, m_5 is lacking on this segment in *H. pityusica*, but present in *serrata*.

Hypogastrura tigridis J.M. Brown, 1926, from Mesopotamia, also has the "dorsal hairs obscurely serrated", and is otherwise related to *pityusica*. However, *H. tigridis* is easily separated by the clavate tenent hair, the shape of the mucro and the well-differentiated antennal sense hairs. Within the *Hypogastrura* species with normal setae, the closest relative of *H. pityusica* is *H. ripperi* Gisin, 1952, described from an Austrian mushroom nursery. But the mucro of *ripperi* has a strong internal lamella and ant_1 bears an accessory seta "p" which is absent in *H. pityusica* and *serrata*.

Description.- Length 0.8 mm. Irregular grey pigment granules dispersed over the body. Eye-patch rather darker. Skin granulation regular and not particularly strong.

Eyes 8 + 8. Postantennal organ not well studied, seemingly normal with an accessory tubercle (fig. 1k). Ant_1 without seta "p" (fig. 1e). Antennal organ III normal, sensory hairs on ant_4 weakly differentiated (fig. 1a). Apical retractile papilla present, subapical sensillum not seen. Eversible sac of *Ceratophysella* type absent Body chaetotaxy as represented in fig. 1h. All setae on head, dorsum and coxae, and even those on the first two antennal segments are serrate, with the exception of the setae sensuales. The setae are rather short, somewhat stiff, and are mostly bent backward; serrations are mostly present at the anterior face of the hairs. Setae sensuales are m_6 and p_4 on th_{2-3}, p_5 on abd_{1-4} and p_3 on abd_5. A row m is present on th_{2-3} and abd_4. On th_3 and abd_4 m_2 is lacking. Anal spines short, about 5 µ, on papillae that measure about 3 µ; the papillae are well separated at their base (fig. 1i). Ventral tube with 4 + 4 setae (fig. 1c). Retinaculum quadridentate. Ductus ejaculatorius divided in two compartments (fig. 1d). Dens with 6 setae that are all about equally thick; the basal seta is much longer than the other ones. The posterior integument of the dens is rather coarsely granulated, especially distad, though by far not as strong as in *H. vernalis*. Mucro with a moderately large outer lamella, that reaches up till about 2/3 of the mucro; the mucro moreover has a small inner lamella in distal position (figs. 1f, g). Length of dens 35 µ, length of mucro 10 µ.

Unguis without lateral teeth, but with a small tooth to the inner lamella at about 0.7 from the base. Unguiculus of normal length, with a very weak inner lamella. Pretarsal hairs long. One tenent hair that is not clavate (fig. 1b). Length of unguis of P_3 22 µ, length of unguiculus of P_3 13 µ.

SUPPLEMENTORY DESCRIPTION OF THE HOLOTYPE OF *Hypogastrura serrata* (Ågren, 1904)

Since from the literature alone it could not be established beyond all doubt that *Hypogastrura pityusica* represented a good species, distinct from *H. serrata*, I studied for comparison the holotype of the latter species. The specimen,

which is preserved in the collection of the Department of Systematics of the Zoological Institute, Lund, was borrowed through the kind assistance of Dr. Hugo Andersen.

The specimen proved to be dissected, apparently after treatment with KOH, and was mounted on two slides. One slide contains the dissected antennal apices (severed through ant_2) and the head (severed from the body through th_1). The remainder of the body is preserved in another slide. Both mounts are in good condition. They are labelled identically: "Achorutes / serratus n.sp./ Lycksele Lappmark. / Björkfors, 15.VII. / 1903. S. Bengtsson". The specimen evidently is a female, but I could not ascertain of the genital orifice is open or not.

The integument is rather coarsely granulated, especially on the last three abdominal segments.

The postantennal organ could not be studied. Ant_1 without accessory seta "p" (fig. 2c). Sensory setae on ant_4 rather well differentiated.

Body chaetotaxy is schematized in fig. 2d. Setae sensuales are on th_{2-3}: p_4 and (indistinctly) m_6, on abd_{1-4}: p_5 and on abd_5: p_3. A row m is present on th_{2-3} and on abd_4. Seta m_2 is lacking on th_3. I am inclined to interpret the chaetotaxy of abd_4 thus that m_2 is present, but has been displaced somewhat in lateral direction. I admit, however, that alternative interpretations are equally possible, in which m_2 would considered to be absent. Anal spines slender, not very short, viz. 12.5 µ (fig. 2b). Ågren remarks that the anal spinets are bent anteriorly, but in the preparation this is not evident. The anal spines are inserted on low papillae, that are separated at their base by one or two integument granules. Retinaculum quadridentate; tubus ventralis with 4 + 4 setae. Dens stout, with 7 + 7 setae (contrarily to the statement by Ågren, who reports 6 + 6 setae). The three distal setae are strong and curved; the most apical seta and the distoexternal seta as well are even somewhat serrate. Of the two basal hairs the external one is very long (48 µ), and inserted on a large hairring. The posterior granulation of the dens is coarse, apically even more so than basally, but nowhere as strong as in *H. vernalis*. Length of dens 68 µ. Mucro 25 µ long, with a thick apical tooth and a moderately broad external lamella, that is abruptly interrupted apically (fig. 2a).

The unguis has no lateral teeth, but a strong tooth to the internal lamella, in P_2 at 22 µ from base. Length of unguis of P_2 40 µ, length of unguiculus of P_2 26 µ. Unguiculus without internal lamella, terminating in a hairlike filament. Pretarsal hairs long. Tenent hair 51 µ, practically acute (fig. 2e).

Note.- When I analyzed the chaetotaxy of the specimen, I was struck by the fact that many setae were somewhat anomalous in aspect. Some hairs had a cleft apex,sometimes even they were cleft over a pretty distance down; on the femur of one P_1 found a hair with an apex cleft in five; some hairs had a strangely strong base. Most anomalies appeared (as far as could be studied) asymmetrically.

It is very tempting to bring this in connection with the fact that the specimen was heavily parasitized by some sort of Sporozoa. In the body (not in the head or in the extremities) numerous "nests" occur of 10 - 30 strongly refracting lemon-shaped bodies of approx. 7 x 3.5 µ, which are individually enclosed by a less refractive mandorla of approx. 8.5 x 6 µ (fig. 2f). Dispersed in the body are moreover enormous numbers of elongate corpuscules of 3 x 1 µ (fig. 2g). Although interpretation is difficult due to the treatment the specimen has undergone with potassium, it is highly probable that the bodies must be explained as some kind of Sporozoa, perhaps Microsporidia (Doflein, 1916, Weiser, 1969). I am grateful to mr. J. Huisenga for confirmation of my interpretation.

It is a well known fact that in the genus *Hypogastrura* phenomena of ecomorphosis are of wide occurrence. Although these phenomena are very incompletely understood, one can generalize that they are always connected with a disturbance of the metabolism caused by a physiological stress on the organism, and are generally expressed in abnormalities in the integumentary ornamentation (Cassagnau, 1971). This brings me to suspect that the serration of the setae of *H. serrata* could be such an anomaly, due to stress caused by parasitation. This would, moreover, present an elegant explanation of the extreme rarity of this species: after the initial publication there is but one reference in the literature; Shoebotham, 1911, reports *serrata* from Staffordshire, England. The

material has been checked by Ågren, but unfortunately no description is added. The specimen is not in the British Museum, as mr. P. N. Lawrence kindly informed me.

However, if one would suppose the serrate setae of *H. serrata* to be a pathological, or anyway ecomorphic character, one would logically surmise to be able to correlate *serrata* with another species with normal setae. The most closely related species seems to be *H. ripperi* Gisin, 1952. This species is known from Austria, France, Switzerland (Gisin, 1960) and some Portuguese caves (Da Gama, 1964). *H. serrata* is separated from *ripperi* by at least two good characters: a small instead of a large mucronal lamella and the absence of seta "p" to ant_1. Moreover, as far as presently known, the range of both species does not show any overlap.

Xenylla brevisimilis mediterranea Da Gama, 1964

Material: 4 ♀, 2 ♂, 3 juv.

Since the exhaustive studies of Da Gama on the genus *Xenylla* (1964, 1969, 1971) there is not much additional information to give as regards the species of that genus. The material agreed completely with the published descriptions.

Apart from Ibiza, the subspecies is known now from Portugal, Morocco, Macedonia, southern France and the Netherlands. The typical subspecies is known from Poland and Morocco. As a matter of fact it seems questionable to continue attributing subspecific rank to *mediterranea*, but I refrain from changing the status untill more information is available concerning the exact distribution of both taxa.

Protaphorura armata (Tullberg, 1869)
s. Gisin, 1952

Material: 3 ♂, 1 juv.

The material agrees in all key characters with the detailed descriptions by Gisin, except in a slightly different M/s relation on abd_5, which in the adult specimens is 14/6, 14/8 and 17/7.

The chaetotaxy of the prothorax is rather unstable. In the adult specimens, the frontal row of microchaetae counted 3 + 3, 3 + 3 and 3 + 2 respectively; in the same order the posterior row had the formula 1i1 2MM2 1i1, 1-1 1MM2 1i1 and 1i1 1MM1 1i1. This differs somewhat from Gisin's formula 1i1 3MM3 1i1, and illustrates the danger of attributing too much value to this aspect of the chaetotaxy.

Pseudachorudina bougisi Delamare Deboutteville, 1951

Material: 1 juv.

The specimen is in good agreement with the descriptions in the literature. *P. bougisi* is known from central and southern Europe, and North Africa; its discovery in Ibiza is not surprising.

Lathriopyga ibicensis n. sp.

Material: 6 ♀, incl. 1 ♀ holotype, sample number 970.004. All specimens mounted separately on slides in Marc André II. Of four paratypes the pigment has been destroyed by treatment with HCl-$KClO_3$.

Discussion.- The new species belongs to the group of *"Neanura" phlegraea*, distinguished by Da Gama, 1964, on the following set of characters: eyes 2 + 2, unguis toothless, dorso-internal tubercles on abd_4 separated, those on abd_5 fused, setae relatively long, rugose with a double outline. Within this group, *ibicensis* belongs to the species that have the central and apical cephalic tubercle completely fused, i.e. to the group of *L. sinistra* (Denis, 1935), *conjuncta* (Stach, 1926) and *monticola* (Cassagnau, 1954). *L. ibicensis* differs from all three species in having on the central cephalic tubercle a finely granulated area, as is the case in *L. phlegraea* (Caroli, 1912).

Lathriopyga ibicensis agrees with *sinistra* in possessing an accessory secondary tubercle Ee to the cephalic tubercle. However, the dorso-external tubercle of th_2 has 4 setae; on the central cephalic tubercle seta D is blunt and stout, not a slender thin hair as in *sinistra*. The relative lengths of the median setae on abd_5 (10 : 2.5 : 2) differs from that in *sinistra* (10 : 7.5 : 2), as well as from *monticola* and *conjuncta* (both 10 : 10 : 3). *L. ibicensis* shares with *conjuncta* and *monticola* the possession of 4 setae on the dorso-external tubercle of th_2, but differs in having the accessory tubercle Ee and in being much smaller, especially if compared with *monticola*.

Description.- Length 0.9 mm approx., which is rather small for the group. Body diffusely bluish-grey pigmented. The pigment is concentrated in the secondary tubercles, the antennal bases and the eyes. Eyes 2 + 2. Unguis toothless. Integument coarsely granulated, secondary tubercles strongly developed especially on the posterior segments. All setae except the setae sensuales are very long, blunt, distinctly rugose with a double outline. Antennae with 7 sensory hairs, typical for the group. Mouthparts not studied. Abd_6 visible from above for a minor part.

The central and apical cephalic tubercle are completely fused. Antero-laterally from seta E an accessory secondary tubercle Ee is present. In front of the secondary tubercles AA a finely granulated area is present, devoid of secondary tubercles. No median seta O in this tubercle. Seta D is normal, stout and blunt. (fig. 3a). Ocular tubercle with 2 eyes, 2 strong normal setae and antero-medially a very fine setula. Cephalic tubercle di fused with de, each joint tubercle with 4 setae.

On abd_4 all tubercles are free; on abd_5 the lateral tubercles de and dl are fused, as well as the medial tubercles di + di. Relative length of medial setae on abd_5 is 10 : 2.5 : 2 (fig. 3b).

Rudiment of furca mostly with 3 + 3, sometimes with 2 + 2 setae.

The formula of the chaetotaxy is given below:

	di	de	dl	l
head	14	3	6	
	4			
th 1	1	2	1	-
2	3	4	4	3
3	3	4	4	3
abd 1	2	4	2	3
2	2	4	2	3
3	2	4	2	4
4	2	3	3	7(8)
5	3+3		8	
6	7			

Lathriopyga conjuncta is known from a fairly wide region in central and South-Eastern Europe; roughly ranging from Poland to Bulgary and Jugoslavia, and from Switzerland to the Ukraine *L. conjuncta* is replaced in south-western Europe by *L. sinistra*, which is known from France, Italy, Portugal and Madeira. *L. monticola* (endemic to the Pyrenees) and *L. ibicensis* can be explained as peripheral isolates of *sinistra*.

Folsomides marchicus (Frenzel, 1941)

Proisotoma marchica Frenzel, 1941

Subisotoma petiti Delamare Deboutteville, 1948 - new synonymy.

Material: 5 ♀, 7 ♂ , 3 juv.

Apart from some differences that will be discussed below, the material is in good agreement with the description by Frenzel. The main differences are: 1, the grey-blue pigment mentioned by Frenzel is present only in some granulae near the eye-patch (fig. 4e); 2, the unguiculus is longer than one third of the unguis; 3, the number of dental setae is more variable than is stated by the author.

I think that not too much importance is to be attached to the practically unpigmented condition of the material, although it may be a reflection of a geographic variation.

Frenzel states that the unguiculus has one third of the length of the unguis. He does not state explicitely that this is the case in all feet. In the Ibizan material, the unguiculus is about one half of the unguis length in P_1, but the unguiculus is proportionally longer in P_3. But often the unguis and unguiculus are not exactly parallel, which makes it very difficult to establish their respective lengths, the more so because of the very fine apex of the unguiculus (figs. 4a,d).

The variability of the dental chaetotaxy is much larger than expected. The anterior face of the dens is bare in all specimens, but I found all intergradations between 4 + 3 and 2 + 2 setae on the posterior face.

Represented in tabular form:

4 + 3	1 ♀	
3 + 3	2 ♀ 3 ♂	
3 + 2	2 ♀ 2 ♂	2 juv.
2 + 2	2 ♂	1 juv.

This demonstrates that an arrangement of 2 + 2 setea on the dentes falls within the normal variability of *F. marchicus*. I am strongly inclined to believe that this fact brings *Subisotoma petiti*

Delamare Deboutteville, 1948, in the position of a synonym of *F. marchicus*. *S. petiti* was described from the French Camargue; already Gisin, 1960, made evident that this species was separated from *marchicus* by the dental chaetotaxy and by the unpigmented habit only.

I admit that *petiti* is placed by its author in the genus *Subisotoma* Stach, 1949, whereas *marchicus* is attributed by Stach, 1949, explicitly to *Folsomides*. But evidently Stach had not studied the type material, and the attribution of *marchicus* is only based on the interpretation of a decidedly quick drawing, since Frenzel made no statements in his text concerning presence or absence of the generic character of *Subisotoma*: the presence of a lateral lamella to the unguiculus.

To settle the problem by the simplest solution, I have tried to study the type material, but in vain. Frenzel described the species from Bellinchen an der Oder, and writes that the types are deposited in the biological station of that village. The locality is now Polish territory (Stach, 1949). Dr. Szeptycki informed me that the biological station of Bielinek nad Odra, as the locality is called nowadays was destroyed by war action, with most of the collection. Doz. Dr. Palissa informed me that neither the type series, nor in fact any other specimen of this species is present in the collections of the Institut für Pflanzenschutzforschung, Zweigstelle Eberswalde, or in the Zoologisches Museum der Humboldt-Universität zu Berlin.

Otherwise, at the generic level, I am not convinced of the validity of the genus *Subisotoma*, based at it is on the presently used set of characters. Stach, 1949, erected this genus, with *Folsomides pusillus* (Schäffer, 1900) as type species, with as distinguishing characters the three-winged unguiculus and the shape of the body, which is not so strongly elongated as in *Folsomides*. Poinsot, 1972, adds that the sixth abdominal segment is only indistinctly separated from abd_5 in *Subisotoma*. The character of the body shape is too subtle to be reliable; a little pressure on the cover slip of a fresh preparation demonstrates the limited applicability of shape characters. I agree with Poinsot that e.g. in *Folsomides variabilis* (Gisin, 1949) or in the material under consideration, the suture between abd_5 and abd_6 is rather vague - but we know from the *Isotomina* - *Cryptopygus* case what this character is worth. The only structural character of essential importance is the three-winged unguiculus - and I fear that we would overstate the resolution power of light microscopy if we would deny categorically such a structure in *Folsomides parvulus* Stach, 1922, the type species of *Folsomides* Stach, 1922. Only the scanning microscope could settle this question, although not render practical applicability to these hardly observable structures.

Gisin, 1949, introduced as a generic character for *Subisotoma* the presence of an anterior seta on the dens. This would place *marchicus* as well as *petiti* in *Folsomides*. *Folsomides navacerradensis* Selga, 1962, and *F. variabilis* (Gisin) would be located in the genus *Subisotoma* - just as Poinsot wishes, though on other grounds. But I cannot be convinced of the necessity of splitting *Folsomides* in two, on the strength of one single practical character.

Folsomides marchicus is known from quite a few localities in central and South-West Europe; *petiti* is known from the type locality in southern France, and from Portugal (Da Gama, 1964). It is interesting that Da Gama points out a difference of her material with the description of *petiti*: the Portuguese specimens were pigmented all over the body, though sparsely.

Folsomia cf. *quadrioculata* (Tullberg, 1871)

Material: 3 juv.

Some restrictions have to be made concerning the identification, due to the imperfect material. In particular the chaetotaxy of the female genital area, important since Petersen, 1965, stressed its usefulnes in separating *F. nana* Gisin from *quadrioculata*, could not be studied. However, since in the largest specimens, measuring 570 µ, the longest macrochaetae of abd_6 are 5 times as long as the mucro, there is not much doubt left concerning the identity of the specimens.

F. quadrioculata is very frequently met with, practically everywhere in Europe.

Cryptopygus thermophilus (Axelson, 1900)

Material: 1 ♂.

The specimen is in good agreement with published descriptions. To complete the documentation, a figure of the chaetotaxy of the posterior face of the manubrium is added. (fig. 5).

Provided that all identifications are correct, *C. thermophilus* is a truly cosmopolitan species, limited in its distribution only by a preference for mild microclimates.

Isotomurus palustris (Müller, 1776)

Material: 1 juv.

In a recent paper, Poinsot, 1972, narrows the scope of *I. palustris*, and divides that species in two subspecies (although it is not evident on which geographical arguments). The Ibiza specimen agrees with the typical subspecies.

Entomobrya marginata (Tullberg, 1871)

Material: 1 specimen of unknown sex, in bad condition.

The pigmentation and the structure of the labral papillae is in good agreement with the description by Stach, 1963. The species has been reported from many European localities; Stach has seen this species among material from Malta.

Entomobrya quinquelineata Börner, 1901

Material: 1 specimen of unknown sex.

The specimen agrees with the description by Stach, 1963. It does decidedly not belong to the subspecies *iberica*, described by Stach, 1963, from southern Spain.

Sminthurinus aureus (Lubbock, 1862)

Material: 1 ♂.

The single specimen, which is referable to the variety *atrata* Börner, 1901, deviates in the non-subdivided tubercle on the third antennal segment. This would point toward an identification as *Sminthurinus planasiensis* Dallai, 1969, described from the mediterranean island of Pianosa. But the latter species is differentiated by its author from *aureus* by having a dental chaetotaxy of the *S. flammeolus* type.

Neosminthurus natalicius n. sp.

Material: 1 ♂, holotype, sample 970.004. The specimen is dissected and mounted in Marc André II on one slide.

Discussion.- As far as species known at present from Europe are concerned, *N. natalicius* comes close to *Lipothrix lubbockii* (Tullberg, 1872) and *L. italica* (Cassagnau, 1968). *N. natalicius* differs from both in the generic characters of *Neosminthurus* Mills, 1934, viz. the non-subsegmented fourth antennal segment and the absence of bothriotricha B and D. Moreover, *natalicius* differs from *lubbockii* by the frontal macrochaetae being half as long as the subocular ones, and in the dental chaetotaxy. The postero-internal row of dental setae in particular contains two setae in basal position (sometimes one) in *lubbockii*; the same row has but one seta in intermediate position. Contrarily, in *natalicius* the basal group has but one seta, the intermediate group 3. Additional differences with *L. italica* are in the subocular macrochaetae (in *italica* as small as the frontal ones) and in the dental chaetotaxy.

Within the genus *Neosminthurus*, *natalicius* differs from the type species, *N. curvisetis* (Guthrie, 1903), in having one instead of two recurrent spines on the femur of P_1. *N. clavatus* (Banks, 1897), described as *curvisetis* from North America, is very incompletely known, and I confess that presently the best differentiating character between *clavatus* and *natalicius* is to be found in the locality labels. But I judge it unwise to correlate two species from so widely different regions only for lack of arguments to the contrary. *Neosminthurus schalleri* and *N. gisini*, both described by Delamare Deboutteville & Massoud, 1964, in the genus *Spyrotheca* from Angola, have profemoral spines as *curvisetis* and differ moreover in possessing a horizontal seta on each tibiotarsus. The last character is also present in the Japanese species *amabilis* and *mirabilis*, both described by Yosii, 1965, also in *Sphyrotheca*. The profemoral chaetotaxy is not known in the last two species.

Description.- Total length approx. 0.8 mm. Integument coarsely but regularly tuberculate. Abdomen, head and antennae pigmented with blue; feet and furca feebly pigmented. Small irregular white spots and lines mark the border of the tho-

racal segments.

Abdomen globular, postabdomen broadly attached, segments 5 and 6 fused. Bothriotricha A short and straight, C long and wavy. Bothriotricha B and D are lacking. Abdominal chaetotaxy consists of some 4 + 4 rows of strongly clavate setae. The anterior setae are almost triangular, the posterior ones are somewhat more slender (figs. 6 d,e). Among the clavate setae short blunt simple setae of about the same length are present on posterior half of abdomen. Thoracal segmentation feebly indicated. Mesothorax with an irregular-conical protuberance. Rami of tenaculum tridentate, corpus with 2 + 2 setulae, no digitiform processus (fig. 6f). Ventral tube with long exsertile filaments, each of which has 7 rows of elevated papillae. Postabdomen in the male without special features (fig. 6c).

Manubrium anteriorly bare, posteriorly with 9 + 9 smooth slender setae. Dental chaetotaxy can be summarized as follows (fig. 6k):
anterior (.) 1 (subbasal spine), 2 (setulae in the apical whorl)
posterior (o) 1 (± short), 1 (longer), 2 (shorter), 1 (long)
postero-intern (-) 1 (basal), 3 (intermediate), 2 (setulae in the distal whorl)
postero-extern (x) 2 (basal group), 2 (intermediate), 2 (setulae in the distal whorl)
Mucro characteristic for the genus, with a smooth outer and an undulate-dentate inner lamella, both lamellae ending in a notch distally. No mucronal seta (fig. 6l).

Feet. P_1: trochanter with 3 apically clavate, and 1 normal seta; femur and tibiotarsi with short (generally blunt) and long (generally acute) setae. Femur moreover with a sensilla in a groove externally and one recurrent spine on its internal face. Neither horizontal hairs nor tenent hairs on tibiotarsus (fig. 7b). Unguis with thin tunica, an internal tooth, strong and heavily dentate pseudonychia and a dorsal tooth (fig. 6g). Unguiculus simple with a subapical filament which is apically enlarged and reaches beyond the unguis. P_2: trochanter with 5 normal acute hairs and 1 clavate seta. Femur and tibiotarsus with blunt and acute setae, some of the last being rather strong. The internal face of the tibiotarsus bears in basal position a small structure which seems to consist of a tubercle with a spinula (fig. 7a). Claw as in P_1. P_3: trochanter with 5 acute setae and a spine; oval organs not observed in the single specimen. Femur and tibiotarsus essentially as in P_2, but femur moreover with a fleshy "spine" (fig. 8b). Claw not well studied.

Head. Interocular tubercles strongly developed. As far as can be seen 8 + 8 ocelli. Frontal macrochaetae small, 1/2 - 1/3 as long as those at the inner margin of the eye-patch. In medial position but two macrochaetae are observed, but this may be due to failure to see the lowest one because of the strongly pigmented frontal ocellus in the "background" (fig. 6a). Labrum with the chaetotaxy 6/554; distal four setae separated among themselves by three strongly chitinized ridges (fig. 6h).

Antennae: head diameter = 39 : 34. Relative length of antennal segments 5 : 9 : 12 : 13. First segment with 4 blunt setae, second segment with 13 blunt and 1 acute setae; antennal organ III consists of two separate slender rods deeply buried below the integument; no accessory organ observed. Antennal segment 4 very indistinctly and incompletely annulated. With some difficulty one manages to count 9 or 10 incipient subsegments. This segment is heavily clothed with fine, apically finely blunt setae (fig. 8a). The specific name alludes to the collecting date.

Note.- It is not without some doubt that this species has been placed in the genus *Neosminthurus* Mills, 1934. The practically undivided fourth antennomere is a strong argument in favour of this solution, as is the distribution of the bothriotricha (Richards, 1968). However, the species of *Neosminthurus* that have been studied satisfactorily - among which the type species - all have 2 recurrent spines on the profemur. The presence of but one such spine in *natalicius* links this species to *Lipothrix*.

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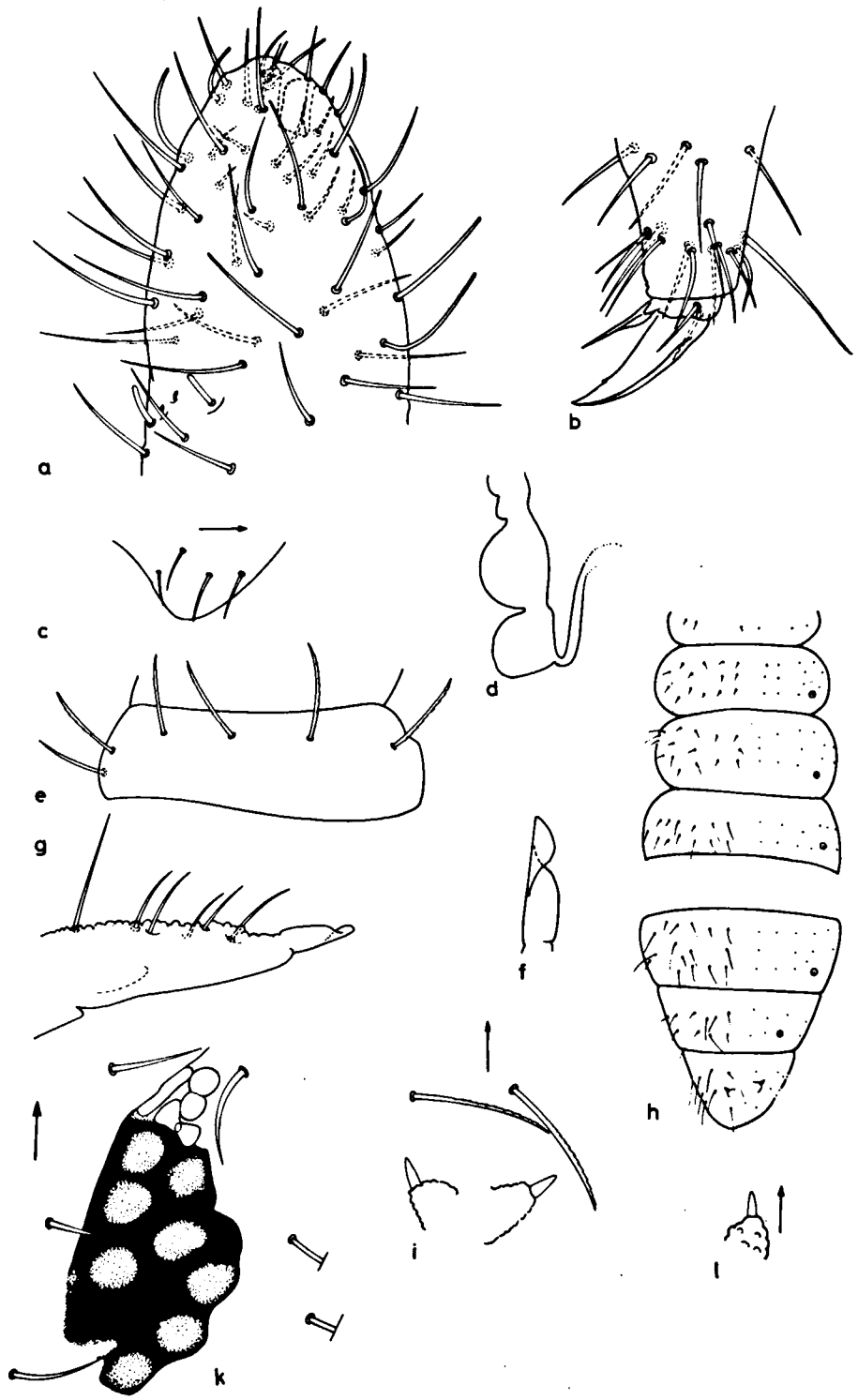

Fig. 1. *Hypogastrura pityusica* n. sp. a, ant_{3-4} left, dorsal aspect; b, P_3; c, ventral tube; d, ductus ejaculatorius; e, ant_1 right, dorsal aspect; f, interior face of mucro; g, exterior face of mucrodens; h, dorsal chaetotaxy; i, anal spines, dorsal; k, eye-patch; l, anal spine, lateral aspect.

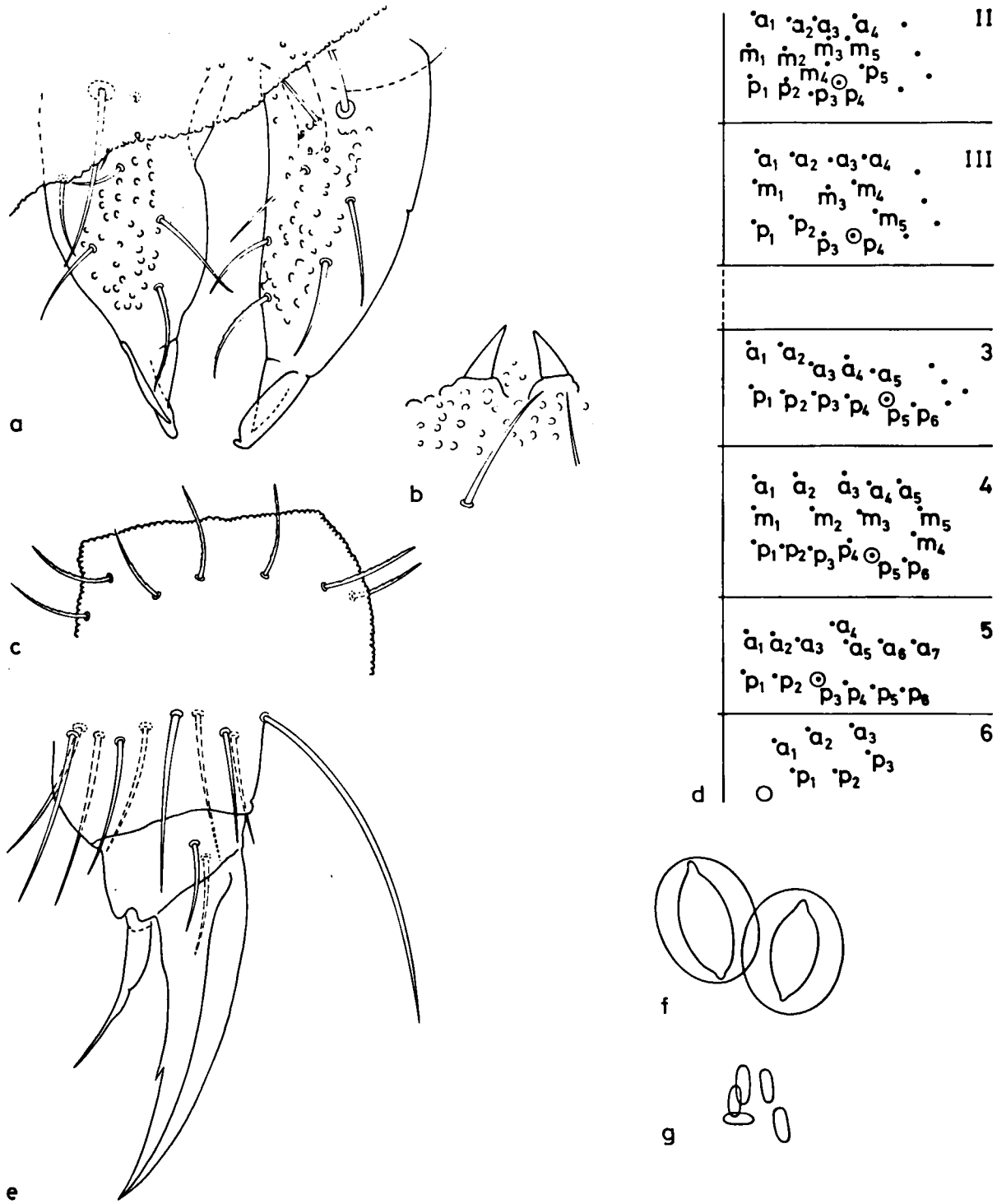

Fig. 2. *Hypogastrura serrata* (Ågren, 1904). a, posterior face of mucrodentes; b, anal spines; c, ant_1 dorsal aspect; d, dorsal chaetotaxy; e, P_2; f, Sporozoa cysts (?) in body cavity; g, Sporozoa spores (?) in body cavity.

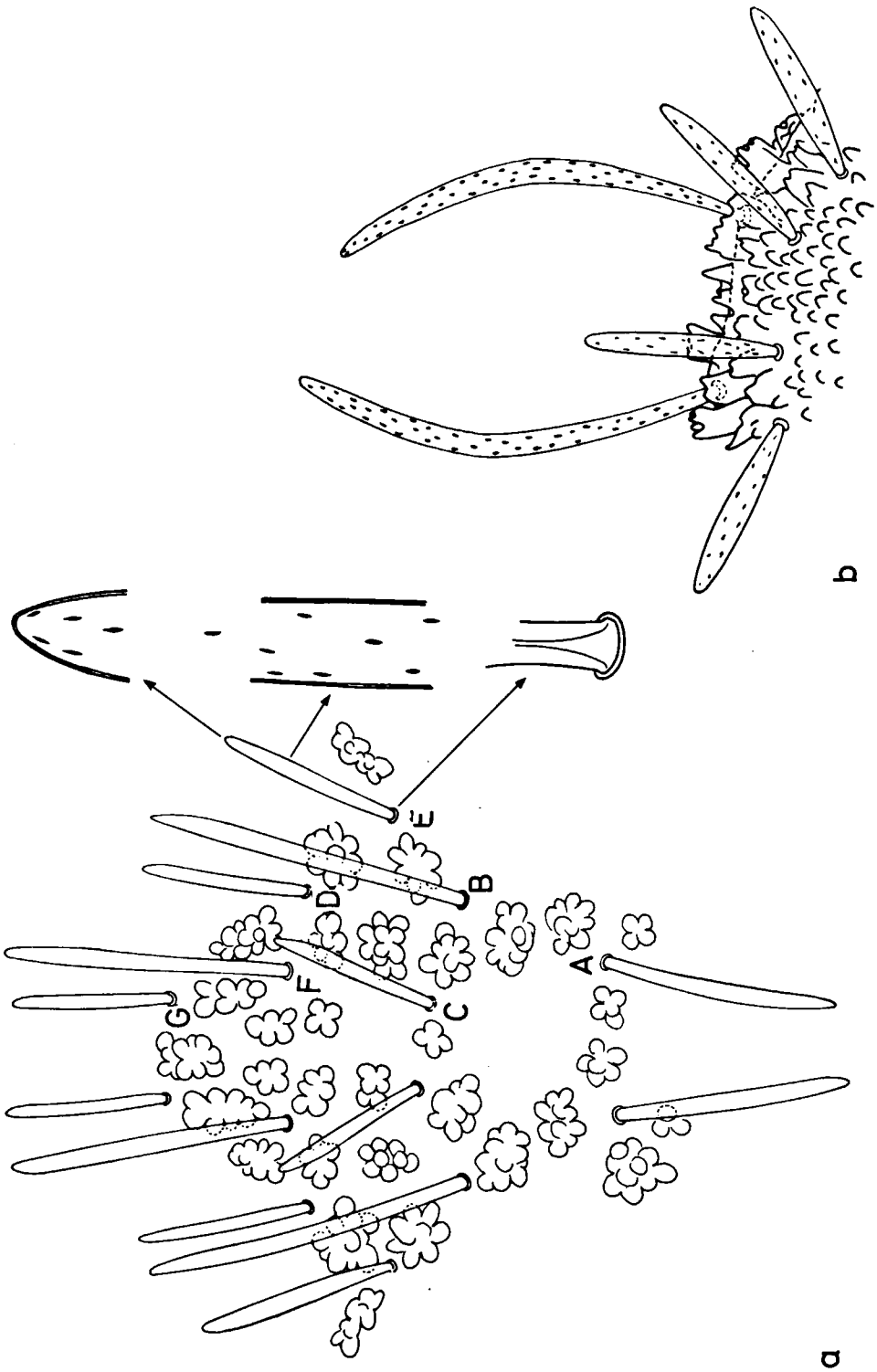

Fig. 3. *Lathriopyga ibicensis* n. sp. a, chaetotaxy of central cephalic tubercle; b, medial setae of abd_5.

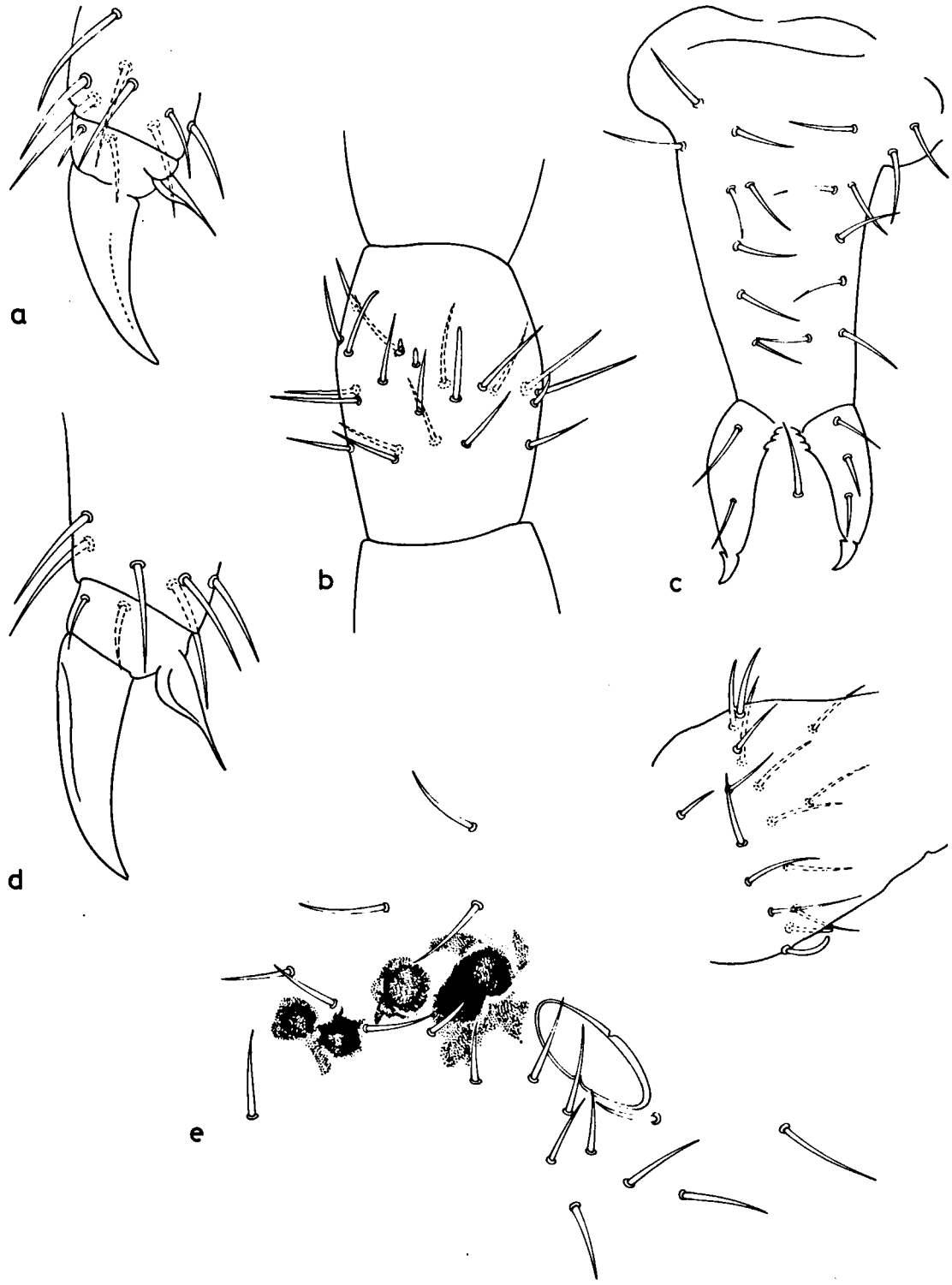

Fig. 4. *Folsomides marchicus* (Frenzel, 1941). a, P_1; b, ant_3 right, dorsal aspect; c, furca and retinaculum; d, P_3; e, eye-patch, postantennal organ and ant_1.

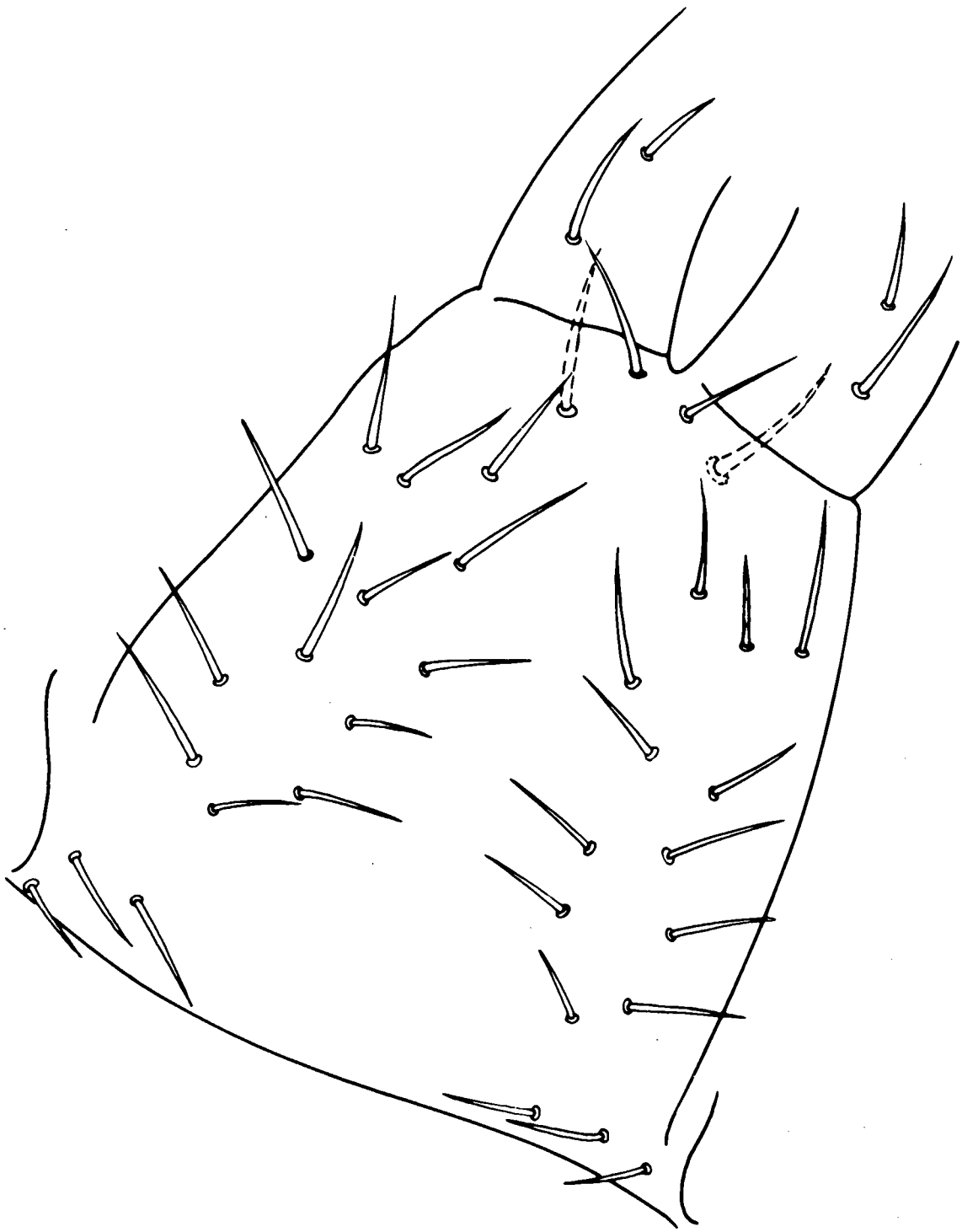

Fig. 5. *Cryptopygus thermophilus* (Axelson, 1900). manubrium, posterior face.

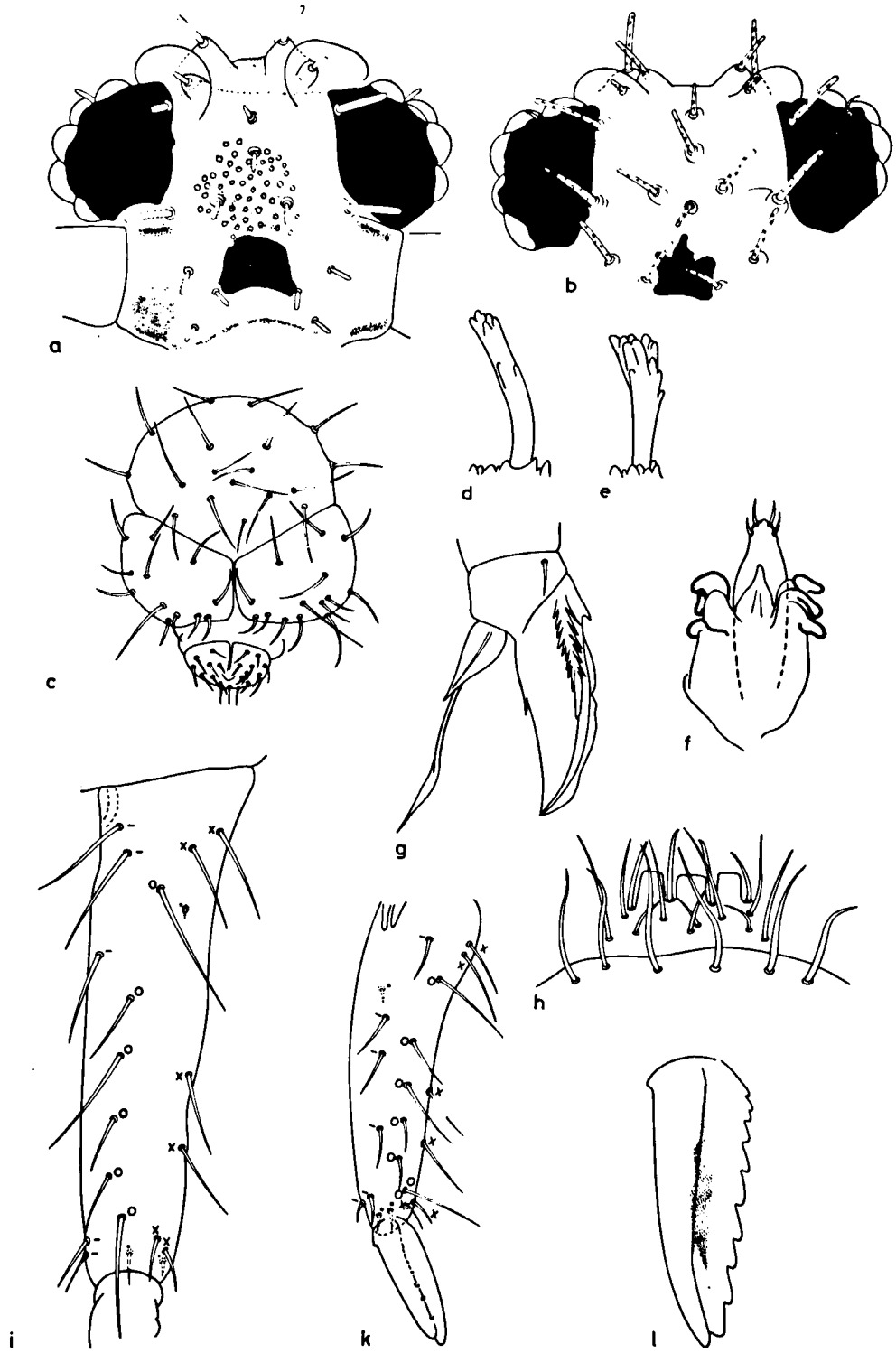

Fig. 6. *Neosminthurus natalicius* n. sp. a, frontal chaetotaxy; c, male postabdomen; d, macrochaeta of posterior part of abdomen; e, macrochaeta of anterior part of abdomen; f, retinaculum; g, claw of P_1; h, labral chaetotaxy; k, postero-internal aspect of mucrodens; l, mucro. *Lipothrix lubbockii* (Tullberg, 1872) from the Netherlands (Hoog Soeren). b, frontal chaetotaxy; i, posterior face of dens.

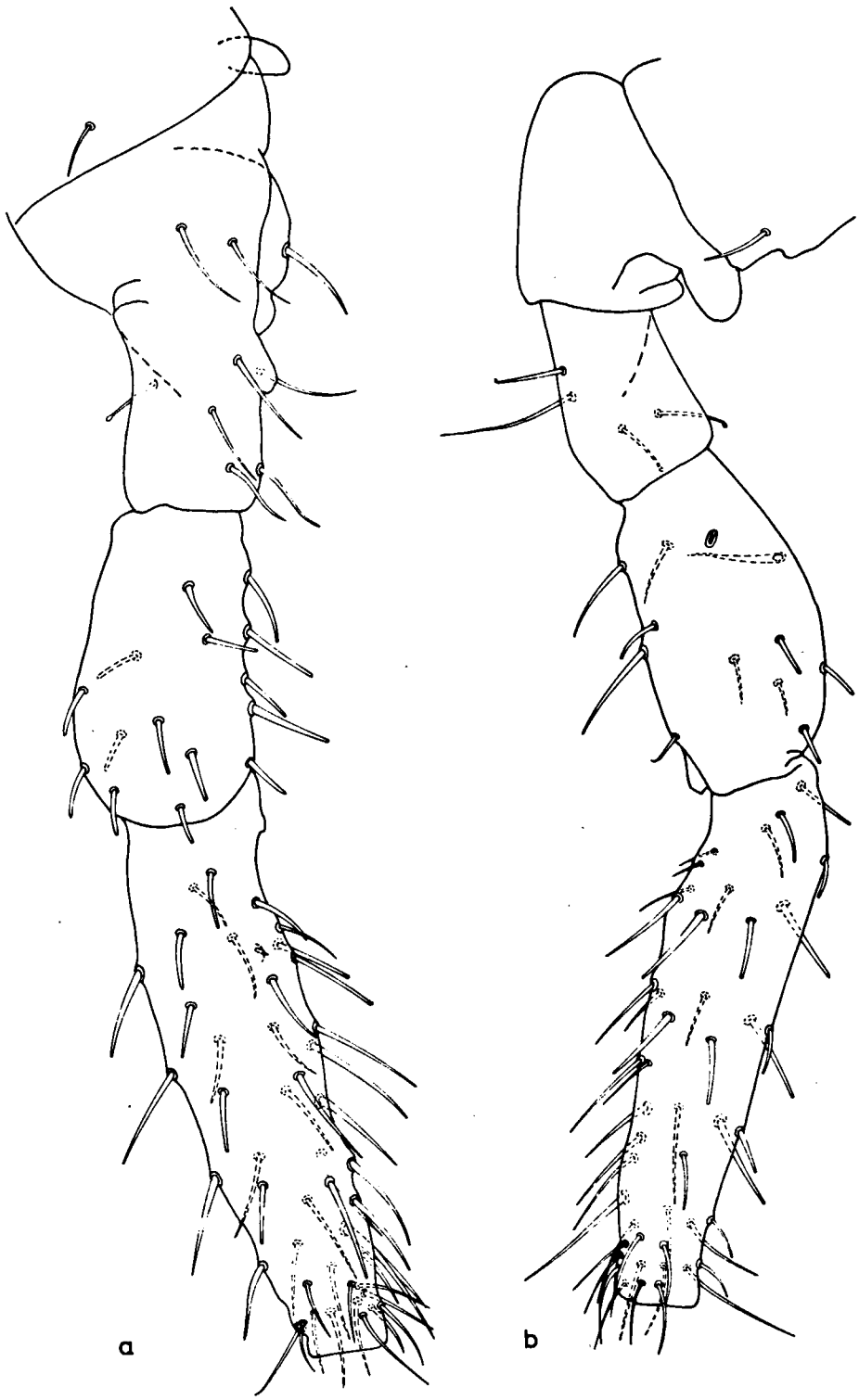

Fig. 7. *Neosminthurus natalicius* n. sp. a, P_2; b, P_1.

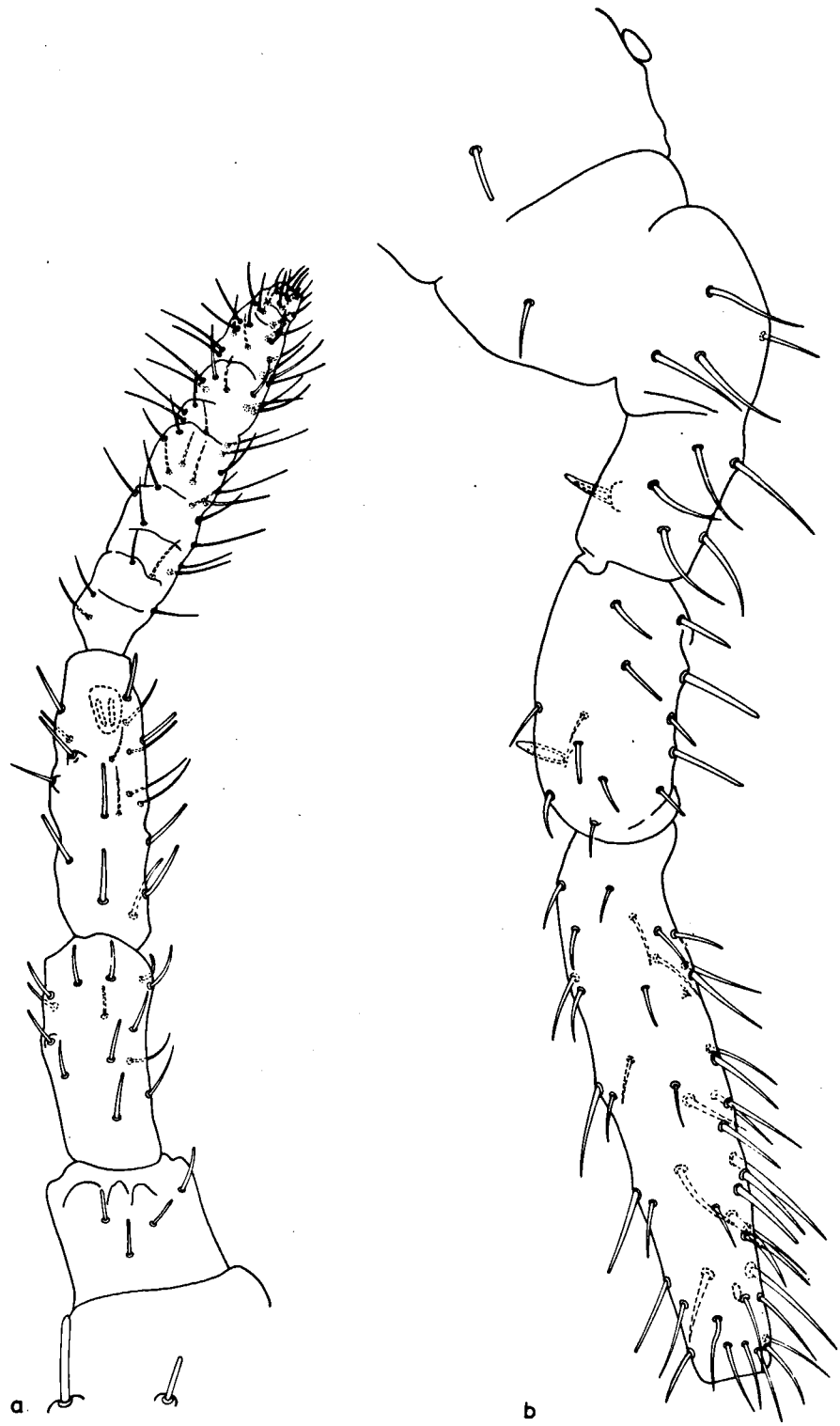

Fig. 8. *Neosminthurus natalicius* n. sp. a, antenna; b, P_3.