

ISOTOMIDAE FROM THE SOLOMON ISLANDS (Collembola)

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Abstract: Fourteen species are discussed, including 2 new species, besides some species identified only to genera.

The paper is based on material collected by the Royal Society Expedition of 1965, studied together with the collections of Dr and Mrs P. J. M. Greenslade, the Noona Dan Expedition and other material from the Zoological Museum, Copenhagen and specimens from the B. P. Bishop Museum, Hawaii. All undermentioned species are recorded from the Solomon Islands for the first time and two new species are described.

Folsomides exiguus Folsom, 1932

Type locality: Hawaii.

Occurring on 25 islands, often in large numbers, this species appears to be the most common Isotomid and possibly the most abundant Collembolan in the region. The present material was compared with one of Folsom's original specimens of *exiguus* kindly lent by Bishop Museum and with topotypic examples of the species from Hawaii, Oahu, Manoa Valley, in dead grass, 21. XI. 1966 collected by Prof. P. F. Bellinger. No significant difference was observed. The Solomon Islands specimens exhibited a posterior ocelli pigment spot often of an appreciably smaller size than that of the anterior ocelli. *F. parvus* (type locality: Iowa) has been recorded from the U.S.A., Singapore, Poland, *F. exiguus* from Hawaii, Australia, Malaya and *F. parvulus* from Poland and Spitzbergen. It seems possible that *parvulus* is a widespread species, or if three species are present, their curious overlapping distributions suggest that they may not always have been correctly identified. *F. americanus* Denis, 1931 differs in having only a single ocellus on each side of the head. However, the posterior ocellus which is absent in *americanus*, is degenerate in *exiguus* (fig. 2,4), it is possible that *americanus* and *parvulus* are extreme ends of a range of variation of which *exiguus* is an intermediate. Until the types and fresh topotypes of these species can be compared in more detail, it is not possible to finally resolve this problem.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, Rennell, Small Malaita, Malaita, Santa Cruz, Kolombangara, Santa Ysabel, San Cristoval, Ugi, Vella Lavella, New Georgia, Ngela, Choiseul, Russell Is., Savo, Mano, Nila. Collectors. J. D. Bradley, Noona Dan Expedition, J. & M. Sedlacek, A. Yoshinosa, P. Shanahan P. J. M. Greenslade, P. N. Lawrence, Royal Society Expedition. Material deposited at Bishop Museum, Hawaii; Zoological Museum, Copenhagen; British Museum (Nat. Hist.). BISMARCK IS.: Manus, Lavongai,

Mussau, Dyaul, Duke of York, New Britain, New Ireland (Noona Dan Exped.) ; Zoological Museum, Copenhagen. NEW GUINEA : 22 km SE of Okapa, (J. Sedlacek), Wau, J. & M. Sedlacek) ; Bishop Mus.

Isotomiella minor (Schäffer, 1896)

Type locality : Germany.

In the Solomon Is. this species occurs from sea-level to mountain summits but is most numerous up to 300 m, where it is among the most common Collembola in ground litter. *I. minor* is abundant throughout Europe and has been recorded from Jan Mayen, Japan, America, Russia, New Zealand and Africa. Although it is possibly one of the World's most numerous insect, little is known of its biology.

MATERIAL EXAMINED. SOLOMON IS. : Guadalcanal, Rennell, Kolombangara, San Cristoval, Ugi, Santa Ysabel, Malaita, Choiseul, Russell, Buka, Gizo, Bellona, Nggela, (P.J.M. Greenslade), Royal Society Expedition (P.N. Lawrence), British Museum (Nat. Hist.). BISMARCK IS. : Lavongai, Manus, Mussau, Duke of York, New Britain, New Ireland, Dyaul (Noona Dan Exped.) ; Zool. Mus. Copenhagen. NEW GUINEA : Wisselmeren, 1700 m, Upper Jimi Vall., 1200, Daulo Pass, 2800 m, Star Mts., Mt. Wilhelm, 3000 m, (J. L. Gresitt), Wau, 1180-1200 m, 22 km NE of Okapa, 1900 m (J. Sedlacek) ; Bishop Mus.

Denisia falcata Folsom, 1932

Type locality : Hawaii.

This species is based on syntypes in poor condition, kindly loaned by Bishop Museum, the Illinois Natural History Survey and the U.S. National Museum, Washington. The species is described as having 5-6 sense clubs on antenna IV and a falcate mucro. The Bishop Museum syntypes are the only specimens with complete antennae. Those from the other institutions do appear to have falcate mucrones but those of the Bishop Museum specimens are tridentate. The original description of *falcata* was obviously based on the anterior of one species and the posterior of another. As the anterior of the animal was described before the posterior and in order to prevent further confusion, a lectotype of *denisi* is hereby designated from the Bishop Museum syntypes. As these specimens are juveniles of *Isotomiella minor* Schäffer, 1896 which Folsom also records from the type locality of *falcata*.

The occurrence in some Solomon Is. samples of *I. minor* together with a *Folsomina* species first aroused suspicion that *falcata* had been described from a similar mixture.

Isotomina thermophila (Axelson, 1900)

Type locality : Helsinki, Finland.

In the Solomon Is. this species occurs from sea level to mountain summits. Below 300 m it is outnumbered among the Isotomids only by *Folsomides exiguus*, *Isotomiella minor* and *Proisotoma centralis*. *I. thermophila* has a cosmopolitan distribution.

MATERIAL EXAMINED. SOLOMON IS. : Guadalcanal, Santa Ysabel, Rennell, Malaita, San Cristoval, Ugi, Kolombangara, Santa Cruz, Choiseul, Vella Lavella, Russell Is., New

Georgia, Collectors: M. & J. Sedlacek, A. Yoshinosa, P. J. M. Greenslade, P. N. Lawrence, Royal Society Expedition. Material deposited at: British Museum (Nat. Hist.), B. P. Bishop Museum. BISMARCK IS.: Lavongai, Dyaul, New Ireland (Noona Dan Exped.); Zoological Museum, Copenhagen.

***Proisotoma centralis* Denis, 1931**

Type locality: Costa Rica.

The species was previously known only from Costa Rica, Cuba and Yucatan Caves.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, San Cristoval, New Georgia, Gizo, Baraloama, Nggela, Soso, Vella Lavella, Malaita, Small Malaita, Dala, Mono, Choiseul, Katurvele (P. Shanahan) Bishop Museum; Zoological Museum Copenhagen; (P. J. M. Greenslade), Royal Society Expedition, (P. N. Lawrence), British Museum (Nat. Hist.). NEW GUINEA: (NE) (J. Sedlacek, G. A. Samuelson), Wau (O. R. Wilkes, J. & M. Sedlacek); Bishop Museum.

***Proisotoma minuta* (Tullberg, 1871)**

Type locality: Sweden.

The species has a cosmopolitan distribution.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, 300 m, 7050 m, San Cristova, 225 m, 300 m, 420 m, San Jorge, Kolombangara, N. of Kuzi, 15 m, 75 m, 150 m, Royal Society Expedition (P. N. Lawrence), Kolombangara, Iriri, 5 m (J. Sedlacek); Bishop Museum. BISMARCK IS.: Dyaul, Kollepine (Noona Dan Exped.); Zoological Museum, Copenhagen.

***Proisotoma fitchi* Denis, 1933**

Type locality: Costa Rica.

All the following records are from coastal habitats, the species being unrecorded inland; it was known previously only from Costa Rica and Spain.

MATERIAL EXAMINED. SOLOMON IS.: San Cristoval, congregating on water in coconut husk (P. J. M. Greenslade), swarming in compost heap, Santa Ysabel, Vulavu, Royal Society Expedition (P. N. Lawrence); British Museum (Nat. Hist.). BISMARCK IS.: Manus, Lorengau, in an area of small brooks and ponds. (Noona Dan Exped.); Zoological Museum, Copenhagen.

***Proisotoma musci* Lawrence, new species**

Fig. 1-10.

Length up to 0.9 mm.

Color white with minute flecks of gray pigment scattered dorsally on body and a little more densely on hind margin of head. Eye patches with dense concentrations of pigment spots.

Cuticle macroscopically smooth but entirely covered with a minute hexagonal network of granules, each of which is near the limit of resolving power of the light microscope.

Chaetotaxy of fine, smooth, curved setae interspersed with shorter, stouter, blunter setae, some of which have constricted apices.



Text-fig. 1-10. *Proisotoma musci* sp.: 1, Whole animal; 2-3, Postantennal organs; 4, Sensory setae; 5, Postantennal organ; 6, Apex of abdomen; 7, Antenna III-IV; 8, Dens and mucro; 9, Tenaculum; 10, Claw and empodial appendage. (A=Abdomen; T=Thorax).

Antenna I with 2 weakly developed olfactory hairs among common setae. Antenna II with setae and setulae but no discernible olfactory hairs. Antenna III sense organ with poorly differentiated long outer rods and shorter, plumper, basally-narrowed, inner pins. Antenna IV with a single, spherical, subapical knob and about 13 cylindrical olfactory hairs of various diameters. The finest of these hairs are sharply pointed at their apices. Thorax II-Abdomen III

with 2 sensory setae on each side. These setae are usually cylindrical but some have abruptly pointed or bifurcated apices; they are usually about $1/2 \times$ length of a nearby small common seta. Abdomen IV with 3 setae similar to the pairs on preceding segments. Abdomen V with 4 sensory setae each side which are almost equal in length to small common setae. These sensory setae are more than $2 \times$ the diameter of those on other segments and their constrictions and bifurcations, when present, are more exaggerated. Tibiotarsus with outer apical hairs longer and finer than inner but hardly sufficiently specialised to be regarded as tenent hairs. Rami of tenaculum with 1-3 setae. Manubrium with $1 + 1$ anterior setae. Dens with 10-15 anterior setae and 4, finer posterior setae.

Antennae about $3/4 \times$ length of head. Head broad and particularly deep. Mandibles with 3-4 strong apical teeth, closely compacted on to sharp-toothed, grinding area. Postantennal organ, thin-walled, difficult to resolve, basically a depressed elliptical lobe with an approximately concentric point of attachment of lesser diameter than its outer margin. Often, anterior edge of lobe is folded in such a way as to produce an incised outline (fig. 3). The thin-walled nature of the organ renders it liable to form itself into a variety of shapes, often asymmetrically (fig. 5). Eyes apparently only one on each side of head. Claw toothless, rather narrow with curved apex but with outer edge fairly straight, even slightly concave in basal portion. Empodial appendage broad, toothless, reaching past middle of claw's inner edge. Rami of tenaculum quadridentate. Dens with strong, projecting, internal, basal hooks and irregular median crenulations. Mucro tridentate with strong apical tooth, erect anteapical tooth and curved outer tooth. Abdomen V and VI separated by a broad area devoid of setae which is sometimes indistinctly traversed by a partial or complete segmental boundary.

Discussion: The species is interesting in that it is among those intermediate between *Proisotoma* and *Isotomina* while in some respects also resembling *Folsomina* species. In the genus *Proisotoma* which Stach appropriately styles as a "systematical lumberroom" there are about 80 species. Many of these have been inadequately described, with lost types and inaccessible topotypes. None of them, however, resemble *musci* in reduction of eyes and variability of postantennal organ and sensory setae. Perhaps the most closely related species is *posteroculata* Stach which is known by only 1 specimen from an indoor flower pot in Poland. Although *musci* appears to be confined to mossy forests at high altitudes, it nevertheless survived in plastic-box $1/2$ litre samples of its habitat for 9-11 days. During this time samples were manhandled down the mountains and across the ocean to the extracting funnels on Guadalcanal.

This illustrates the tolerance of the species and the possibility of collecting mossy-montane microfauna from saturated summits where operating extracting equipment would be impracticable.

MATERIAL EXAMINED. SOLOMON IS.: Holotype and 1 paratype, Guadalcanal, Mt. Gallego, 900 m, 12. VII. 1965. Further paratypes: 2 spec., Mt. Gallego, 1050 m, 12. VII. 1965; 1 spec. San Cristoval, c. 9.6 km SE of Wainoni, 698m, 3. VIII. 1965; 1 spec., Kolombangara, 900 m, 4. IX. 1965; 1, Kolombangara, 1662 m, 5. IX. 1965 (P. N. Lawrence); 1, Popamanasiu, 1500 m, X. 1965, (P. J. M. Greenslade). All specimens in British Museum (Nat. Hist.).

Coloburella spp.

Examples of this genus were scarce. When several were found in one locality, a range of variation was exhibited, particularly in dental chaetotaxy. Descriptions of new species based on such a paucity of material, cannot adequately record the variation within the species and are therefore of limited value. The localities from which *Coloburella* is re-

corded are the most southern from which the genus is known and are listed so that additional material might be sought. It seems likely that at least two species are present, one coastal and the other montane.

MATERIAL EXAMINED. SOLOMON IS.: Santa Cruz, Graciosa Bay, 21. XII. 1964 (P. J. M. Greenslade), Guadalcanal, Popamansiu, 1500 m (Greenslade), Guadalcanal, Mt. Gallego, 900 and 1050 m, 12. VII. 1965, Kolombangara, N. of Kuzi, 900 m, 4. IX. 1965 (Lawrence); Royal Society Expedition, British Museum (Nat. Hist.). BISMARCK IS.: Lavongia, Banatam, 19. III. 1962 (Noona Dan Exped.); Zoological Museum, Copenhagen. NE NEW GUINEA: Mt. Giluwe, 4200 m, 29. V. 1961 (J. L. Gressitt); Bishop Museum.

Folsomina onychiurina Denis, 1931 Fig. 11-18.

Type locality: Costa Rica

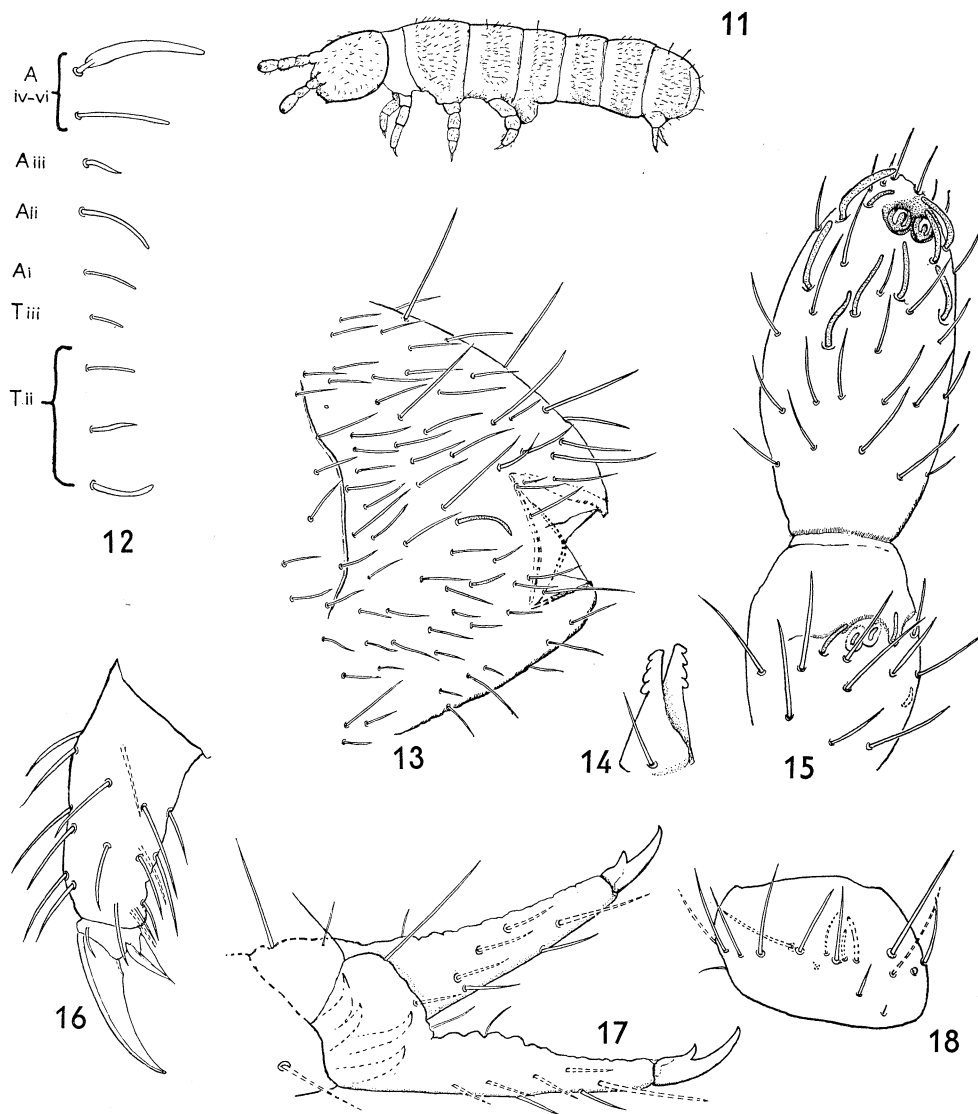
Length up to 1.0 mm.

Color entirely creamy-white. Cuticle of similar nature to that described for *F. yosii*.

Chaetotaxy largely of smooth, finely-pointed setae distributed irregularly among ill-defined rows of similar, longer setae. Among the setae are thin-walled, basically blunt, cylindrical ones which sometimes taper to a point and are distributed anterolaterally on following segments: Thorax II with a row of 3 of which median seta is pointed and internal is more weakly developed than external. Thorax III with a single, extremely weakly-developed seta. Abdomen I-II each with a progressively larger, rod-like seta; abdomen III with a plump, pointed seta. Abdomen IV-VI with a pair of unequal-sized rods, longer and plumper than those of any other segment. Antenna I with 2 unequal-sized rods and 2 minute setulae. Antenna II with a long rod-like seta similar to pair of sense rods flanking sense organ of antenna III. The inner, shorter pair of rods of this organ are each set in a shallow oval depression. An additional accessory rod present on ventral surface of antenna III. Antenna IV is remarkable for its pair of pear-shaped or globular sensillae which are deep-set near apex; these structures appear trifid in optical section and have been variously interpreted by previous workers but seem to be in the form of a cup with a central rod. Antenna IV also equipped with about 9 olfactory hairs of various sizes. Tibiotarsi with simple setae, none of which are differentiated as tenent hairs. Manubrium with 1 + 1 anterior setae. Dens posteriorly with a long proximal and usually 2 shorter, finer setae; anteriorly with long, apical seta, following 6 further setae in 2 rows.

Antennae about $\frac{2}{3} \times$ length of head with segmental ratios approximately 2:3:3+:5. Eyes and postantennal organ absent. Toothless inner edge of claw, approximately $2 \times$ the length of toothless empodial appendage and $\frac{1}{2}$ length of outer edge of tibiotarsus. Tenaculum with quadridentate rami and 1 seta on corpus. Manubrium, difficult to measure owing to an indistinct boundary with abdomen IV but apparently a little longer or shorter than dens which is $3-5 \times$ longer than mucro. Mucro bidentate but with anteapical tooth often so reduced that the structure is almost falciform.

Discussion: Since the original description of the species from Costa Rica, *Folsomina onychiurina* has been recorded from N. America, Australia, New Zealand, Ivory Coast, Singapore, Brasil, Peru and Nepal. Denis describes a sensory hair often present on thorax II but never on thorax III, with no mention of any elsewhere. Yosii describes only one such hair on abdomen V-VI of his Nepalese specimens; Winter describes Peruvian specimens with up to as many as are found on the Solomon Islands material but examination of one of his specimens reveals that they are of a different form. Judging partly from figures, the dens-mucro ratio of *onychiurina* is stated by various workers to be approximately as follows: Salmon 5:1, Denis 10:1, Yosii 20:1 Lawrence 3:1. The



Text-fig. 11-18. *Folsomina onychiurina* Denis, 1931: 11, Whole animal; 12, Sensory setae; 13, Apex of abdomen; 14, Tenaculum; 15, Antenna III-IV; 16, Tibiotarsus and foot; 17, Dentes and mucrones; 18, Antenna I.

variation of these proportions in various instars and in different populations of Collembola is well-known. However, a mucro varying in length from 1/3rd to 1/20th the length of the dens is so exceptional that one suspects that at least 2 species are involved. It is also unusual for the number of dental setae in adults to vary from 10-12 as described by Denis to about 22 as mentioned by Yosii. Dr Winter's Peruvian specimen more closely approximates Yosii's Nepalese examples in this respect. The Solomon Is.

specimens differ from any other referred to *onychiurina* by the antennae being shorter than the head, the long, bidentate mucro, short dens and by the differentiation of specialised setae on the antennal and body segments. I have not been able to examine the type of *onychiurina* and it is possible that the present material and some other reports of *onychiurina* may represent different species.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, Honiara, 10. IX. 1953, Mt. Austen, Malatotha, Santa Ysabel, Small Malaita, Malaita, Santa Ysabel, Tatamba, *Casuarina* litter, 27. IX. 1965. Collectors J. D. Bradley, P. J. M. Greenslade, P. N. Lawrence, Royal Society Expedition, British Museum (Nat. Hist.). Rennell, Niupani, 18-19. VIII. 1962 (Zool. Mus. Kb. J. no. 103-104). BISMARCK IS.: Mussau, Boliu, 4, 7. VII. 1962 (Noona Dan Exped. Berleses 51, 54), Manus, Lorengau, 22. VI. 1962 (Noona Dan Expdn. Berleses 62-63) Duke of York, Manuan, 21. VII. 1962 (Noona Dan Exped. Berleses 87-88, 93); Zoological Museum, Copenhagen. SE NEW GUINEA: Bisianumu, NE of Port Moresby, 500 m, 24. IX. 1955 (J. L. Gressitt); Bishop Museum.

Folsomina yosiii Lawrence, new species Fig. 19-27.

Length up to 0.65 mm.

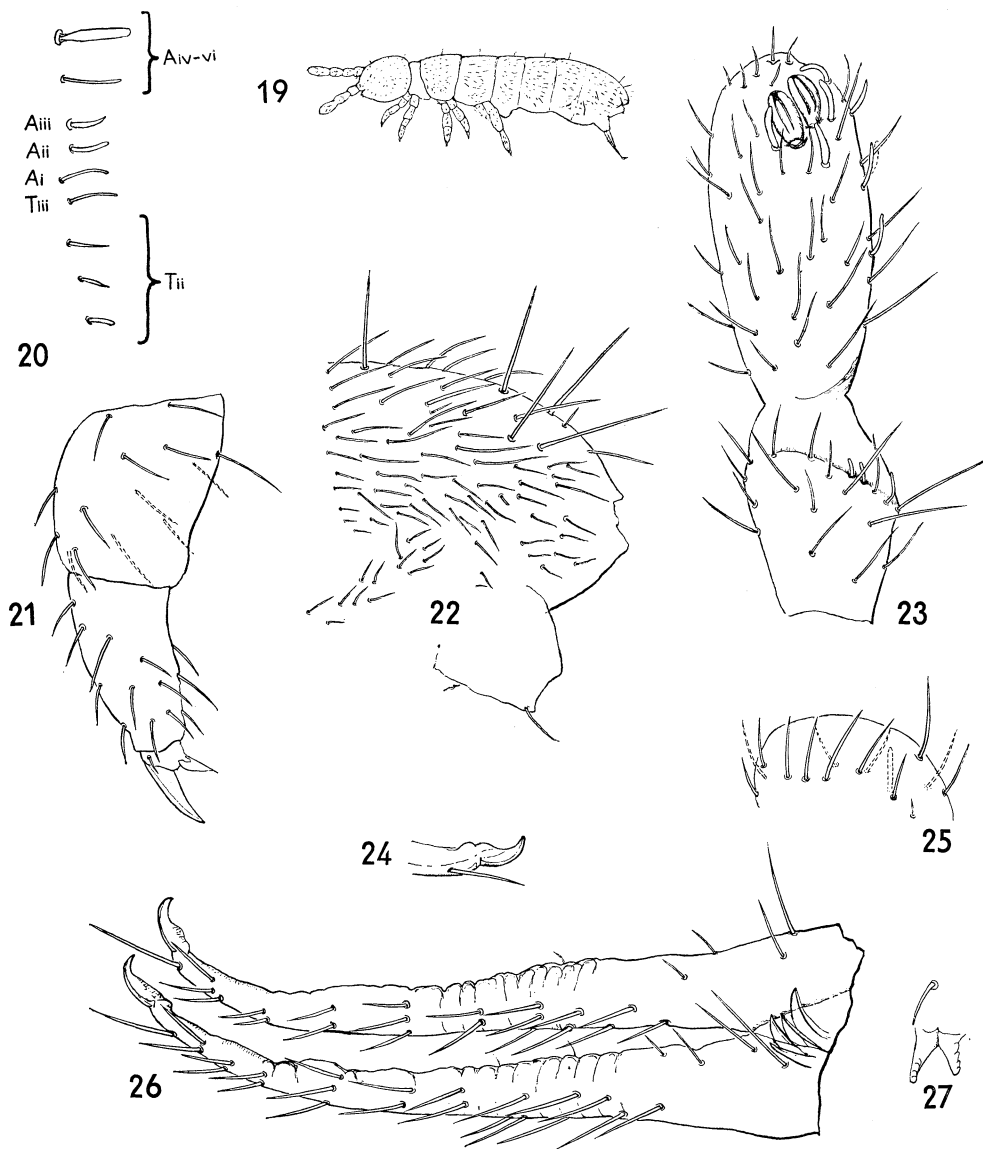
Color entirely white.

Cuticle divided into irregularly-shaped and haphazardly placed fields containing regular rows of fine, connected granules. The axes of these rows differ from those adjacent areas, producing an obscure patchwork or linked, granular chains. Chaetotaxy of sparse, smooth, pointed setae, among which are located specialised lateral setae, variously modified. Antenna I with a small setula, about half the length of a nearby blunt, sensory seta. Antenna III with sense organ composed of two slender, outer rods of which one is poorly differentiated from a common seta; these rods enclose a pair of shorter, rather plumper sense pins. Antenna IV with about 8 olfactory hairs, the stoutest of which are swollen in the basal 1/3 but most are of almost even thickness, and all are with rounded apices. About 4 of these hairs, situated near apex of antenna, enclose a pair of elliptical organs which appear trifid in optical section; they are similar to those in *Folsomina onychiurina* but more elongated giving the appearance of 3 slender fingers. They actually seem to be made up of a long pin in a deep cup. Thorax II on each side with up to 3 specialized sensory setae—upper one poorly differentiated from a common seta, median one shorter, basally narrowed and apically pointed, and lower one cylindrical with a rounded apex (Fig. 20 Tii). Thorax III and abdomen I with a slim, cylindrical, rounded seta on each side. Abdomen II with a shorter, stouter lateral seta apically rounded. Abdomen III with an equally short, plumper lateral seta which is apically pointed. Posterior part of abdomen with 2 longer specialized setae—one conspicuously cylindrical with a constricted base, the other poorly differentiated from common setae.

Eyes and postantennal organ absent. Claw and empodial appendage simple and toothless. Rami of tenaculum quadridentate, corpus with 1-2 setae. Manubrium with a pair of long, stout ventral setae. Dens anteriorly with from 17-22 setae, dorsally with 5 or 6. Mucro falcate with posterior basal lobe of a different nature, suggesting a small additional tooth. Mucrodens substantially longer than femur, tibiotarsus and claw while in *onychiurina* the mucrodens is less than length of tibiotarsus and claw alone.

Discussion: It is possible that some specimens recorded as *F. onychiurina* are referable to this species, notably those described by Yosii, 1966 from Nepal.

MATERIAL EXAMINED. SOLOMON IS.: Holotype and 4 paratypes, Guadalcanal, Lunga Beach, 28. VI. 1965 (P. N. Lawrence). 4 paratypes from type locality, 31. VIII. 1965; 2 pa-



Text-fig. 19-27. *Folsomina yosii* n. sp.: 19, Whole animal; 20, Sensory setae; 21, Femur, tibiotarsus & foot; 22, Apex of abdomen; 23, Antenna III-IV; 24, Mucro; 25, Antenna I; 26, Dentes and mucrones; 27, Tenaculum.

ratypes, nr Mt. Gallego, Hidden Valley, 3. VII. 1965; 1 paratype, Mt. Gallego, 900 m, 12. VII. 1965; 1 paratype, Mt. Popamanasiu, 1610 m 9. IX. 1965 (Lawrence), Royal Society Expedition; 1 paratype Small Malaita, 11. VII. 1966, (P. J. M. Greenslade), British Museum (Nat. Hist.); 1 spec., Rennel Is., Niupani, 19. VIII. 1962, Zoological Museum, Copenhagen.

NE NEW GUINEA : 1, Mt. Otto, 2,500 m, 22. VI. 1955 (J. L. Gressitt) ; Bishop Museum.

The undesignated specimens are referable to this species but they are incomplete or damaged so are not considered among the 21 paratypes listed above.

Isotomodes trisetosus Denis, 1923 Fig. 28-36.

Type locality: France.

Length up to 1.0 mm.

Color entirely white.

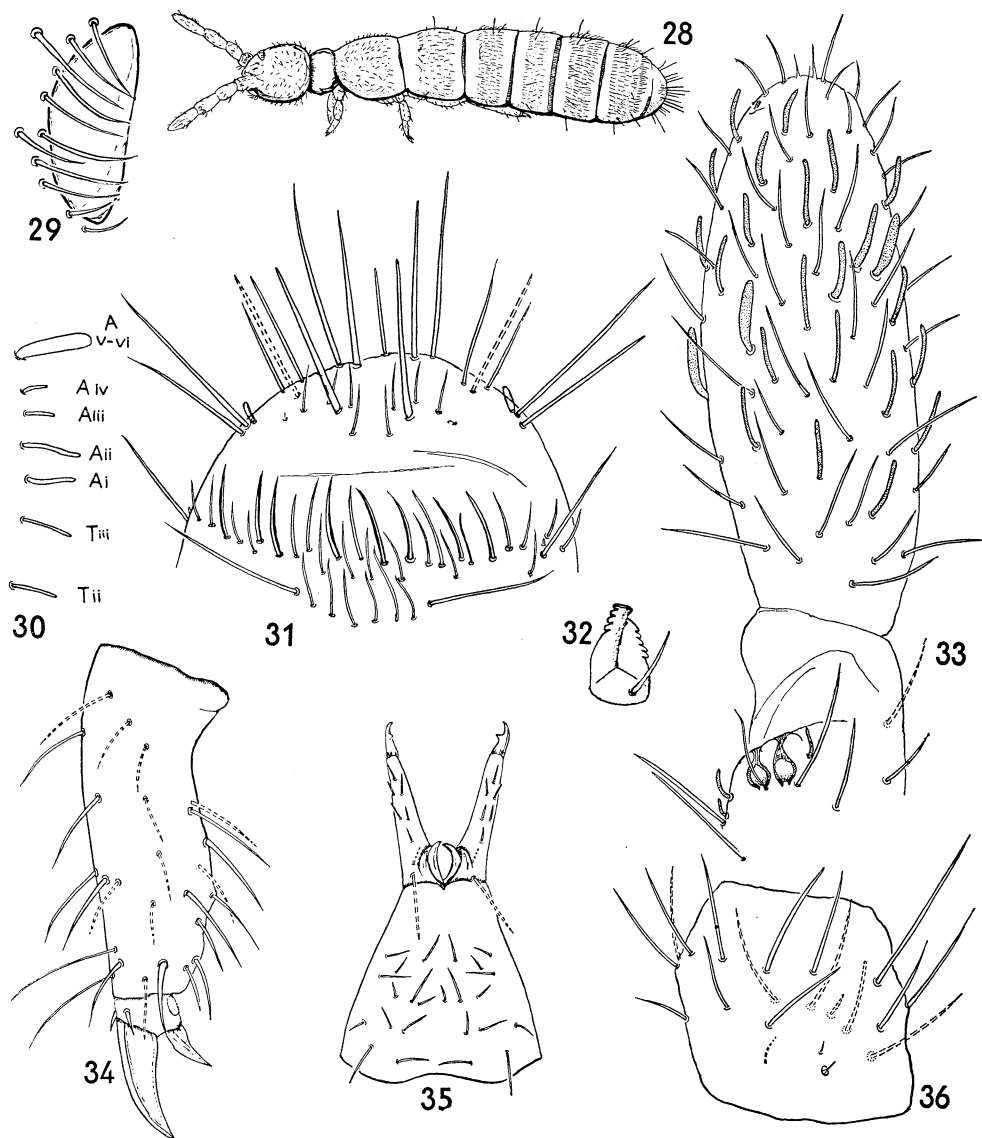
Cuticle divided into irregularly-shaped and haphazardly-placed areas containing fairly straight, regular rows of fine squarish granules which are slightly concave where they meet their connecting network. Granules appear to be formed by thickening of corner walls of squared network and occasional larger granules produced by fusion of walls of more than 1 square. This structure is on the limit of resolution of the light microscope and has been interpreted with the help of the scanning electron microscope.

Chaetotaxy of curved, smooth, pointed setae arranged in regular rows and interspersed with longer, stronger setae which become stouter and blunter posteriorly. Specialized thin-walled setae present laterally on body segments as follows: Thorax II-III each with a fine rod, a little shorter than common setae; abdomen I-II with rods of similar length, but slightly plumper; abdomen III-IV with rods about $1/2 \times$ length of those anterior. Abdomen V-VI with a conspicuously plump rod, slightly longer than those of any other segment. Abdomen IV with seta p. 12 present (nomenclature after da Gama, 1963); 6 microsetae m. arranged almost in an arc between dorsal macrosetae. Abdomen V with a pair of dorsomedian spinose setae as in *productus*; 4 microsetae enclosed by these spines arranged as in this species but are relatively longer, while of the 3 flanking setae, the most anterolateral is reduced to a minute setula which is sometimes difficult to resolve. Antenna I with 2 unequal sense hairs and 1-3 minute setulae; antenna II with a distinct sense hair; antenna III with inner pair of sense organ pins each sunk in a deep pit, visible only in optical section, as in *I. denisi* from Hawaii. Antenna IV with approximately 25 olfactory hairs of various sizes and a single apical papilla. Margin of postantennal organ guarded by up to 9 setae. Tibiotarsus with simple setae of which 2-3 apically are longer, finer and more outstanding, perhaps representing tenent hairs. Ventral tube with $4 + 4$ setae. Tenaculum with 1 seta. Manubrium with 24 setae dorsally and none ventrally. Dens with 2 dorsal and 6 ventral setae.

Claw and empodial appendage untoothed. Rami of tenaculum with up to 5 teeth. Manubrium strongly tapering. Dens with well developed proximal hooks. Mucro bidentate. Manubrium, dens, mucro ratio ca. 6:4:1.

The species is recorded from Europe, Madeira, the Azores and Peru and has a closely related species in Hawaii. Most of the species in the genus *Isotomodes* are based on a small number of individuals or populations. The small differences of chaetotaxy used to separate the species are sometimes obscured by asymmetries. Striking differences in the dorsal chaetotaxy of abdomen V arise from the variable development of 6 pairs of setae, one pair of which may appear as spines while another may be reduced to minute setulae or be absent. When more extensive collections of *Isotomodes* are available for study it is possible that fewer species may be recognised.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, nr Honiara, Kukum, Agricultural Department, mulching beds, 28. VI. 1965, Royal Society Expedition, (P. N. Lawrence).



Text-fig. 28-36. *Isotomodes trisetosus* Denis, 1923: 28, Whole animal; 29, Postantennal organ; 30, Sensory setae; 31, Apex of abdomen; 32, Tenaculum; 33, Antenna III-IV; 34, Tibio-tarsus and foot; 35, Furcula; 36, Antenna I.

Guadalcanal, Honiara, 4. VIII. 1962 (Noona Dan Exped. Berlese nos. 99, 100), Malatoha, 25. XI. 1964 (P. J. M. Greenslade 15189), Mt. Austen, 10. VIII. 1966 (Greenslade 21804). Small Malaita, VIII. 1966 (Greenslade 23564). Rennell, Niupani, 18, 24. VIII. 1962 (Zool. Mus. Kb. Berlese J. no. 103, 113). BISMARCK IS.: New Britain, Valoka, 13. VII. 1962 (Noona Dan Exped. Berlese no. 77).

Isotomodes productus (Axelson, 1906)

Type locality: Finland.

MATERIAL EXAMINED: SOLOMON IS.: Guadalcanal, Kukum, VI-VII. 1966 (P. J. M. Greenslade); British Museum (Nat. Hist.). BISMARCK IS.: New Britain, Valoka, 13. VII. 1962 (Noona Dan Expdn. Berlese no. 73); Zoological Museum, Copenhagen.

Pseudisotoma sensibilis (Tullberg, 1876)

Type locality: Novaja Semlja.

This species has been found commonly in Britain in mossy situations, as well as widely in Europe up to 3100 m. Records exist from Arctic Siberia, Canary Is. and U. S. A. The species was hitherto listed from the tropics by Handschin, 1932 on the basis of 2 specimens. Both of these were from W. Java, 1 at 3300 m and the other from a mountain which rises to 2958 m.

The occurrence of this species, in some numbers, on mountains in New Guinea, the Bismarcks and the Solomon Is. at altitudes from 900 m to 1055 m and its complete absence from collections below 900 m is of some interest. Climatically the present habitat of *sensibilis* in temperate regions is only approximated in the tropics at high altitude. The temperature factor, influencing the mosses on which *sensibilis* is found, may limit the distribution of the species. Although differences could be found between the fauna of various summits and that of Europe, they did not prove to be sufficiently constant to be considered as specific.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, Mt. Popamanasiu, 1320 m, 1610 m, 2100 m, Mt. Gallego, 900 m, 1050 m. Kolombangara, N of Kuzi, 900 m, 1662 m. Invariably in mosses, Royal Society Expedition (P. N. Lawrence) (P. J. M. Greenslade); British Museum (Nat. Hist.). BISMARCK IS.: Lemkamin, 1200 m (Noona Dan Expedition nr. 30); Zoological Museum, Copenhagen. NE NEW GUINEA: Daulo Pass, 2800 m, 14. VI. 1955, Mt. Wilhelm, 3000 m, 2. VII. 1955, 3600 m, 1. VII. 1955, 3600 m, 1. VII. 1955, Enarotadi, 1900 m, Mt. Giluwe 3200 m, 3850 m (J. L. Gressitt), 22 km, SE of Okapa, 1900 m (J. Sedlacek), Edie Creek, 2150 m (G. A. Samuelson); Bishop Museum.

Pseudisotoma spp.

The summit of Popamanasiu (P. J. M. Greenslade), (P. N. Lawrence), Mt. Giluwe, 4050 m, 4200 m, SE New Guinea, and Swart Vall., NW New Guinea (J. L. Gressitt) each supported a different *Pseudisotoma* species in insufficient numbers to justify descriptions. Among the specimens were some with swollen setal bases on the furcula. In *Pseudisotoma* this characteristic appears to be an ecotypic variation, although the feature is thought to be of diagnostic importance in separating allied genera.

Parisotoma sp.

Although the present material agrees substantially with Willem's original description of *octoculata*, it does exhibit differences from specimens from the Antarctic identified by Tillbrook and Wise. In some respects, the Solomon Is. material agrees more closely with some of the New Zealand species described by Womersley and Salmon and with Enderlein's

Kerguelen species. Several of these species differ only slightly from *octoculata* in characters varying on the Solomon Is. material. At present, however, there seems to be insufficient evidence to synonymize any of these species or to describe the present material as new. It is clear that there is a predominantly Southern group of animals, possibly with a cosmopolitan relative, *notabilis*, although the similarity of this species to the other *Parisotoma* may be due to the convergent evolution of reduced eye number and not to any close natural relationship. In the Solomon Is. specimens antenna III sense organ consists of 2 sense pins of which one or both may be in a deep pocket. The lateral rods, when discernible, are reduced, sometimes smaller than the pins and hardly differentiated from common setae. Occasionally the apical part of the 3rd antennal segment is developed in such a way as to exhibit a structure similar to the "trilamellate organ" described for *postantennata* and figured for *octoculata ovata*. The ocelli number appears to vary from 3-5 on each side of the head and is frequently difficult to determine with the light microscope. Even with the scanning electron microscope the exact number of ocelli becomes a matter of opinion due to some degeneration (fig. 5). Some claws have a lateral thickening similar in contour to the "large lateral basal plate-like tooth" described for *picea*. The Solomon Is. specimens have a shorter furca than that of *octoculata*, the dens being only about $3 \times$ the length of the manubrium. A New Guinea specimen from 1900 m has manubrium and dental setae with swollen bases reminiscent of those of some *Pseudisotoma* species from high altitudes. Setae so modified are characteristic of some genera which could be confused ecotypes of *Pseudisotoma* and *Parisotoma*.

A unique feature of some of the Solomon Is. specimens is the presence on abdomen III dorsomedially of a pair of bothriotricha. Bothriotricha have been considered to be of great taxonomic importance and such hairs have been used to split *Isotomurus* from *Iso-toma*.

Of the material on hand the bothriotricha may easily become detached and the vacant sockets, overlooked. It is possible that more southern region *Parisotoma* possess these bothriotricha but most unlikely that they are ever present on the cosmopolitan type species, *notabilis*. If this speculation proves to be correct, it might indicate that *notabilis* is not so closely related to the other members of the genus which it represents. In this case the southern region *Parisotoma* species will require a new generic name. The identification of this species must await the revision of the genus, the species of which have been separated on eye number which is now shown to be unreliable.

MATERIAL EXAMINED. SOLOMON IS.: Guadalcanal, San Cristoval, Santa Ysabel, Kolombangara, Royal Society Expedition, (P. N. Lawrence), Guadalcanal, Mt. Austen, Choiseul, Rennell (P. J. M. Greenslade) British Museum (Nat. Hist.) Rennell (Torben Wolff). BISMARCK IS.: Mussau, Lavongai, Dyaul (Noona Dan Expdn.). NE NEW GUINEA: Wau (J. Sedlacek), Nondugl, in birds nests; Bishop Museum.

In the Solomons, the species is frequent in ground litter and up trees.

***Isotomurus tricuspis* (Börner, 1909)**

Type locality: Java.

SOLOMON IS.: Guadalcanal, Ilu, 23. XII. 1964, X. 1965. Beside canal and in some num-

bers on rice fields (P. J. M. Greenslade).

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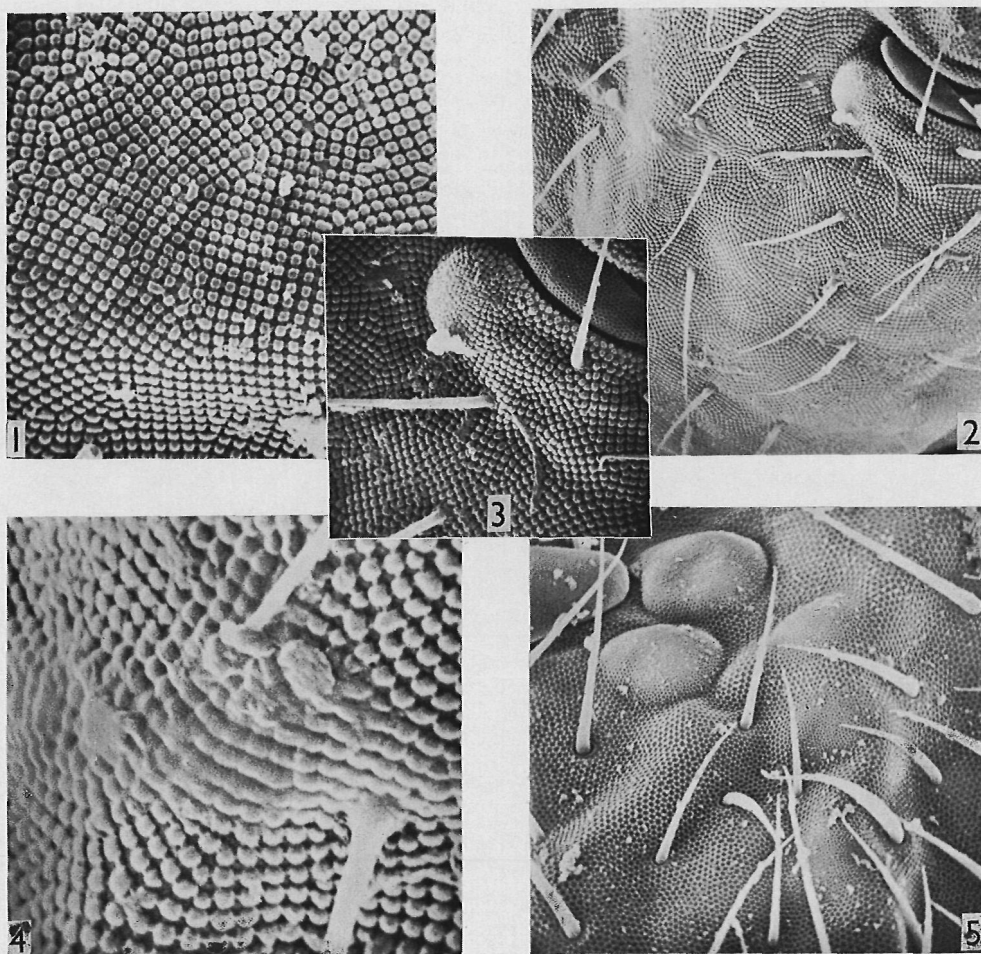


Plate I.

1, *Folsomides exiguus* body cuticular structure; 2, *F. exiguus* head, postantennal organ and ocelli; 3, *F. exiguus* head, postantennal organ, anterior ocellus; 4, *F. exiguus* head, poorly developed posterior ocellus; 5, *Parisotoma* sp. head with ocelli in various degeneration stages specimens freeze-dried by R. H. Harris Dept. Zoology. Stereoscan scanning electron microscope photographs by R. G. Adams, Dept. Entomology, processed by the Electron Microscope unit, British Museum (Nat. Hist.).

