

A C T A Z O O L O G I C A
C R A C O V I E N S I A

Tom II

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H. E. GOTO (London)

Nowy gatunek skoczogonków, *Proisotoma stachi* n. sp.
z Nigerii, Zachodnia Afryka (*Collembola*)

Новый вид ногохвосток, *Proisotoma stachi* n. sp.
из Нигерии, Западная Африка (*Collembola*)

A new species of *Collembola*, *Proisotoma stachi* n. sp.
from Nigeria, West Africa

[Pl. I—III and 3 text-figures]

It is with great pleasure that I dedicate this new species to Prof. Dr. Jan STACH, the doyen of workers on the *Collembola*.

***Proisotoma stachi* n. sp.**

Colour: the head and trunk are dark violet both dorsally and laterally. The intersegmental membranes are pale. The head (especially postero-dorsally and laterally) and the trunk segments have regularly arranged sub-circular to oval pale patches. The legs, ventral tube, furca and the ventral surface of the body are grey-white. The eye-patches are black. The violet pigment is not uniformly disposed, but is deposited on the trunk as small adjacent sub-circular patches over most of the segment and as laterally elongated patches on the posterior margins of the segments [Pl. I, fig. 2].

Cuticle: covered with extremely fine granules which are flat, uniform and closely packed. Each cuticular granule is slightly smaller than the average hypodermal pigment granule.

Vestiture: the body is largely covered with short acuminate setae both dorsally and laterally. Those on the head project in various directions, but predominantly posteriorly; those on the trunk always point backwards. The fourth and fused fifth and sixth abdominal segments bear some macrosetae which are about twice as long as those of the general vestiture surrounding them. Some macrosetae are also present on the sub-coxae of the first and second pairs of legs. The majority of the macrosetae are unilaterally serrate, a few have a preponderance of serrations on one side, but with a small number also on the opposite side. Of the setae of the general clothing the majority are apparently smooth, but the larger ones are seen under the highest magnifications to be unilaterally serrate like the macrosetae. Nearly all the setae on the fused fifth and sixth abdominal segments are of the serrate type. The macrosetae, although posteriorly directed, are more outstanding than the smaller and finer setae. The macrosetae on the fourth abdominal tergite are arranged in three transverse rows: a row on the anterior half and two rows on the posterior half of the segment. Those of the middle of the three rows (six in number) are longer and stouter than those of the anterior (four in number) or posterior (six to eight in number) rows. The exact number in the posterior row is difficult to determine as they gradually approximate, on either side of the segment, to the size of the setae of the general vestiture. The ankylosed fifth and sixth segments of the abdomen bear an anterior row of eight, a middle row of eight and a posterior row of about six macrosetae. A single erect elongate seta is present on the inner face of each femur. This seta is only slightly shorter than the longest of the macrosetae, but is smooth and considerably finer than the latter. A single clavate tibio-tarsal seta is present on the pro-thoracic legs and there are two on each of the other legs [Pl. I, fig. 3]. The ventral tube is armed apically with four setae on either side. The corpus of the retinaculum bears, on its anterior face, a single smooth seta approximately equal in length to one of the rami. The

female genital aperture [Pl. I, fig. 4] is protected by eight setae arranged in two transverse rows, one in front and one behind the aperture. The male pore [Pl. I, fig. 5] is surrounded by ten small and two large setae. The ventral surface of the manubrium possesses a pair of stout, but smooth setae close to the origin of the dentes [Pl. II, fig. 6]. Along the whole of its dorsal surface the manubrium bears setae which are arranged in two longitudinal groups of about 25 each [Pl. II, fig. 7]. The setae of the dorsal surface of the dens are seven in number and are confined to the proximal quarter [Pl. II, fig. 7]. Approximately mid-way along the dens there is a row of three setae on either side. Ventrally [Pl. II, fig. 6] each dens bears three longitudinal rows of setae: seven to ten in the outer, seven to eight in the middle and nine to ten in the inner row. There are no bothriotrichia or multilaterally serrate or ciliated setae.

Head: more or less prognathous. The ratio of the antennae to the head diagonal is about nine to seven. The antennae are four-segmented and without secondary annulations on either of the last two segments. The relative length of antennal segments I, II, III and IV are approximately as 23:44:44:58. All the antennal segments are quite separate. In addition to the general vestiture the basal antennal segment possesses a short fine seta (microseta) on the proximal half of the dorsal and ventral faces. This segment also bears a pair of sense rods similar in form to, but slightly smaller than those of the third antennal segment. These sensillae are situated on the ventro-external region of the segment [Pl. II, fig. 8]. The second antennal segment possesses three microsetae similar to those of the first segment, but there are no sense rods. A similar single microseta is present on the proximal end of the third segment. This segment also bears a pair of fairly stout, gradually tapering, but blunt-tipped sensillae. These sensillae do not arise from distinct pits and are without protective folds or papillae. The outer sensilla curves distinctly towards the midline and the inner one inclines slightly in the same direction. On either side of and slightly proximal to these sensillae is a further pair which are finer and curve in towards one another. This group of four sensillae is protected by a group of over-

arching setae. In addition to these sensillae (Ant. org. III) there are four similar structures on the segment arranged as in figure 9 [Pl. III]. The last antennal segment [Pl. III, fig. 10] has no apical cone, or terminal retractile or non-retractile papilla. A small subapical pit with a minute rounded sensilla at its base is present on the upper surface of the segment. Immediately behind the pit is a short slightly blunt-tipped, basally curved sensilla about 0,25—0,5 the length of an olfactory seta. The latter are distributed along the whole length of this segment. Many of them are difficult to distinguish from the surrounding setae as they are fine and not particularly blunt. The postantennal organ is more or less regularly elliptical and approximately half as wide as long or a little less. The length of the postantennal organ is about the same as the diameter of a single ocellus. There is no median constriction or bridge. There are eight ocelli on either side of the head, each group being on a common patch. Ocellus H is slightly smaller than the others. The oral region is rounded. The mandibles are provided with a basal molar area and three to four apical teeth. The maxilla head is more or less globular and has an ungulum with three stout teeth lying approximately side by side. There are at least four narrow, toothed lamellae extending slightly beyond the apex of the ungulum and a shorter and broader, but also toothed, lamella. The maxilla head is too minute and complex to determine its precise structure.

Thorax: the prothoracic segment is without a distinct tergite or setae. The proportions of the head diagonal and the three thoracic segments are approximately as 7:1,5:3,5:3,2. The ratios of the trochanter, femur and tibiotarsus of legs I, II and III respectively are as 2,0:4,0:3,75 (leg I), 2,0:3,5:4,0 (leg II) and 2,0:4,5:5,5 (leg III). Indications of a tibiotarsal sub-segment are present on all legs [Pl. I, fig. 3]. The unguis bears a single pointed, prominent, but narrow, inner tooth arising a little more than half way along the inner margin of the claw which is otherwise without teeth or a tunica. The unguiculus has a small tooth about half way along the inner margin. The apex of the unguiculus is pointed and reaches about half way along the inner margin of the unguis. The ratios of the lengths of the diagonal of the unguis, the outer

margin of the unguiculus and the clavate tibiotarsal seta (e) are respectively as follows: 2,8:1,3:2,8 (leg I), 2,8:1,3:2,8 and 2,9 (leg II) and 3,3:1,5:2,9 and 3,2 (leg III).

Abdomen: the last two abdominal segments are fused together. The relative lengths of the metathorax, the abdominal segments and the furca are approximately as follows: 3,2:3,6:3,0:3,6:4,0:2,8:9,0. The paratergites of the fourth abdominal segment are distinct and the ventro-lateral region of the third tergite is not prolonged posteriorly. There are no anal spines or papillae. The anus is terminally directed. The corpus of the ventral tube is short and stout with rounded, but not greatly protruding vesicles. The rami of the retinaculum each bear four blunt teeth. The furca is well developed and when flexed reaches forwards to the anterior margin of the second abdominal segment. All parts of the furca are distinct and separate. The relative lengths of the manubrium, dens and mucro are approximately as follows: 6:7:0,5. The manubrial hooks are normal. The dentes are annulated along almost their entire length. The basal quarter bears some large irregular humps and the apical 1/20 is smooth. Between these two regions are some forty more or less regular and close annuli. The ventral edge of the three-toothed mucro is slightly curved [Pl. III, figs 12—14]. The apical tooth is rather variable, but usually slightly up-turned. The ante-apical teeth are subequal and both stronger than the apical one. The outer ante-apical tooth arises slightly more proximally than the other (median) one. There are no mucronal lamellae or setae.

Sexual dimorphism, apart from that of the immediate genital areas [Pl. I, figs. 4 & 5], was not noted.

Maximum size excluding antennae is 1,5 mm.

In the smallest specimens available (0,75 mm) there were no significant departures from the description given above even in the number of setae on the manubrium and dentes.

Type locality: Numerous examples were taken from swarms in a garden at Ibadan, Nigeria, West Africa in May, 1956. The specimens were collected by G. H. CASWELL to whom I am indebted for the opportunity to examine and describe the material.

The holotype (mounted) and ten paratypes (in spirit) have

been deposited in the British Museum (Natural History), London and a further ten specimens have been sent to the Institute of Zoology of the Polish Academy of Sciences, Branch in Kraków and to the University College, Ibadan, Nigeria.

Discussion: Although undoubtedly an isotomid, the new species described above does not fall readily into the diagnosis of any known genus of the *Isotomidae*. It is excluded from the *Anurophorinae* by the presence in *Proisotoma stachi* n. sp. of some serrated setae, of the well developed furca, the annulated dentes, the tridentate mucro which is quite separate from the dentes and by the posteriorly directed anus. *P. stachi* n. sp. possesses some features more characteristic of the *Isotominae* than of the *Proisotominae*, for example the presence of serrate setae (these are confined to *Folsomina* DENIS in the *Proisotominae*). It is excluded, however, from this genus by a number of characters. The presence of serrations along more than one side of some macrosetae in *P. stachi* n. sp. seems to indicate an affinity with the *Isotominae*. The densely annulated dentes of a length greater than the manubrium is also more characteristic of the *Isotominae* although not confined to them. If these characters were to be considered of importance and *P. stachi* n. sp. were to be placed in the *Isotominae*, it would be limited to *Pseudisotoma* HANDSCH. by the absence of a tunica and presence of a tooth on the claw, the limited number of sense rods on the third antennal joint and the terminal joint with fine olfactory setae, the presence of a postantennal organ and eyes, the short dentate mucro, the presence of clavate tibiotarsal setae and some serrated setae, the fusion of the last two abdominal segments, the absence of marked secondary sexual dimorphism and finally the absence of bothriotrichia. The latter is a holarctic genus whose only two species are undoubtedly closely related to one another and quite distinct from *Proisotoma stachi* n. sp. *Pseudisotoma* HANDSCH. differs from *P. stachi* n. sp. in the following features: the absence of sense rods on the basal antennal joint, the third antennal joint with only two sensillae which lie in a shallow furrow, the terminal joint with an apical cone and an apical papilla, the presence on the corpus of the retinaculum of six to twelve setae, the dentes about two and one-half times the length of

the manubrium, the long distal non-annulated region of the dens and the differences in chaetotaxy of the trunk. These differences are too great to permit the inclusion of *P. stachi* n. sp. within the genus *Pseudisotoma* HANDSCH. The only alternative, at the same time retaining *P. stachi* n. sp. in the *Isotominae*, would be to create a new genus. Rather than do this it has been placed in the genus *Proisotoma* BÖRN. sens. lat. which STACH has very appropriately called the lumber room of Collembolan systematics. Amongst the *Proisotominae* it would be limited to this genus on account of the articulation between the fourth and subsequent fused abdominal segments, the imbricate terga, the absence of dental bladders and bothriotrichia.

In its broad primary sense *Proisotoma* BÖRN. includes the genera (of some authors) *Subisotoma* STACH, *Ballistrura* BÖRN., part of *Isotomina* BÖRN. and *Proisotoma* BÖRN. sens. str. The first and third of these genera have been excluded above as they fall more naturally in the *Anurophorinae* and *Isotominae* respectively. *Proisotoma stachi* n. sp. has some characters which are more common in *Ballistrura* BÖRN., for example the dentes longer than the manubrium, and others which are more characteristic of *Proisotoma* BÖRN. sens. str., for example the annulated dentes. No attempt is being made here to find an exact position in existing genera for *P. stachi* n. sp. — one more occupant of the „lumber room“ will not make the ultimate revision of the group much more difficult.

The following notes on the biology of *Proisotoma stachi* n. sp. have been made by Dr. ALEXANDER of the University College, Ibadan and sent to me by Mr. CASWELL.

„The *Collembola* have been observed very frequently on a mowed lawn (mainly *Cynodon dactylon*). The lawn which is 4 years old and regularly mowed receives annual dressing of artificial fertilisers (superphosphate 3 times, sulphate of ammonia twice and sulphate of potash once). The *Collembola* usually appear on the lawn, but have twice been observed covering parts of the rock border to the lawn and were once seen crossing the laterite drive.

On all except one of the occasions on which the *Collembola*

were observed they came to the surface soon after sunrise and the last of them disappeared about eleven o'clock. In the exception they appeared in the evening at the foot of a very powerful lamp.

On first appearing the *Collembola* form a black circular disc on the lawn [fig. 1]. In a short while (not timed, but in the order of twenty minutes) a preferred direction of movement causes the disc to elongate and it becomes a dark streak

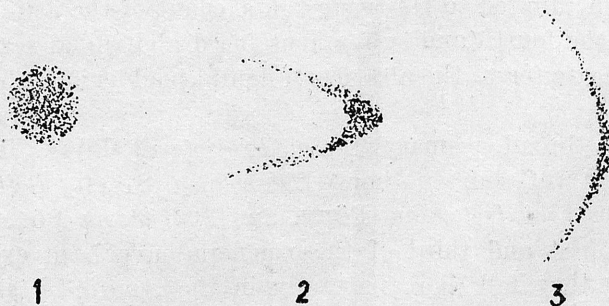


Fig. 1—3. Phases of migration of *Proisotoma stachi* n. sp.

in the form of a sharp parabola [fig. 2]. As time goes on the parabola gradually flattens and after an hour or two becomes a very gentle curve [fig. 3]. Up to eight patches of migrating *Collembola* have been observed in half an acre of lawn. The general directions of migration of the individual swarms (indicated by the position of the peak of the parabola) on any one morning bear no obvious relation to each other, two neighbouring swarms may be migrating in the same direction, in opposite directions or at any angle.

Correlation of *Collembola* swarming with seasons or weather has not been attempted. The general impression left after four years desultory observation is that the *Collembola* swarm with the first of the rains (any time from the end of January to April) and continue to swarm till the rains are well established and the fire-flies appear in force. They most frequently appear on bright sunny mornings where there is a light dew on the grass. They have been observed on lightly over cast mornings after rain“.

Mr. CASWELL himself states in his letter: „My own observations have been limited to placing them in a jar and noting that they move to the window side“.

Swarming in *Collembola* has been noted on a large number of occasions and from different parts of the world, but the behaviour, mentioned by Dr. ALEXANDER, has not been described. The mechanism and significance of these swarms are doubtful although a few possible explanations have been attempted. In general *Collembola* are lucifuge, but some are positively phototactic and others appear not to respond to light stimuli at all.

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STRESZCZENIE

W niniejszej pracy autor opisuje nowy gatunek skoczogonka, *Proisotoma stachi* n.sp. z Nigerii oraz poddaje dyskusji przynależność rodzajową tego gatunku, który, choć należy bez wątpienia do rodziny *Isotomidae*, ma pewne cechy zarówno przedstawicieli podrodziny *Proisotominae* jak i *Isotominae*. Autor dochodzi do wniosku, że należy go umieścić prowizorycznie w rodzaju *Proisotoma* BÖRN. sens. lat. W zakończeniu pracy autor podaje uzyskane wiadomości o biologii opisanego gatunku.

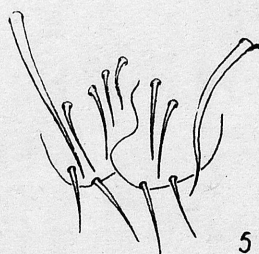
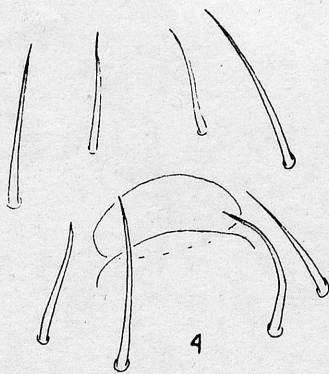
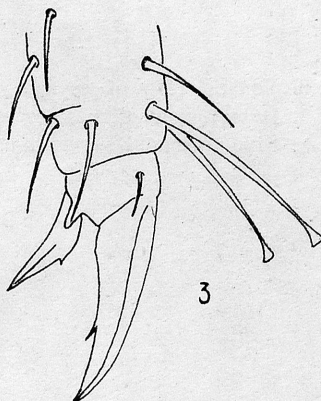
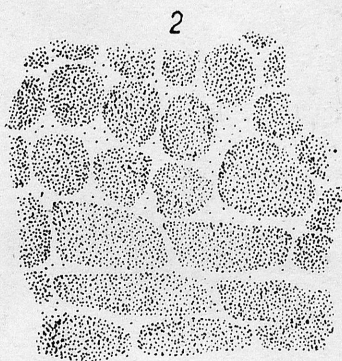
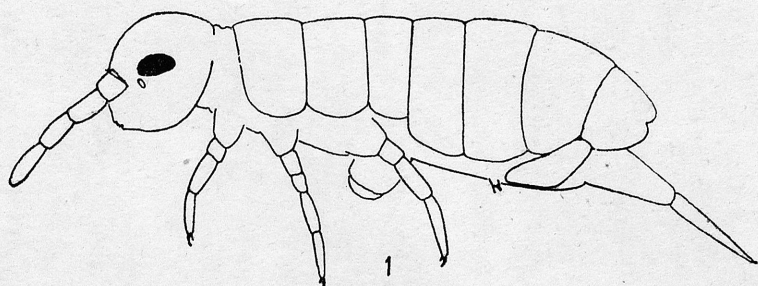
РЕЗЮМЕ

В настоящей работе автор описывает новый вид ногохвостки. *Proisotoma stachi* n. sp., из Нигерии и ставит под дискуссию родовую принадлежность этого вида, который, хотя без сомнения принадлежит к семейству *Isotomidae*, но имеет некоторые признаки представителей как подсемейства *Proisotominae* так и *Isotominae*. Автор приходит к заключению, что следует причислить его пока к роду *Proisotoma* BÖRN. sens. lat. В окончании работы автор приводит полученные данные о биологии описанного вида.

Plate I

Proisotoma stachi n. sp.

- Fig. 1. Whole specimen in side view.
- Fig. 2. Distribution of pigment granules.
- Fig. 3. Apex of tibiotarsus and claws of leg III.
- Fig. 4. Female genital area.
- Fig. 5. Male genital area.



Auctor del.
H. E. Goto



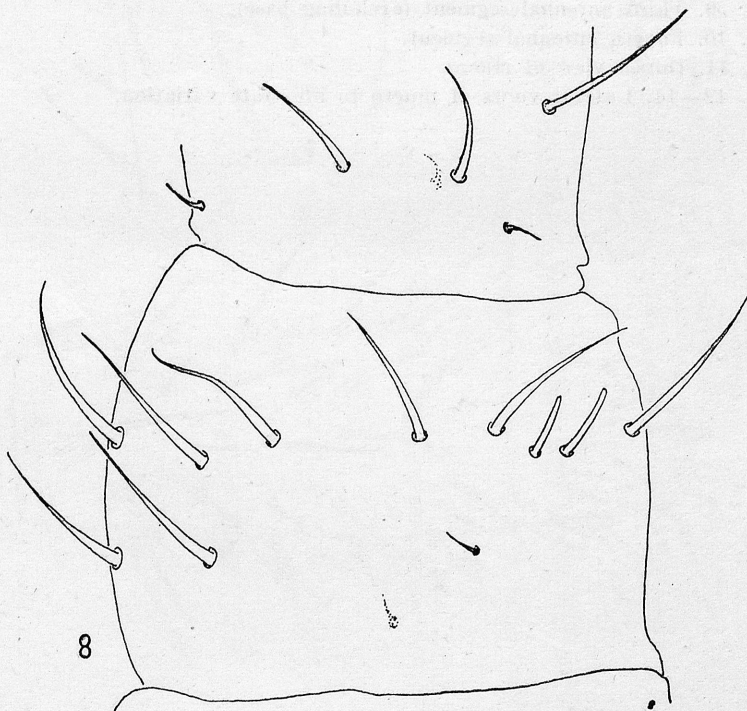
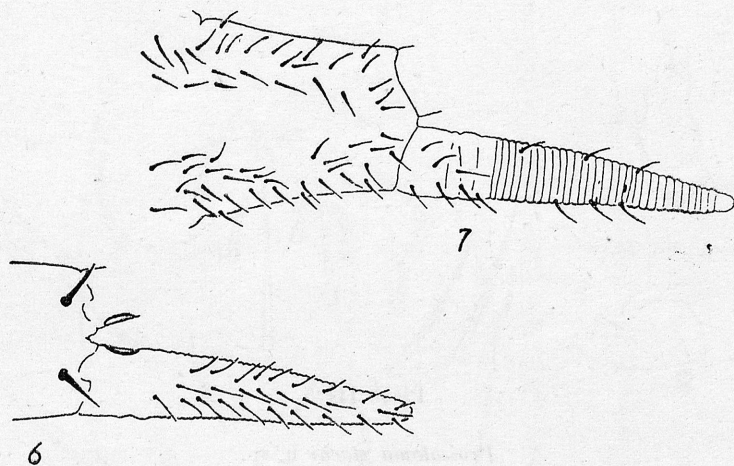
Plate II

Proisotoma stachi n. sp.

Fig. 6. Ventral view of apex of manubrium and dens.

Fig. 7. Dorsal view of manubrium and dens.

Fig. 8. First antennal segment and base of second.

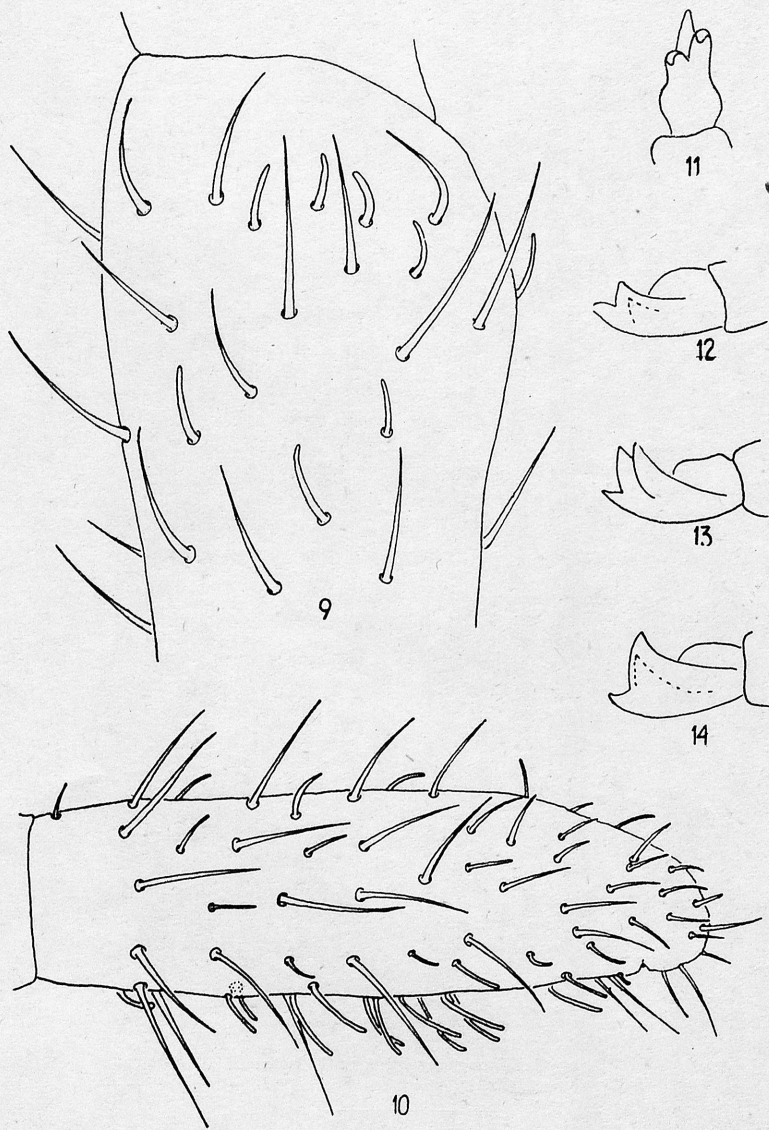


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Plate III

Proisotoma stachi n. sp.

- Fig. 9. Third antennal segment (excluding base).
Fig. 10. Fourth antennal segment.
Fig. 11. Dorsal view of mucro.
Fig. 12—14. Lateral views of mucro to illustrate variation.



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