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The spring fauna of Collembola (Insecta) from Rhodos, with descriptions of some new taxa

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ABSTRACT

An account is given of the collembolan fauna of the Greek island Rhodos, from material collected in early spring 1970. Altogether 52 taxa were recognized, constituting the first faunal list for the Greek isles.

Six new species are described in this material, viz. *Lathriopyga hellenica, Folsomides nanus, Pseudosinella ciliata, Orchesella sporadica, Deuterosminthurus pandayi* and *Dicyrtomina (Calvatomina) articulata;* moreover the new subspecies *Acherontiella bougisi rhodia* and *Deuterosminthurus sulphureus mediterraneus,* and the new forma *Deuterosminthurus pallipes fenyesi* f. *pallida. Heteromurus sexoculatus* Brown, 1926, is reduced to a form of *H. major* (Moniez, 1889), *Deuterosminthurus fenyesi* Stach, 1926, is reduced to a subspecies of *D. pallipes* Bourlet, 1843. A lectotype is designated for *D. p. fenyesi. Folsomides anophthalamis* Hepburn & Woodring, 1964, is synonymized with *F. americanus* Denis, 1931; *Oncopodura ambigua* Christiansen, 1958, is synonymized with *O. crassicornis* Shoebotham, 1911; *Seira pillichi graeca* Ellis, 1966, and *S. petrae* Jacquemart, 1973, are synonymized with *S. ferrarii* Parona, 1888. A key is presented to the species of *Folsomides,* and to the European species of *Deuterosminthurus.* The *Sminthurus viridis* complex is represented by *S. viridis* (Linnaeus, 1758), and a peculiar form of *S. nigromaculatus* Tullberg, 1872, that presumably represents a separate taxon.

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Introduction

In the spring of 1970, from the end of March until the third week of April, the author and his wife collected Collembola and other insects in the Dodecanesean Island of Rhodos. Most material was collected in the immediate neighbourhood of the small village of Líndos, a rightly well-known tourist attraction situated at the eastern coast of the island.

Material was collected with the use of a sweeping net, and with a modification of Salmon's version of the Berlese funnel. The collecting time fell just in the short outburst of spring. At the beginning of our stay some days of heavy rains marked the end of the winter season. At the end all vegetation was already yellow and wilted.

This particular collecting time no doubt had its influence on the species and age composition of the collected material. It is striking that a typical mediterranean genus as *Proctostephanus* is not represented in the material.

Contributions towards the Collembolan fauna of Greece are few (Strebel, 1938, Ellis, 1966, Cassagnau, 1967, 1968, 1969, 1970, 1971, 1973, Denis, 1933, 1935, 1936 and Stomp, 1972). More important for the study of the Collembolan fauna of Rhodos were the papers of Cassagnau & Delamare, 1955, and of Christiansen, 1957, 1958, on the Collembola of the Lebanon. In all, some 52 taxa could be recognized in the material, though not all could be identified accurately, often because of immaturity of the specimens. All material is mounted on slides in Marc André II and is preserved in the collection of the Institute of Taxonomic Zoology (Zoological Museum).

List of samples

1 Ródos, Líndos, 27 March 1970, swept in garden with pistachio and olive trees, with a luxuriant herb vegetation (author's collection number: 970.011).
2 Líndos, Limín Apostólou Pávlou, 28 March, soil sample taken at the foot of a steep, about 30 m high north slope; soil damp, rich vegetation. (970.028).
3 Líndos, Limín Apostólou Pávlou, 1 April, swept in phrygana. (970.005).
4 As above, swept elsewhere (970.014).
5 As above, swept elsewhere (970.018).
6 Lárdos, 4 April, collected manually from wet surface of barren loam in a vineyard. (970.024).
7 Between Líndos and Kálathos, 5 April, sample of various mosses and *Selaginella denticulata* (L.) Link, growing in rock-fissure in west slope. (970.016).
8 Kálathos, 5 April, swept and beaten from undergrowth of a forest of *Pinus brutia* Ten. (970.022).
9 Líndos, Akrotíria Milanós, 6 April, specimens occurring under pieces of timber. (970.025).

10 Líndos, Marmári, 8 April, soil sample collected under large stone in phrygana. (970.012).
11 Líndos, 10 April, soil sample consisting of coarse, damp loam at the base of a wall (in permanent shadow) in a pistachio and olive garden. Rich undergrowth, mainly *Oxalis pes-caprae* L. (970.013).
12 Líndos, 10 April, soil sample consisting of moderately damp, crumbly loam in a shadowed olive garden. (970.006).
13 Between Kálathos and Malón, in the bed of the river Gadourás, 11 April, swept from coarse herbs and *Cistus* in a river dune landscape. (970.015)
14 Líndos, 12 April, soil of frequently trodden grass-vegetation. (970.009).
15 Líndos, 12 April, swept and beaten from low vegetation, and collected manually under stones. (970.026).
16 As sample 13, 13 April. (970.017).
17 Láerma, 14 April, soil sample consisting of sandy loam at the bank of small rivulet. (970.008).
18 Láerma, 14 April, soil sample consisting of relatively damp loam under hedge with rich low undergrowth. (970.021).
19 Líndos, 15 April, litter under *Coridothymus capitatus* (L.) Rchb., in phrygana. (970.010).
20 Líndos, 15 April, soil at the foot of a wall in an olive garden. (970.019).
21 Líndos, 15 April, swept on macrophyte vegetation in old shady olive grove. (970.020).
22 Líndos, 15 April, soil of a pistachio and olive garden. (970.027).
23 Líndos, Limín Apostólou Pávlou, 20 April, swept on rough grassy vegetation. (970.023).

Since it is not possible to deduct the Greek orthography from the transcription alone, I give in table I the Greek spelling of the locality names with the transcription used above, in the order in which they appear in the list.

TABLE I. Greek orthography and transcription of the locality names used.

Ρόδος	Ródos
Λίνδος	Líndos
Λιμὴν Ἀποστόλου Παύλου	Limín Apostólou Pávlou
Λάρδος	Lárdos
Κάλαθος	Kálathos
Ἀκρωτήρια Μιλανός	Akrotíria Milanós
Μαρμάρι	Marmári
Μαλών	Malón
Γαδουράς	Gadourás
Λάερμα	Láerma

ACCOUNT OF THE SPECIES

Onychiurus cf. archivari Christiansen, 1957

Material: one immature specimen from sample 12.

The specimen measures 1.2 mm; the genital orifice is still closed. Postantennal organ is of the "compound" type, with 12 primary tubercles. The antennal organ consists of 4 conical papillae, two slender sense rods and two large, smooth, apically somewhat notched sensory clubs. Antennal base finely granulated, well separated from head capsule. Abdominal spines straight, a little less than 2/3 as long as the claw, inserted without basal papillae directly on the semiglobular apex of abd_6. Claw without lateral or internal teeth. Unguiculus tapering, 2/3 as long as unguis. Dorsal pseudocelli 32/013/33343; ventral pseudocelli 3/011/2111; subcoxae with 2 pseudocelli.

The single specimen agrees with the description of *O. archivari* in most details, except for some differences in the dorsal pseudocelli formula, and especially, in the presence of ventral pseudocelli, which are stated to be absent in *archivari*. This species was described from the Lebanon, and, as far as I know, has not been recorded after its description.

Onychiurus spec., near **rectopapillatus** Stach, 1933

Material: 1 ♀, 1 ♂ from sample 11; 5 ♀, 14 juv. from sample 12.

The length of the largest specimen, the only ovigerous female that occurred in the material (from sample 12) measured 1.9 mm. Antennal organ composed of 4 conical papillae (one ♀ had 4 + 5 papillae), two large smooth sense clubs and the usual sense rods. Postantennal organ consists of approximately 14 strongly compound vesicles. Antennal base distinctly demarcated, much more finely granulated than cephalic integument. Claw without teeth, unguiculus without internal lamella, gradually tapering to a filament, about 2/3 as long as unguis. No anal spines. In the only ♂ no ventral male organ could be observed, possibly because the specimen was still hardly mature — the genital papilla was distinct and apparently open, but still very small, bearing approximately 22 setulae. Pseudocelli arrangement is rather variable. Basically, the arrangement is dorsally 32/022/33343, ventrally 3/000/1212, subcoxae 2. But in three specimens th_1 bears dorsally 1 + 0 pseudocellus, in two other specimens even 1 + 1. Th_2 and th_3 had a pair of ventral pseudocelli in two specimens, and in one specimen abd_1 has two, instead of one pair of ventral pseudocelli. Especially the instability on th_1 is confusing, as this is sometimes used as a specific character.

It is not useful to dwell any longer on this material, since it is manifestly too small and too young, and especially since the male ventral organ is not developed. The species with which it seems to be most closely related, *O. rectopapillatus*, is known from East Central Europe (Poland, Roumania, Bulgaria, C.S.S.R., Hungary).

Protaphorura spec.

One, very immature specimen from sample 11.

Protaphorura meridiata (Gisin, 1952)

Material: 4 immature specimens, without differentiated genital orifices, from sample 17.

The largest specimen measures 0.8 mm. The material agrees with the description of *meridiata*, except that the relation M/s is 5/3 (instead of 2/1), and that the unguis has no teeth.

The species was described from the South of Switzerland, and is reported by Gough, 1971, from Britain.

Metaphorura affinis (Börner, 1902)

Material: 1 ♀ from sample 7; 3 juv. from sample 10; 3 ♀, 2 juv. from sample 11; 2 ♀, 1 juv. from sample 12; 1 ♀ from sample 17.

The material is in good agreement with published descriptions. *M. affinis* is a wide-spread species that has been recorded from most European countries.

Mesaphorura italica (Rusek, 1971) (fig. 1a)

Tullbergia (Mesaphorura) italica Rusek, 1971.

Material: 1 ♀ from sample 14.

The specimen agrees completely with the elaborate description by Rusek, except that the ventral tube apically does not have 3 + 3 setae, as in the type series, but 2 + 2. (fig. 1a). At present it is not possible to evaluate the importance of this difference.

Until now *M. italica* was known only from the type locality in central Italy. Perhaps it is relevant that the original material was also collected ir the spring.

Acherontiella bougisi rhodia nov. subspec. (fig. 1 b, c)

Material: 1 ♂ (holotype) and 1 ♀ (paratype) from sample 12; both specimens are mounted separately on slides, in Marc André II.

Description. Total length 0.9 mm. No trace of pigmentation. Skin granulation coarse. Antennal organ III as described for the typical subspecies. Although my drawing of the apex of ant_4 differs somewhat from that of *b. bougisi,* I presume this is only a matter of interpretation. Ant_4 bears subapically on its inner face a swollen sensilla; apically the segment is flattened, but dorsally and ventrally a cuticular flap extends beyond the flat tip. The upper surface of the dorsal flap bears an inflated sense hair. Ventrally on the dorsal flap is a very small rod-like sensilla. The flattened tip of the antenna bears two strong, swollen curved sensillae. The ventral flap is not provided with sensillae, but at its base, at the ventral face of thc antenna, is a retractile globular papilla (fig. 1c).

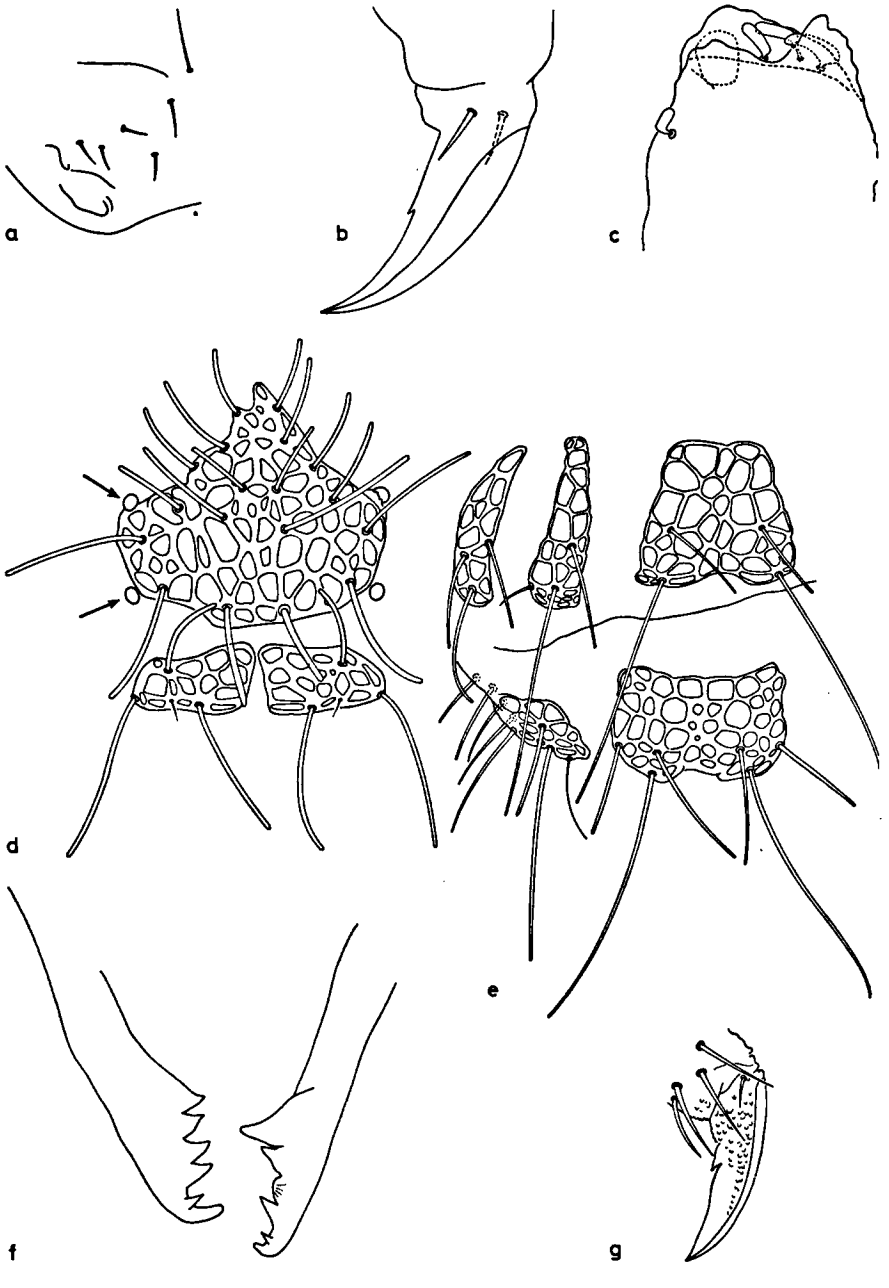

FIG. 1. *Mesaphorura italica* (Rusek). a, ventral tube. *Acherontiella bougisi rhodia* n. ssp. b, unguis P_2; c, apex of antenna.
Lathriopyga hellenica n. sp. d, frontal tubercle; e, tubercles of abd_{4-5}; f, mandibles; g, unguis P_3.

Since the body chaetotaxy agrees in all details with the drawings by Thibaud, 1967, I refrain from a description of the setal pattern. The ventral tube bears 4 + 4 setae. Male and female genital orifices do not show any peculiarity. The claw of the feet has a distinct tooth, in a rather basal position (fig. 1b).

Discussion. The two specimens agree in all detail with the original description of *A. bougisi* by Cassagnau & Delamare Deboutteville, 1955, except that the ungues are furnished with an apical tooth on the internal lamella. Since this is a rare character within the genus, I think it justified to base a new taxon on this minute difference. The chaetotaxy of the new subspecies is identical with that of the typical subspecies, as described by Thibaud, 1967.

A. bougisi was described from the Lebanon (from a cavernicolous as well as from an edaphic locality), and is moreover recorded from three localities in the Pyrenees, by Thibaud, 1967, and from the Azores (Paclt, 1961).

Apart from the new subspecies, the genus *Acherontiella* contains presently 12 species. A group of seven species can conveniently be segregated on the absence of anal spines: *A. onychiuriformis* Absolon, 1913, (Algeria), *variabilis* Delamare Deboutteville, 1948, (France, Massif Central), *xenylliformis* Gisin, 1951, (Atlas range), *massoudi* Thibaud, 1963, (Côte d'Ivoire), *cassagnaui* Thibaud, 1967, (Pyrenees), and *cryptobia* and *dentata,* both described by Djanaschvili, 1971, from Adzerbaidzhan. In the remaining five species, clavate tenent hairs distinguish *epigea* Bonet, 1945, and *sabina* Bonet, 1945, both from Mexico, and *cavernicola* Tarsia in Curia, 1941, from Italy. The only remaining species are *A. palatinensis* Hüther, 1969, described from a vineyard in Germany, and abundantly characterized by the very peculiar antennal organ, and *bougisi* Cassagnau & Delamare, 1955.

Xenylla brevisimilis Stach, 1949

Material: 1 ♂ from sample 1; 10 ♀, 11 ♂ and 7 juv. from sample 19.

The material is in all respects in good agreement with the description by Stach, 1949, and Gama, 1964, 1969 (except one specimen that will be discussed below). The species is recorded from Poland, Morocco (Gama, 1964), Austria (von Törne, 1958), the Lebanon (Cassagnau & Delamare, 1955), Öland (Delamare & Jacquemart, 1961), and France (Cassagnau & Rouquet, 1962, Cassagnau, 1962).

One specimen (a juvenile) deviates from the others in having 2 + 2 teeth to the tenaculum, and thus ought to be identified as *X. b. mediterranea* Gama, 1964. The coexistence of two subspecies in one sample is patently impossible, but I cannot decide on this single observation how it should be interpreted otherwise.

Hypogastrura spec.

Material: 1 juv. from sample 18.

It was not possible to identify the single specimen with any certainty.

Friesea (Polyacanthella) coiffaiti Cassagnau & Delamare Deboutteville, 1955

Material: 1 ♂ and 6 juv. from sample 17.

The material is in good agreement with the description of *coiffaiti*, which was described from the Lebanon, with one difference. In the original material the claw had a distinct tooth to the unguis, but in the material from Rhodos this tooth is absent, or almost so.

Friesea coiffaiti is known to differ from the North American *F. pentacantha* Mills, 1934, in only two characters: the absence in the last species of a tooth to the internal ungual lamella, and the absence of clavate tenent hairs. If one takes into consideration the fact that in all probability *pentacantha* was based on juvenile material — as is admitted by Mills himself — these differences are faint indeed. I have attributed the Rhodos material to *coiffaiti*, and not to *pentacantha*, mainly on the geographical argument, and moreover because even my juvenile specimens have distinctly clavate tenent hairs.

Even more questionable are the differences between *F. coiffaiti* and *F. maxima* Baijal, 1956, described from the high alpine Himalaya: the only differentiating character of *maxima*, apart from the absence of an inner tooth on the unguis, is its larger size. *Friesea maxima* ranges from 2.0—2.5 mm; *coiffaiti* measures from 1.2—1.4 mm. My only adult specimen from Rhodos is no more than 0.9 mm.

Pseudachorutella asigillata (Börner, 1901)

Material: 13 immatures from sample 19; 2 immatures from sample 22.

The material is evidently very young: the average length is about 0.6 mm; the largest specimen measures about 0.8 mm. No trace of a genital orifice is visible. However, the mandible has only two teeth, so that confusion with *P. remyi* (Denis, 1933), is excluded.

Pseudachorutes dubius Krausbauer, 1898

Material: 1 adult ♀ from sample 18.

The specimen, which measures 1.3 mm, agrees in all details with the published descriptions, as regards the mouth-parts, post-antennal organ, structure of antennal sensillae, etc. The species, which is known from almost all European countries, was already reported from the Greek island Evvia by Cassagnau, 1971b.

Pseudachorutes subcrassus Tullberg, 1871

Material: 1 juvenile from sample 12; 4 juveniles from sample 19.

The specimens measure 0.5—0.8 mm, and are so young that no trace of a genital orifice is visible. The species has been recorded from most European countries.

Lathriopyga hellenica nov. spec. (fig. 1 d-g)

Material: holotype and four paratypes, all females, from sample 2. Four

specimens depigmented by treatment with HCl-$KClO_3$; among these the holotype. All specimens are mounted separately as whole mounts in Marc André II.

Description. Length 2.1—2.5 mm. Dark blue pigment is irregularly distributed on body and antennae; the hind margins of the tergites are somewhat darkened generally, and especially so on abd_5. Abd_6 completely hidden below abd_5. Integument coarsely tuberculated, but no more than is usual in the genus.

Eyes 2 + 2. Unguis with a very strong basal tooth to the internal lamella; lateral lamellae toothless (fig. 1-g). Hairs rough, with a double contour, and a somewhat blunt apex. Hairs rather long, but not of exaggerated length: longest macrochaetae of abd_4 reach (under the cover slip) just beyond hind margin of abd_5.

Mandible very constant in shape (fig. 1f) (contrary to the observations of Lawrence in *longiseta*), with 6 teeth. The basal tooth is slightly stronger than the following 3; the 5th tooth is much smaller, the distal one is crook-shaped. Slight differences in orientation may suggest a non existent variability. The antennae do not offer any particularity. The tubercles on head and body are strongly developed. The apical, central and ocular tubercle are completely fused. The smooth fields that Caroli, 1912, and da Gama, 1964, recognized on this complex in *longiseta* are absent. The dorso-internal and dorso-external tubercles at the hind margin of the head are fused (fig. 1d). The dorso-internal tubercles of abd_4 and abd_5 are completely fused as well, and finally the dorso-external and dorso-lateral tubercles on abd_5 form one mass (fig. 1e).

TABLE II. Number of setae on dorso-internal (di), dorso-external (de), dorso-lateral (dl) and lateral (l) tubercles in *Lathriopyga hellenica* n. sp.

	di	de	dl	l
head	10 + 10		11	
		4	6	
thorax I	1	2	1	
II	3	3	4	3
III	3	4	4	3
abdomen 1	2	4	2	3
2	2	4	2	4
3	2	4	2	4
4	2 + 2	3	3	7
5	3 + 3	8		
6	7			

The chaetotaxy is schematized in table II. Three of the four setae on the fused di + de tubercle on the head hind margin are arranged in a transverse row, of which the middle seta is distinctly shorter than the other two. (In *longiseta* these hairs are arranged in a lozenge, of which the postero-external two setae are long, the two antero-internal short). The relative lengths of the setae on the median tubercle of abd_4 are 100: 38; on abd_5 the 3 setae relate as 100 : 44 : 38.

Discussion. The new species is closely related to *L. longiseta* (Caroli, 1912), which is described from Italy and recorded from Madeira, Jugoslavia (Gama, 1964), and Corsica (Gisin, 1960). *L. hystrix* (Bagnall, 1940), described from England, and considered a synonym of *longiseta* by Lawrence, 1970, is the only other species that may come near *hellenica. L. longiseta* stands very isolated in the genus by having the dorso-internal tubercles of abd_4 and abd_5 fused, and by having a strong internal basal tooth to the unguis. *L. hellenica* differs from *longiseta* in the shape of mandible (to judge from the drawing of Caroli — but after the study by Lawrence, 1970, this might be a suspect character), by having 2 instead of 3 dorso-lateral setae on abd_{1-3}, by having 4 instead of 3 lateral setae on abd_2, and by having a different setal pattern at the di + de tubercles at the hind margin of the head. The non-tuberculated fields in the central cephalic tubercle of *longiseta* are absent in *hellenica.*

Folsomides parvulus Stach, 1922

Material: 3 ♀ and 1 juv. from sample 2; 1 ♀ and 1 juv. from sample 7; 20 ♀ and 24 juv. from sample 11; 5 ♀ and 6 juv. from sample 12; 1 juv. from sample 20.

Description. The dental chaetotaxy shows 3 + 3 setae on the posterior face in all specimens except one (a juvenile from sample 7, which has 3 + 2 setae). This constancy is in sharp contrast with the variability shown in the same character in *F. marchicus* (Frenzel, 1941). The number of ocelli is no more variable, in a sense. In one adult from sample 12 one side has 2 ocelli, widely separated as usual, but the two ocelli at the other side are close together at the site of the frontal one. All other specimens show either 2 + 2 distinct well-pigmented ocelli, or the same number of ocelli but not at all pigmented, and difficult to detect. In profile a lens can be seen, but in frontal view only the absence of the fine skin reticulation discloses the position of the ocellus.

Unpigmented ocelli occur in juveniles as well as in adults. The frequency of this character and mean lengths of the specimens summated over the whole material are:

	juvenile			adult		
	N	mean length	s.d.	N	mean length	s.d.
ocelli unpigmented	20	0.58 mm	0.087	7	0.71 mm	0.090
ocelli pigmented	13	0.60 mm	0.070	22	0.80 mm	0.054

The figures suggest that adults with unpigmented eyes are in a minority compared with normal adults, and that in the mean they are smaller, which indicates a younger age.

Folsomides americanus Denis, 1931, has been synonymized on several occasions with *F. parvulus,* because the arrangement and number of ocelli, their main difference, was considered to be so variable that no definite

distinction could be drawn. In the material under consideration I can find no argument in favour of this synonymy. On the contrary, I am inclined to share Poinsot's 1972, opinion, that it would be rash to take shat step. She found that populations with the ocelli arrangement of *americanus* and *parvulus* never occur mixed.

Folsomides parvulus was described originally as having 2 + 2 dental setae, whereas all subsequently collected material that is attributed to this species has 3 + 3. Most authors (e.g. Gisin, 1960) attribute this difference to abnormality or damage of the single specimen on which Stach founded his *parvulus*. But in view of the very constant setal number that I find now, I begin to mistrust the customary statement that setal arrangement might be 2 + 2 or 3 + 3.

Finally I draw attention to the interesting absence of males in the present material. These figures are suggestive for an, at least local and facultative, parthenogenesis.

Folsomides spec.

Material: 1 immature specimen from sample 18.

The specimen, which measures 0.6 mm, differs from the material which is attributed to *F. parvulus* in the chaetotaxy of the dens, which bears 2 + 2 setae, by the slightly broader, not constricted postantennal organ, and especially by having only 1 + 1 well pigmented ocelli close to the upper corner of the PAO. At the site where the other ocellus could be expected the integument was perfectly normal. This curious specimen comes close to *F. americanus* Denis, but differs from that species by having a different dental chaetotaxy.

Folsomides nanus nov. spec. (fig. 2 a-h)

Material: 13 ♀, 3 ♂ and 9 juv. from sample 7; 1 juv. from sample 10; 1 ♂ and 2 juv. from sample 14; 1 ♂ from sample 20. Holotype is a female from sample 7. All specimens are mounted separately on slides in Marc André II.

Description. Mean length of the adult specimens is 0.56 mm, length of holotype female 0.6 mm. Very sparse grey-blue pigment granules in most specimens dispersed over the body, mostly so on the head. In all specimens the ocelli are black, on weakly pigmented eye-patches. Integument finely and regularly reticulate. All setae stiff, smooth. Suture between abd_5 and abd_6 well visible dorsally; outline of the body in these two segments normal for the genus (fig. 2h).

Ocelli 5 + 5, arranged as in *marchicus*. All ocelli separately pigmented, only the anterior two are touching each other (fig. 2c). Postantennal organ broadly oval, about three times as broad as long and about as long as diameter of first antennal segment. PAO with a faint constriction, and with the anterior border thickened. Labral chaetotaxy 4/5,5,4 (fig. 2a).

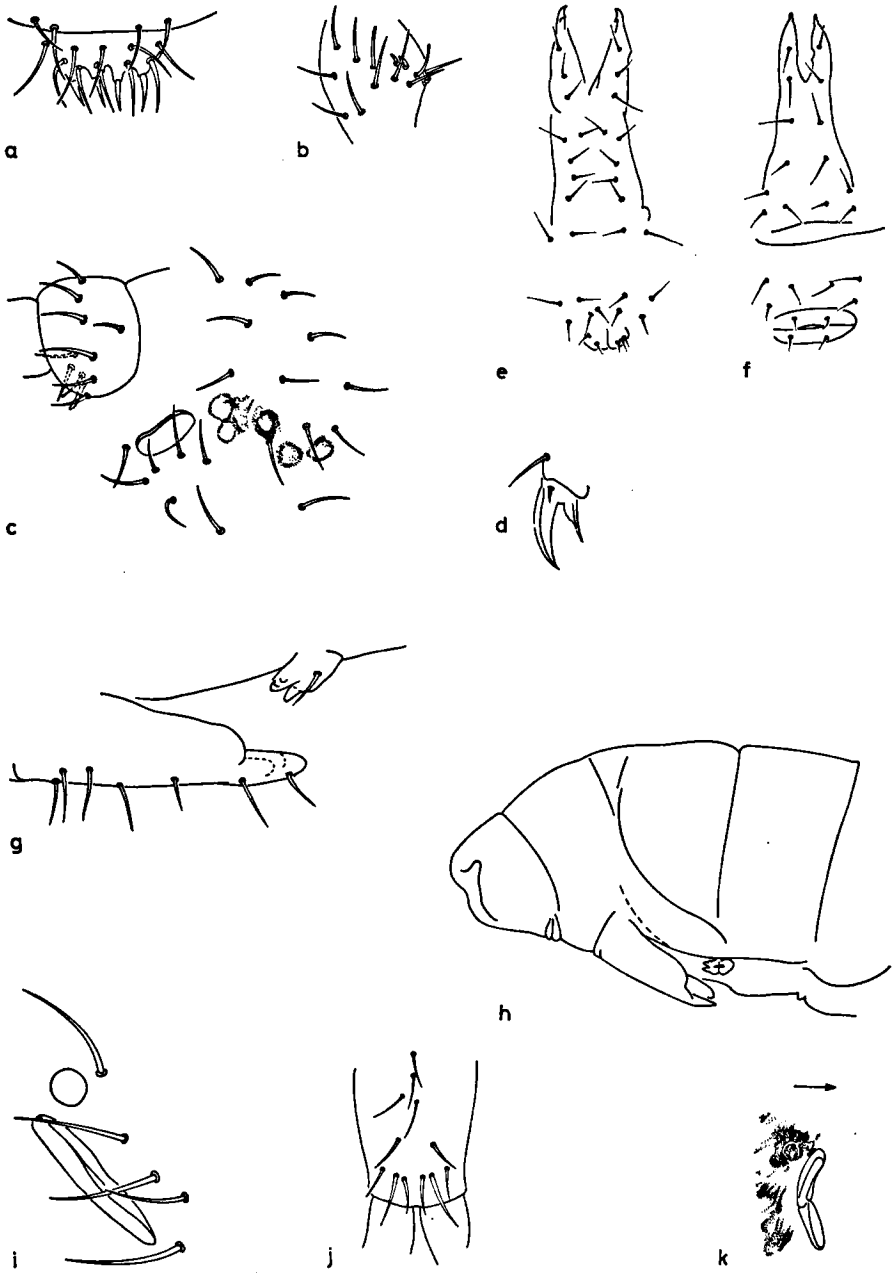

FIG. 2. *Folsomides nanus* n. sp. a, labral chaetotaxy; b, ant$_3$; c, ocelli, postantennal organ and ant$_1$; d, unguis P_3; f, the same of a female; g, furca and retinaculum in lateral view; h, lateral aspect of abdomen.
Folsomides marchicus (Frenzel) from Ibiza, e, posterior face of furca and male genital papilla for comparison with fig. 2f.
Folsomides anophthalamis Hepburn & Woodring, paratype. i, ocellus and postantennal organ.
Folsomia ksenemani Stach. j, posterior face of manubrium; k, ocellus and postantennal organ.

Ant_1 with a whorl of fine setae and ventrally two sense hairs, inserted close together. The external one of these is distinctly thicker and longer than the interior one. Ant_2 ventrally with one sense hair, apart from the normal hairs, ant_3 with a small sensory hair on outer face and the normal antennal organ III (fig. 2b). This consists of two erect sensory rods, and two long slightly bent accompanying sense hairs. Ant_4 with many sense hairs; those (about 18) on the dorsal surface are particularly strong. Apex of ant_4 without special features. Ant 1 : 2 : 3 : 4 = 4 : 6 : 6 : 10.

Claw toothless. Unguiculus half as long as unguis, terminating in a hair-like filament (fig. 2d). No tenent hairs differentiated. Ventral tube with 3 + 3 setae in distal position, and moreover 1 + 1 on the posterior face. Retinaculum with 2 + 2 teeth (in only one specimen, an adult ♀, I believe I have seen 2 + 3 teeth). Moreover an unpaired hair on the corpus retinaculi (fig. 2g). Manubrium anteriorly without setae. Posteriorly the manubrium bears normally 5 + 5 setae (seen in 18 specimens), in a rather constant arrangement. Sometimes 5 + 6 (4×), or even 6 + 6 (2×) setae were present (only in adult specimens), and twice the arrangement 5 + 4 was found (also in adults). The dens is very plump and short (manubrium : dens : ant_4 = about 100—125 : 25—40 : 100). Almost invariably, the dentes bear 2 + 2 setae. The only exception occurs in an adult male which presents 2 + 1. The mucro is strongly reduced. In ventral view it is visible as a toothlike narrow prolongation of the dens; in lateral view it is hardly possible to distinguish the mucro from the dens. Female genital orifice a broad slit with swollen lips, each of which bears 2 + 2 setulae. Male genital tubercle low and small, with 3 + 3 setae at each side (fig. 2e, f).

Discussion. The new species is closely related to *F. marchicus* and shares with this species the following important characters: number of eyes 5 + 5, postantennal organ broad, neither manubrium nor dens anteriorly with setae, pigment present in most specimens, though sparsely. But *nanus* differs from *marchicus* in having 2 + 2 instead of 3 + 3 teeth to the retinaculum, in having 5 + 5 (exceptionally 6 + 6 or 5 + 4) instead of 8 + 8 or 9 + 9 setae to the posterior surface of the manubrium, in having the dens shorter, with never more than 2 + 2 setae and in having the mucro reduced to a blunt stump. *Folsomides marchicus* is recorded from many countries in South and Central Europe.

Stscherbakow, 1899, described from Southwest Russia rather insufficiently *Isotoma decemoculata* (nec *Folsomides decemoculatus* Mills, 1935), that might well be a *Folsomides*. In the drawings presented by this author, a well differentiated mucro is evident, and in the absence of better evidence this must suffice to distinguish *nanus* from the species of Stscherbakow.

To facilitate future work on this genus, I add a non-critical key to the species of this genus.

Non-critical key to the species of *Folsomides* (inc. *Subisotoma*)

1a ocelli 0 + 0: *anophthalamis* Hepburn & Woodring, 1964, — U.S.A.
b ocelli 1 + 1 2
c ocelli 2 + 2 4
d ocelli 5 + 5 6
e ocelli 6 + 6 15
f ocelli 8 + 8 17
2a posterior face of dens with 1 + 1 seta: *monosetis* Massoud & Rapoport, 1968, — Patagonia
b posterior face of dens with 3 + 3 setae 3
3a posterior face of manubrium with 7 + 7 setae: *americanus* Denis, 1931, — Costa Rica
b posterior face of manubrium with 5 + 5 setae: *stachi* Folsom, 1934, — U.S.A.
4a posterior face of dens with 4 + 4 setae: *neozealandia* Salmon, 1948, — Three Kings Island
b posterior face of dens with 2 + 2 setae: *parvulus* Stach, 1922, — C. Europe
c posterior face of dens with 3 + 3 setae 5
5a anterior and posterior ocellus equally large: *parvus* Folsom, 1934, — Europe, U.S.A.
b anterior ocellus distinctly larger than posterior one: *exiguus* Folsom, 1932, — Hawaii
6a anterior face of manubrium with 2 + 2 setae: *beckeri* Stebaeva, 1966, — U.S.S.R.
b anterior face of manubrium without setae 7
7a anterior face of dens with 1 + 1 seta 8
b anterior face of dens without setae 12
8a retinaculum with 4 + 4 teeth 9
b retinaculum with 3 + 3 teeth (*variabilis* s. lat.) 10
9a European form: *angularis* (Axelson, 1905)
b American form: *decemoculatus* Mills, 1935
10a posterior face of dens with 2 + 2 setae: *variabilis variabilis* (Gisin, 1949), — C. Europe
b posterior face of dens with 3 + 3 — 5 + 5 setae 11
11a chaetotaxy of abd_1 dorsally consisting of an indefinite number of rows, at least 4 or more: *variabilis portucalensis* Gama, 1961, — Portugal
b dorsal chaetotaxy of abd_1 consists of 3 neat rows: *variabilis psammophila* Loksa & Bogojević, 1970, — Jugoslavia
12a mucro distinctly separated from dens: *decemoculata* (Stscherbakow, 1899), — U.S.S.R.
b mucro not separated from dens, or virtually absent 13
13a retinaculum with 2 + 2 teeth: *nanus* nov. spec., — S. Europe
b retinaculum with 3 + 3 teeth 14
14a posterior face of dens with 3 + 3 setae: *marchicus* (Frenzel, 1941), — Central and South Europe
b posterior face of dens with 2 + 2 setae: *petiti* Delamare, 1951, — S. Europe
15a anterior face of dens without setae: *nepalicus* Yosii, 1971, — Himalaya
b anterior face of dens with at least one seta 16
16a posterior face of dens with 1 + 1 seta: *deserticola* Wood, 1970, — Australia
b posterior face of dens with 2 + 2 setae (?): *sexophthalmus* (Womersley, 1934), Wood, 1970, — Australia
17a anterior face of dens without setae: *asiaticus* Martynova, 1970, — Kirghizia
b anterior face of dens with 1 + 1 setae 18
18a clavate tenent hairs present: *pusillus* (Schäffer, 1900), — Europe
b clavate tenent hairs absent: *navacerradensis* Selga, 1962, Petersen, 1965, — Spain, Denmark

Notes:

The following species have not been included:

Folsomidiella inaequalis Bagnall, 1949, included in *Folsomides* by Gisin, 1960, is synonymized with *Proisotoma minima* (Absolon, 1901), by Lawrence, 1970, after study of original material. *Proisotoma canituda* Salmon, 1951, transferred to *Subisotoma* by Prabhoo, 1971, belongs in *Proisotoma* (*Clavisotoma*); the same is true for *Proisotoma* (*Subisotoma*) *veletensis* Steiner, 1959. *Folsomides exiguus eburneus* Cassagnau & Delamare, 1955, from Côte d'Ivoire, is known very incompletely. I do not know the description of *Folsomides pratensis* Palissa & Živadinović, cited by Živadinović, 1972.

If *Isotoma decemoculata* Stscherbakow, 1899, is a good species and belongs indeed in the genus *Folsomides,* this name would take precedence over *F. decemoculatus* Mills, 1935. No new name is available to replace Mills' name, but this does not matter as the name generally is considered as a junior synonym.

The following species have been sunk in synonymy: *stachi* Folsom, 1934, is synonymized with *americanus* Denis, 1931, by Gisin, 1944. *F. parvus* Folsom, 1934, has been synonymized with *parvulus* Stach, 1922, by Gisin, 1944. *F. decemoculatus* Mills, 1935, has been synonymized with *angularis* (Axelson, 1905), by Gisin, 1942. *F. petiti* Delamare, 1951, has been synonymized with *marchicus* (Frenzel, 1941), by Ellis, 1974. Finally the original description of *F. sexophthalmus* (Womersley, 1934), is so short, and the types in so bad a condition, that presently it is not evident why *deserticola* Wood, 1970, should be maintained.

Moreover, Cassagnau & Delamare, 1955, lumped practically all species with 1 + 1 and 2 + 2 ocelli, basing themselves on material from a wide variety of localities. But because their study is more wide sweeping than detailed on the population level, I do not venture to accept their conclusions a priori.

Note on *Folsomides americanus:* I must correct an inaccuracy in my drawing of the furca of this species (Ellis, 1967, fig. 3b). In that drawing only the median 1 + 1 basal setae on the posterior face of manubrium are shown as well as 1 + 1 latero-basal setae. But in reality there are, apart from the 1 + 1 median, 2 + 2 latero-basal setae. *F. americanus* thus has 7 + 7 setae on the manubrial posterior face.

Note on *Folsomides anophthalamis* Hepburn & Woodring, 1964: Through the kind assistance of Dr. R. W. Baumann and Dr. P. D. Hurd jr. I could study 3 paratypes of this species, which are stored in the collection of the Smithsonian Institution.

One of the three specimens, however, was evidently erroneously labelled as the slide contained a juvenile Hypogastrurid, with a well-developed ocular patch. The remaining two specimens were in a moderate condition. One specimen was a ♀; the sex of the other specimen could not be ascertained. Some additions and corrections to the original description can be made:

In both specimens I could ascertain that, contrary to the statement of the authors, there is one eye present. It is not pigmented, and visible only at strong magnification by the semiglobular lens, which is not covered by the normal integumental granulation. The eye is situated close to upper corner of the postantennal organ (fig. 2i). The retinaculum is tridentate. Ventral tube with 3 + 3 lateral setae, and 1 + 1 posterior setae. Manubrium with the 4 + 4 posterior setae that are evident from the original drawings, but moreover there are basally 1 + 1 median, and 2 + 2 latero-posterior setae, just as in *F. americanus*. Mucro somewhat stronger than is suggested by the original drawing. Claw normal, toothless.

Evidently, *F. anophthalamis* is identical with *F. americanus* but for the lack of pigment in the ocelli. From the experience with *F. parvulus* which is just discussed this character evidently is of not much importance. I consider therefore *F. anophthalamis* as a junior synonym of *F. americanus* Denis, 1931.

Folsomia ksenemani Stach, 1947 (fig. 2 j, k)

Material: 2 ♀, 4 ♂ and 9 juv. from sample 2.

Description. The pigment is well developed, especially around the eye (fig. 2k), and to a lesser extent in a transverse belt on the head through the level of the eyes, and on abd_4. The adult females measure 1.4 mm, the males range from 1.0—1.1 mm. The number of setae at the anterior face of manubrium ranges from 9—13. These are arranged in a distal row of 2 + 3 or 3 + 3 strong hairs, followed by a subapical row of 1 + 1, a little less heavy hairs, and about halfway by an irregular, median group of 3—5 rather weak setae (fig. 2j). In juvenile specimens the number of setae may be reduced to only 4 (a distal 1 + 1, and the subapical 1 + 1).

Other details are in agreement with the description by Stach.

Isotomiella minor (Schäffer, 1896)

Material: 1 juvenile specimen from sample 11.

The specimen measures only 0.4 mm. The manubrium has at its anterior face the 5 + 5 distal setae that characterize the species.

Cryptopygus ponticus (Stach, 1947)

Isotomina pontica Stach, 1947

Material: 1 juv. from sample 1; 8 ♀, 6 ♂ and 11 juv. from sample 12; 2 ♂ and 5 juv. from sample 17; 2 ♀ and 3 ♂ from sample 18; 2 juv. from sample 19; 11 ♀, 12 ♂ and 6 juv. from sample 22.

Description. Mean length of the 21 ♀♀ is 0.97 mm, s.d. 0.22 mm; mean length of the 23 ♂♂ 0.77 mm, s.d. 0.10 mm. The 5 + 5 eyes are almost invariably well pigmented. The anterior face of the manubrium bears distally the 1 + 1 typical setae, but sometimes (in 7 out of the 69 specimens studied) the configuration was 1 + 2. The ventral tube bears latero-distally 3—4, sometimes even 5 hairs at each side, and postero-basally, in approx. median position 3, seldom 4, setae.

The posterior face of the dens bears internally invariably 2 fine setae,

exteriorly 2, more rarely 3 fine setae, and basally 2 stronger hairs, to which sometimes a fine third one is added.

The species is not rare in Southern Europe. It is recorded from Lebanon by Cassagnau & Delamare, 1955.

Isotomodes sexsetosus da Gama, 1963, ssp. **provincialis** Poinsot, 1966

Material: 1 ♂ from sample 7; 1 ♀ and 1 juv. from sample 14.

The specimens agree well with the descriptions by da Gama and by Poinsot. The long terminal setae at abd_6 are smooth. The two adult specimens measure 0.8 mm.

The typical subspecies has been described from Austria, and is recorded since from Poland by Szeptycki, 1967. The subspecies *provincialis* is known originally from Southern France, and is recorded afterwards from Italy by Dallai, 1971.

Isotoma viridis Bourlet, 1839

Material: 1 adult specimen of unknown sex from sample 5; 1 ♀ from sample 6; 1 ♂ from sample 17.

The three specimens belong to the variety *riparia* Nicolet, 1842.

Isotoma (?) spec. (fig. 3 a-e)

Material: 1 juv. from sample 19.

The single specimen measures 0.9 mm. The structure of claws, mucro and post-antennal organ (fig. 3a, c-e) have an uncanny resemblance to those of *Isotomurus palustris* juveniles, but in the single specimen I am not able to detect the lasiotrichia characteristic of that genus. The pigmentation is very peculiar: apart from some ill-defined pigment around the frontal ocellus, a black occipital ocellus and black eye-patches, a continuous blue-black patch colours thorax, abd_1 and anterior third of abd_2; the coxae also are pigmented. The remainder of the body is yellow white (fig. 3b).

The absence of lasiotrichia might be in connection with ecomorphosis of the *Isotomurus*-type, described by Cassagnau, 1971. In this perspective it might be relevant to note that the tissue of the intestine seems to be regressed, which anyway is not contradictory to such a hypothesis. Since I have unfortunately but one young specimen, I can do no more than illustrate the specimen.

Isotomurus balteatus (Reuter, 1876)

Material: 4 immature specimens from sample 17.

The specimens show in their lasiotrichia arrangement (1 + 1 on abd_3 and abd_4) the differential character introduced by Poinsot, 1972. The species is recorded by that author from Greece, Palestine and Malta.

Isotomurus palustris (Müller, 1776)

Material: 1 adult of unknown sex, 3 ♀, and 4 ♂ from sample 6; 2 juv. from sample 7; 5 juv. from sample 14; 11 juv. from sample 18; 1 juv. from sample 22.

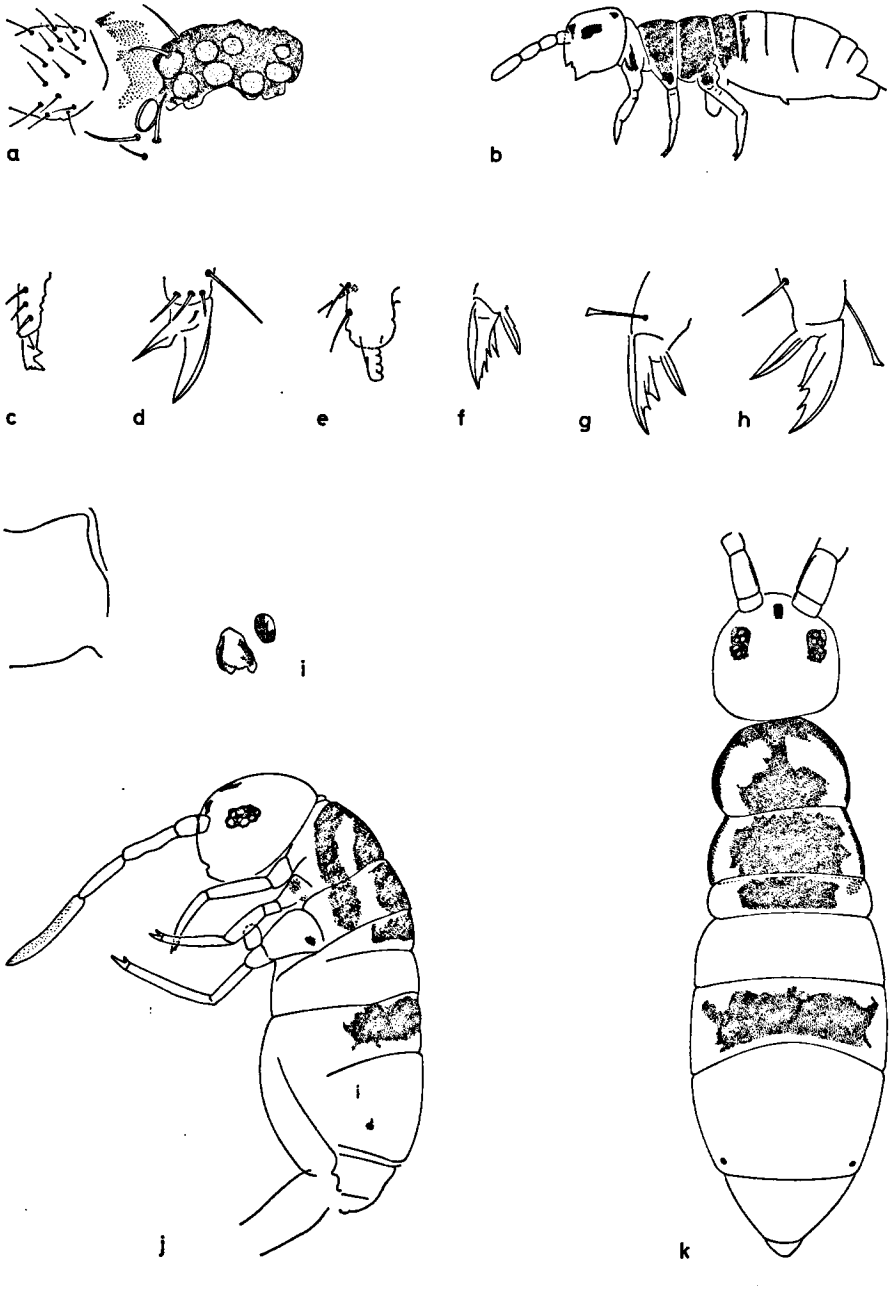

FIG. 3. *Isotoma* (?) spec. a, ocelli and postantennal organ; b, habitus; c, mucro; d, unguis P_3; e, retinaculum.
Pseudosinella ciliata n. sp. f, unguis P_1; g, unguis P_2; h, unguis P_3; i, ocelli.
Orchesella sporadica n. sp. j, habitus in lateral view; k, habitus in dorsal aspect

The material belongs to the typical form or to the form *prasinus* Reuter, 1891.

Oncopodura crassicornis Shoebotham, 1911

Oncopodura ambigua Christiansen, 1958, — nov. syn.

Material: 11 specimens (at least 1 adult ♀, and 1 adult ♂) from sample 2; 2 specimens (at least 1 adult ♀) from sample 7.

The three adult specimens (the male shows active testicular tissue) measure 0.5 mm. The specimens are otherwise in complete agreement with published descriptions, and with other material that I possess of *O. crassicornis.* The material is distinctly different from *O. meridionalis* Cassagnau, 1959, in having 6 elements in the postantennal organ (*meridionalis* has only 4 elements).

Through the courtesy of Dr. K. A. Christiansen I have studied two paratypes of his *O. ambigua.* Some emendations to his description have to be made: the clavate hair on tibiotarsus of P_2 is present indeed; the unguiculus lacks the terminal filament that inadvertently has crept in the drawing of *ambigua;* the triangular ungual lamella is in fact one of the pretarsal hairs, both of which are rather long, and basally rather thick; the elements of the postantennal organ are distinctly broader than suggested by the drawing by Christiansen. It is evident, that herewith the basis for *ambigua* has disappeared.

Cyphoderus gisini Gruia, 1967

Material: 1 ♀, 1 ♂ from sample 18.

Discussion. The male measures only 0.9 mm, the female 1.3 mm. Taking due notice of this proportionally small size and the early collecting date, I venture to identify my material as *C. gisini.* There are some differences from Gruia's description, but all of these can be explained away as being juvenile phenomena. First of all there is the small size, but what is more, I can find only a feeble indication of a tunica, and the mucro is no more than a straight rod, only curved distally to form the single distal "tooth". (It is striking and uncomfortable that these juvenile characters persist in specimens that have their external genitalia and vas deferens perfectly differentiated!). However, otherwise the structure of the claw and the dens are in complete agreement with *C. gisini,* known until now only from Roumania. *C. gisini* is differentiated from its nearest relative, *C. gallicus* (Delamare, 1948), by having one instead of two unpaired teeth to the claw.

Heteromurus major (Moniez, 1889)

Material: 1 juv. from sample 1; 4 juv. from sample 2; 1 ♀ from sample 5; 2 ♂, 1 young ♂ and 2 juv. from sample 7; 1 ♀ from sample 8; 1 juv. from sample 10; 1 ♂ and 2 juv. from sample 12; 1 ♂ and 3 juv. from sample 14; 1 ♀ from sample 17; 2 ♀ from sample 18; 11 juv. from sample

19; 1 juv. from sample 20.

This species is evidently one of the most common species in the fauna of Rhodos. The material is in very good agreement with the elaborate description by Hüther, 1970, after material from the Canary Islands. The only notable difference is that the number of ciliated setae at the base of the labium is rather variable. Hüther describes a group of 6 ciliated hairs in median position, then an oblique row of 3 smooth setae, and more laterally, quite basally, another ciliated seta. The lateral ciliated seta is invariably present, as is the oblique row of 3 smooth setae. But the median group of 6 + 6 consisted in my material of no more than 3 + 3 or 4 + 4 setae.

Heteromurus major is reported from all countries around the Mediterranean.

Heteromurus major var. **sexoculatus** Brown, 1926, nov. comb.

Heteromurus sexoculatus Brown, 1926

Material: 1 immature specimen from sample 12.

Discussion. The single specimen measures 1.8 mm. The specimen is indistinguishable from other immatures of *major* in the collection, except by one character: the eye-patch is much reduced. Only ocelli A, B and D are well pigmented, and large as usual, but the others are absent, and the pigment of the eye-patch in their location is reduced to two irregular strands.

The material differs in one, or perhaps two respects from the description of *Heteromurus sexoculatus* by Brown, 1926, and Handschin, 1942, where the tenent hair is said to be acute, and the antenna is scaled up to the third segment. The tenent hair in my specimen is distally flattened onto the normal triangular structure, but this is very thin and transparant, and at feeble magnifications difficult to recognize. Regarding the antennal segments, both Brown and Handschin use the statement "antennae 5-jointed"; evidently, they interpreted the basal subdivision of ant_1 as a true segment, and thus logically stated that ant_3 was scaled, where I consider this as the second antennal segment.

The taxon was described from Mesopotamia, and recorded afterwards from Israel (Handschin, 1942), and from caves in Roumania (Gruia, 1964).

Pseudosinella octopunctata Börner, 1901, s. Gisin, 1967

Material: 1 ♀ from sample 8; 3 ♀ and 1 juv. from sample 9; 1 ♀ and 1 juv. from sample 10; 1 ♀, 1 ♂ and 1 juv. from sample 12; 2 adult specimens (at least 1 ♂) from sample 17; 3 adult specimens (at least 2 ♀) from sample 18; 2 adult specimens of unknown sex, 5 ♀, 3 ♂, and 9 juv. from sample 19; 1 adult of unknown sex and 1 juv. from sample 20.

The specimens are identified as *P. octopunctata* in Gisin's sense, because of having the labial chaetotaxy MrELL, and all basal labial setae ciliated. Accessory seta is present on abd_4. Chaetotaxy on abd_2 pABQ. Chaetotaxy as figured by Hüther, 1970, for *P. octopunctata* from the Canary Islands. The specimens are comparatively heavily pigmented, and agree in this

respect more with *picta* Börner, 1903, s. Gisin, 1967. Head and coxal region are distinctly pigmented — especially in adult specimens — and there are broad transversal rings on all body segments. The species is recorded from almost all continents, but most of these data have to be revised. Gisin, 1967, reports having seen good *octoculata* from Finland and Switzerland, whereas *picta* is described by him from Portugal.

Pseudosinella ciliata nov. spec. (fig. 3 f-i)

Material: holotype and one paratype, both of unknown sex, most probably adults from sample 12.

Description. Length: 1.0 and 0.9 mm resp. Pigment only in the eyes, one specimen with 1 + 1 eyes, the other with 1 + 2; of the two eyes the anterior one is distinctly smaller than the posterior one, and separated from that eye by about its own diameter. The two corneae are separately but distinctly pigmented (fig. 3i). Ant. 1 : 2 : 3 : 4 = 36 : 61 : 50 : 100. Ant/head diagonal about 1.4. Antennae without scales. All segments with strong ciliate outstanding setae, and smooth, lightly appressed blunt sense hairs. Antennal organ III consists of two ovoid sensillae and some accompanying sense hairs of the type just described.

Dorsal macrochaetae as given by the formula (nomenclature of Gisin, 1967, adapted slightly by Gisin & da Gama, 1969): R101/00/0401 + 2. Chaetotaxy of abd_2: $pABQ_1q_2$; to judge after the sockets, B and Q_1 are about equally strong, and stronger than A. Chaetotaxy of labium: MrELL; r is extremely small, only faintly visible. All other basal labial setae ciliate. The distal row of 5 setae of labium, and the 5 setae at the base of median two labial papillae are ciliate as well.

Anterior lasiotrichium of abd_4 with accompanying seta s. Unguis not unlike that of *P. alba,* with lateral teeth, two strong paired teeth, a strong spiniform basal unpaired tooth and in one of the two specimens a small distal unpaired tooth (fig. 3f-h). Empodium not specialized, with a very feeble tooth on its outer lamella. Tenent hair clavate.

Submucro passing gradually into the dens, about 5 times as long as mucro. Mucro normal, basal tooth about as large as distal one.

Discussion. The new species belongs in the species group having the labial seta r much reduced and possessing microseta p on abd_2. Within this group, *ciliata* is characterized by having on abd_2 the chaetotaxy: $pABQ_1q_2$. As far as I know, the only species with which *ciliata* shares this character combination is *P. gamae* Gisin, 1967, an edaphic species from Portugal. *P. ciliata* differs from *gamae* by having a normal unguiculus, not with a large, *petterseni*-like outer tooth.

Pseudosinella ciliata owes its name to what presumably is a more interesting character. Not only the basal setae of the labium (with the exception of r), but also the distal row of 5 setae on the labium, and even the 5 + 5 setae that are inserted on the base of the median two labial papillae are distinctly ciliated. It is unfortunate that it is not possible to compare this

observation with published descriptions. One of my two specimens has 1 + 1 ocelli, the other 1 + 2. The eye-spot with 2 ocelli, is as in *impari-punctata* Gisin, 1953, from Switzerland, or *insularum* Dallai, 1969, from Montecristo. Unfortunately, *imparipunctata* is not very fully described, but according to Gisin, 1967: 24, the species lacks a seta s on abd_4, and moreover has on th_2-$_3$ respectively 1 and 0 macrochaetae, whereas *ciliata* possesses a seta s, and lacks a macrochaeta on th_2.

All European species having 1 + 1 eyes (*monoculata* Denis, 1938, *ksenemani* Gisin, 1944, *alpina* Gisin, 1950, *substygia* Gisin & da Gama, 1969, *astronomica* Gisin & da Gama, 1970, and *cassagnaui* Gisin & da Gama, 1970), lack microseta p (and all, except *substygia* have a labial seta R. ciliate) (Gisin & da Gama, 1970). Unfortunately, the type specimens of *monoculata* are lost (Gisin & da Gama, 1970), but this species cannot be identical with *ciliata,* because its author states that the ungues are very alike those of *vandeli* Denis, 1923, which are in their turn very different from those of *ciliata.*

Lepidocyrtus lignorum (Fabricius, 1775)

Material: 1 ♀, 1 ♂ and 8 juv. from sample 7; 1 adult specimen of unknown sex from sample 8; 3 ♀ from sample 9; 2 juv. from sample 10; 2 adult specimens of unknown sex and 2 juv. from sample 14; 1 adult of unknown sex and 3 juv. from sample 17; 1 ♀, 3 ♂ and 3 juv. from sample 19; 1 ♀ and 5 juv. from sample 20.

Adult specimens are in complete agreement with the description of this species by Gisin, 1964b. Immature specimens show some points of difference. Subadult specimens differ from adults in having but one seta M to the labium, and in having a slightly greater number of macrochaetae. The head has two pairs of frontal setae in such specimens, and th_2 has a pair of macrochaetae. The chaetotaxy formula of these specimens thus is: R111/10/0101 + 3, instead of the normal, "adult" formula R001/00/0101 + 3. I have however identified the specimens as *L. lignorum,* because specimens with the aberrant chaetotaxy invariably were immatures, and because they usually occurred together with normal adults.

Very immature specimens of *Lepidocyrtus* cannot possibly be identified, because their hair cover has not yet differentiated. (We possess a considerable quantity of such very immature material from Rhodos, but no further consideration is given to it).

Lepidocyrtus cyaneus Tullberg, 1871

Material: 1 ♂, 1 adult of unknown sex, and 8 immatures from sample 18.

The material agrees well with the descriptions by Gisin, 1964, a, b, with the restriction that in one adult specimen the labium has two setae M_1M_2 (M_1 being shorter than M_2), and that I could not find the latero-distal macrochaeta on th_2 that is drawn by Gisin, except in one juvenile specimen.

FIG. 4. *Orchesella sporadica* n. sp. a, labral papillae; b, interocular chaetotaxy; c, unguis P_3; d, right eye-patch.
Orchesella cf. *taurica* Stach. e, unguis P_3; f, labral papillae.
Entomobrya dumitrescuae Gruia. g, unguis P_2; h, asymmetric labral papillae; i, dorsal pigmentation; j, male genital papilla.

But in other material in my collection, from the Netherlands, this same macrochaeta seems to be lacking in most cases as well. Maybe this is the same situation as I referred to in *L. lignorum* subadults from Rhodos, and the macrochaeta on th_2 is only present in not completely mature material.

Seira ferrarii Parona, 1888 (fig. 5 a, b)

Sira banyulensis Denis, 1924
Lepidocyrtinus italicus Cassagnau & Delamare, 1953
Seira arenaria da Gama, 1966
Seira pillichi graeca Ellis, 1966, — nov. syn.
Seira petrae Jacquemart, 1973, — nov. syn.

Material: 2 ♀, 2 ♂, 6 adults of unknown sex and 2 juvenile specimens from sample 6.

Seira ferrarii is known with any accuracy only since 1970, when Dallai and Ferrari published a redescription of the species after extensive topotypical material. The chaetotaxy and structural details of *ferrarii* agreed completely with those of *S. arenaria* da Gama; the pigmentation of *ferrarii* was so variable, that it was not difficult to accomodate *arenaria* within that species. On the other hand, my *pillichi graeca,* described practically simultaneously with *arenaria,* agrees completely with that species except in the very different pigmentation. A study of the holotype and two paratypes, kindly lent to me by Dr. da Gama, confirmed the structural identity in all details. In the original material of *pillichi graeca* I had only adult specimens, which were very dark. Antennae, femora, and the whole of body and head were dark blue black. In the material that I have now under observation, I could observe that the juveniles from Greece have the antennae, head, th_2 and distal part of th_3 only very weakly pigmented, and thus fall wholly in the range of variability of *ferrarii.* In conclusion, the range of pigmentation intensities has to be enlarged a good deal to the dark side. In how far eastern mediterranean material on the whole might be darker than that of central mediterranean origin I cannot guess presently. The range of *S. ferrarii* is already considerable (Southern France, Italy, border of the Black Sea, central Greece and Rhodos, Jordania).

Quite recently, Jacquemart, 1973, described from the hypolithic fauna of Jordania *Seira petrae.* The species is especially compared with *S. arenaria* da Gama. Although the description of *petrae* is not very explicit, differences with *arenaria* are reported regarding the cephalic chaetotaxy, chaetotaxy of abd_5 and in the pigmentation. However, provided that *S. arenaria* and my Greek material are conspecific indeed (and I do not have any argument to the contrary), many of the differences between *petrae* and *arenaria* are either nonexistent, or can be easily explained.

The macrochaeta that would be lacking latero-caudally in the eye-patch of *arenaria* is present indeed. The antero-lateral cephalic macrochaeta that would be missing in *arenaria* is also present. The interocular row of macro-

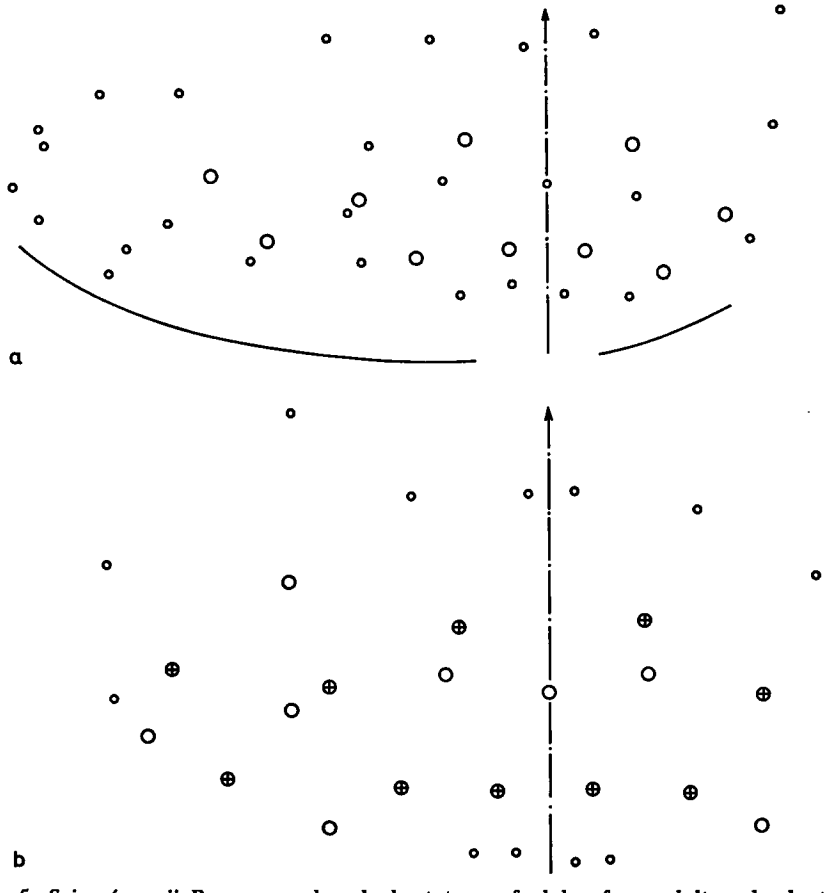

FIG. 5. *Seira ferrarii* Parona. a, dorsal chaetotaxy of abd_5 of an adult male; b, the same of a female that has just reached sexual maturity. (sockets that are considered homologous to those of macrochaetae in fig. 5 a have been marked with a cross).

chaetae would contain one seta less in *petrae*, viz. one of the two that penetrate in the eye-patch. This character is difficult to use, since it is hard to find a hair socket in the heavily pigmented ocular pigment, unless one has depigmented specimens. However, I cannot refute definitively its value, since I did not receive type material upon my request.

The reported difference in chaetotaxy of abd_5 raises a point of general interest. I have studied my Greek specimens in this respect which is not easy. First, a number of specimens were dissected to study the furca — in which case abd_5 is naturally destroyed. Moreover in most full-grown not depigmented material the pigmentation makes exact chaetotaxy study difficult. In all I could use four specimens, viz. a full-grown, darkly pigmented male (length of F_3: 631 μ) of which I could study the discal area of abd_5, a full-grown male (F_3: 575 μ) and a similar female (F_3: 662 μ), of which the

pigment was destroyed by treatment with HCl-$KClO_3$, and finally a female with genital orifice opened, but pigment not strongly developed (F_3: 376 μ). Evidently this last specimen must be regarded as a subadult. In all three adults I find a very similar pattern of chaetotaxy. This is figured in fig. 5a. Evidently, there is a rather close agreement with the somewhat diagrammatical figure given by Jacquemart of *petrae*. Note in particular, that no median macrochaeta is present, as is drawn by Jacquemart for *arenaria*. For comparison, I also inserted in the drawing the microchaetae; one of these is present in median position.

In the subadult specimen a chaetotaxy pattern is revealed, that, although at first glace totally different, is in fact a not-differentiated replica of the pattern in the adult specimens (fig. 5b). (To facilitate the comparison, I have marked the sockets that are homologous to future macrochaetae). This subadult pattern is rather near that drawn by Jacquemart for *arenaria*. In particular a distinct median seta is present — of course the same median microchaeta that is shown in my drawing of the adult pattern, but much more conspicuous.

This is a rather strong argument in favour of the opinion of Szeptycki, that in order to interprete correctly the chaetotaxy, one is obliged to include the microchaetae.

The pigmentation of *petrae* is much reduced, and only in the eye-patch black pigment is present. In view, however, of the enormous variability demonstrated by *ferrarii*, this is hardly of any importance.

The few remaining differences between *petrae* and *arenaria* (in the chaetotaxy of the rear margin of the head), are, if real, on their own not strong enough to warrant at present a specific status for *petrae*.

Orchesella sporadica nov. spec. (fig. 3 j, k, 4 a-d)

Material: holotype ♀, presumably adult, and 9 paratypes presumably partly adult, all from sample 8. All specimens mounted individually on slides in Marc André II.

Description. Total length of largest specimen 2.0 mm. Antennae 0.5 times total length, 2—3 times head diagonal. Ant. 1 : 2 : 3 : 4 = 4 — 5 : 5 — 7 : 5 — 7 : 10. $Abd_4 : abd_3$ = 18 — 23 : 10.

Integument normal, with the usual abundant hair cover of short, ciliate setae and many large flexed setae. Antennae typical for the genus, first two segments with a basal subsegment; ant_4 not annulated. No apical papilla. Ocelli 8 + 8. Labrum at distal margin with 2 + 2 conical protuberances, the median ones rather spherical, the lateral ones more flattened; all four bear a small hair-like appendage (fig. 4a). Labium with distal row of normal 5 + 5 smooth setae, and basal row which in analogy with *Lepidocyrtus* can be described as M_1M_2RELL; in another specimen the arrangement was $M_1M_2R_1R_2ELL$. Seta R is slightly shorter than the others, which are subequal among each other. Feet long. Unguis with spinelike outer tooth and with strong lateral teeth. Interior lamella with proportionally small

basal teeth; both unpaired teeth distinct. Unguiculus with small tooth to outer lamella, at about 2/3 from base. Tenent hair normal (fig. 4c). No smooth setae on the tibiotarsi. Retinaculum quadridentate as usual. Furca normal, submucro passing gradually into annulated part of dens, about 6 times the mucro. Pigmentation (fig. 3j, k): ground colour yellowish white, with blue pigment. Antennae feebly pigmented, the two distal joints most intensively, the two basal ones mainly along their inner surface; base and apex of the antennal segments somewhat darker than remainder of antennae. Head white, except the black eye-patches, the black frontal ocellus and an ill-defined spot of feeble pigment between antenna-base and eye-patch, present in most specimens. Thorax with a well-delimited intensively pigmented lateral line that closes at the front of th_2. Th_2 with a thin median line, that quickly broadens caudad to form a discal triangle. Th_3 with a rectangular discal patch, contiguous with the patch on th_2. As a result, a broad, well delimited unpigmented line extends latero-dorsally on th_2 and th_3. Abd_1 without a lateral patch, but with a rectangular transversal patch covering almost completely the discal portion of the segment. Abd_2 clear of pigment. Abd_3 again with a restangular patch, similar to that on abd_1, but extending somewhat further laterally. Abd_4-$_6$ unpigmented, except mostly a tiny circular spot at the caudal angles of abd_4, and (in the darkest specimen) some ill-defined pigment clouding at the distal margin of abd_4. Ventral side, furca, and feet unpigmented except a pair of spots on the coxae of P_2 and P_3.

Discussion. The pigmentation of this new species is so characteristic, that it can only be compared with *O. lucasi* Denis, 1925, from Algeria. *O. sporadica* is doubtless a near relative of *lucasi,* and shares with this species the unpigmented head, abd_2 and (almost completely) abd_4-$_6$. *O. sporadica* however differs from *lucasi* by having a broad, well-defined transversal black spot on abd_1 (in *lucasi* only some feeble traces of pigment at the anterior margin of that segment), and moreover by having a broad wide unpigmented zone on the thoracal segments between the distal and the lateral patches.

Orchesella cf. **taurica** Stach, 1960 (fig. 4 e, f)

Material: 1 ♂ from sample 17.

The single specimen is referred to *taurica* only tentatively, on the base of the presence of a thin lateral line on the thorax, and on the admittedly weak argument that the related species *O. bifasciata* Nicolet, 1841, the alternative possibility for identification, is currently regarded as a central European more or less montane species. I possess another specimen that might belong to this species, which I collected in autumn 1962 in Ag. Theódori, 15 km E of Kórinthos. *O. taurica* was described from the Northern Caucasus and the Crimea. Martynova & Sklyar, 1973, record the species from the Azov steppes (NE of the Crimea).

Entomobrya quinquelineata Börner, 1901

Material: 1 ♂ and another specimen of unknown sex (or juvenile?) from

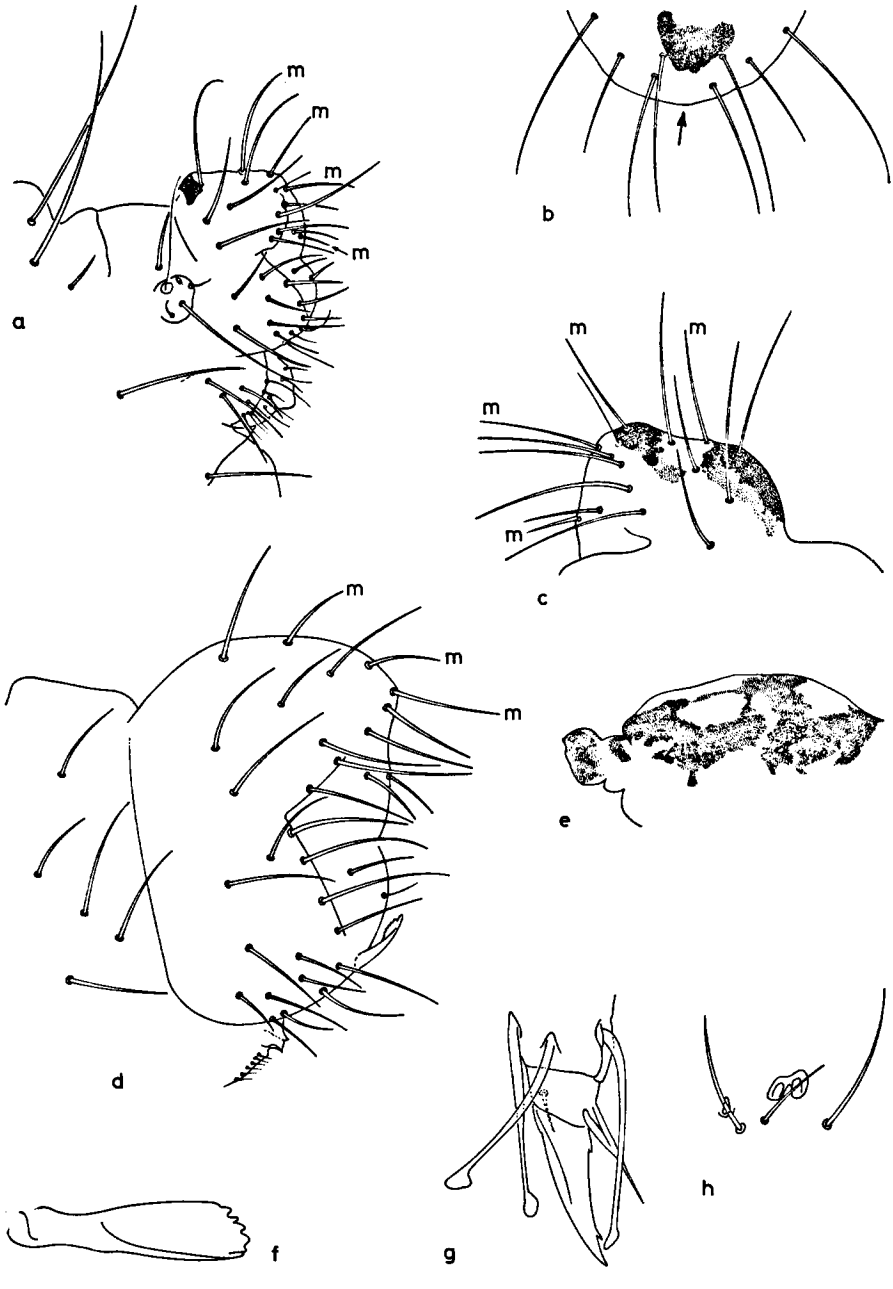

FIG. 6. *Sminthurus nigromaculatus* Tullberg. a, lateral aspect of female postabdomen; b, dorsal aspect of abd$_6$; c, lateral aspect of abd$_6$ of a specimen from the Netherlands. *Deuterosminthurus pallipes fenyesi* Stach. d, lateral aspect of female postabdomen; e, abnormal abdominal pigmentation; f, appendix analis; g, unguis P_2; h, antennal organ III.

sample 8.

This species is known from (South and Central) Europe and North Africa.

Entomobrya dumitrescuae Gruia, 1967 (fig. 4 g-j)

? *E. albanica* Stach, 1922

Material: 1 ♀ (adult?) and 2 ♂ from sample 6; 4 ♀, 3 ♂ and 9 specimens of which presumably 7 are juvenile from sample 9; 1 subadult ♂, 1 adult of unknown sex and 2 juvenile specimens from sample 15.

The general pigmentation of the specimens at first recalls that of *E. marginata* (Tullberg, 1871). Pigmentation is very feeble, most concentrated still in the coxal region, on the sternites, antennae, and in the most heavily pigmented specimens also in narrow stripes at the hind margins of the segments. In darkest individuals, the sides of the body are pigmented as well, as are some longitudinal streaks on abd_4 (fig. 4i). In general pigmentation, thus, there is good agreement with the species of Gruia, described recently from Roumania. Although my specimens differ in some less important details, maybe due only to a different style of drawing (the general habit of Gruia's *dumitrescuae* is rather stout; the claw is rather short as well (cf fig. 4g) and the male genital tubercle has the posterior setae more slender and curved (fig. 4j)), I am fairly sure that my identification is correct, especially because of the structure of the labral margin. However, although about half of my specimens in which I could observe this delicate character have the labral papillae adorned indeed with four cusps, in the other half I only found papillae with only two, mostly sharp, points. Specimens with such a labrum occurred together with typical specimens in the same samples, and were not separable on the base of general habit of pigmentation. Finally I found one specimen (a ♀) that at one side had two papillae with two points, but at the other side one papilla with three, another with four points (fig. 4h).

I think that this reduces to a certain extent the value that can be attributed to the labral papillae. This, in its turn, brings *E. dumitrescuae, albanica* Stach, 1922, *schoetti* Stach, 1922, and *violaceolineata* Stach, 1960, rather close to each other. All four species are described from East Central Europe (Roumania, Albania, Poland, Eastern Ukraine, C.S.S.R., Hungary), and their morphological differences as far as these are known are very small. *E. violaceolineata* remains characterized by having a fine middorsal line; *schoetti* as a rule seems to have broad dark stripes, essentially at the anterior border of segments. *E. albanica* however, known only from a locality in Albania and another in Hungary, having a not very characteristic pigmentation, may well be conspecific with *dumitrescuae*. I have, however, provisionally identified my material as belonging to the younger species, because this is more fully described. In particular, the male genital papilla of *albanica* is not known.

Entomobrya multifasciata (Tullberg, 1871)

Material: 1 adult specimen, of unknown sex, from sample 9.

This species is widespread throughout Europe.

Entomobrya cf. **marginata** (Tullberg, 1871)

Material: 1 juvenile specimen from sample 7.

The specimen is attributed to *marginata* because of its pigmentation, which is feeble, and very diffuse, and especially because of the characteristic labral margin, with rounded papillae having each a sort of setula.

The distribution of the species is still insufficiently known, because it doubtless has been confused with related species, recognized only in recent years.

Megalothorax incertus Börner, 1903

Material: 3 specimens from sample 2; 10 specimens from sample 7; 10 specimens from sample 11; 1 specimen from sample 12; 1 specimen from sample 22.

The material is in good agreement with published descriptions of this almost cosmopolitain species.

Sphaeridia pumilis (Krausbauer, 1898)

Material: 3 ♀ from sample 2; 2 ♀ from sample 12; 19 ♀ and 5 ♂ from sample 14; 1 ♀ and 1 juv. from sample 17; 2 ♀ and 1 juv. from sample 22.

This is a very widespread species, occurring everywhere in the Palaearctis and beyond.

Stenognathellus denisi Cassagnau, 1953

Material: 1 ♀ from sample 19.

This unmistakable species has been recorded from most countries of West and South Europe: the Netherlands, Germany, France, Spain, Italy, Switzerland, Austria.

Sminthurinus spec., near **alpinus** Gisin, 1963

Material: 1 ♂ and 1 juvenile specimen from sample 19.

The adult specimen agrees in dental chaetotaxy, and in having the wart on ant_3 undivided, with *S. alpinus*. But the anterior lobe of the corpus tenaculi bears 2 setulae, and the eye-patch bears 2 setae (as seen in contour). Possibly this material has to be regarded as an undescribed species, but without more material, especially females, it would not be wise to create a new species.

Sminthurus viridis (Linnaeus, 1758) and

Sminthurus nigromaculatus Tullberg, 1871 (provisionally) (fig. 6 a, b)

Material: sample 1: 25 ♀, 23 ♂ and 10 juv. of *viridis*; sample 5: 12 ♀, 9 ♂ and 1 juv. of *nigromaculatus*; sample 13: 28 ♀, 43 ♂ and 10 juv. of *nigromaculatus;* sample 14: 1 ♂ of *nigromaculatus*; sample 16: 3 ♀ and

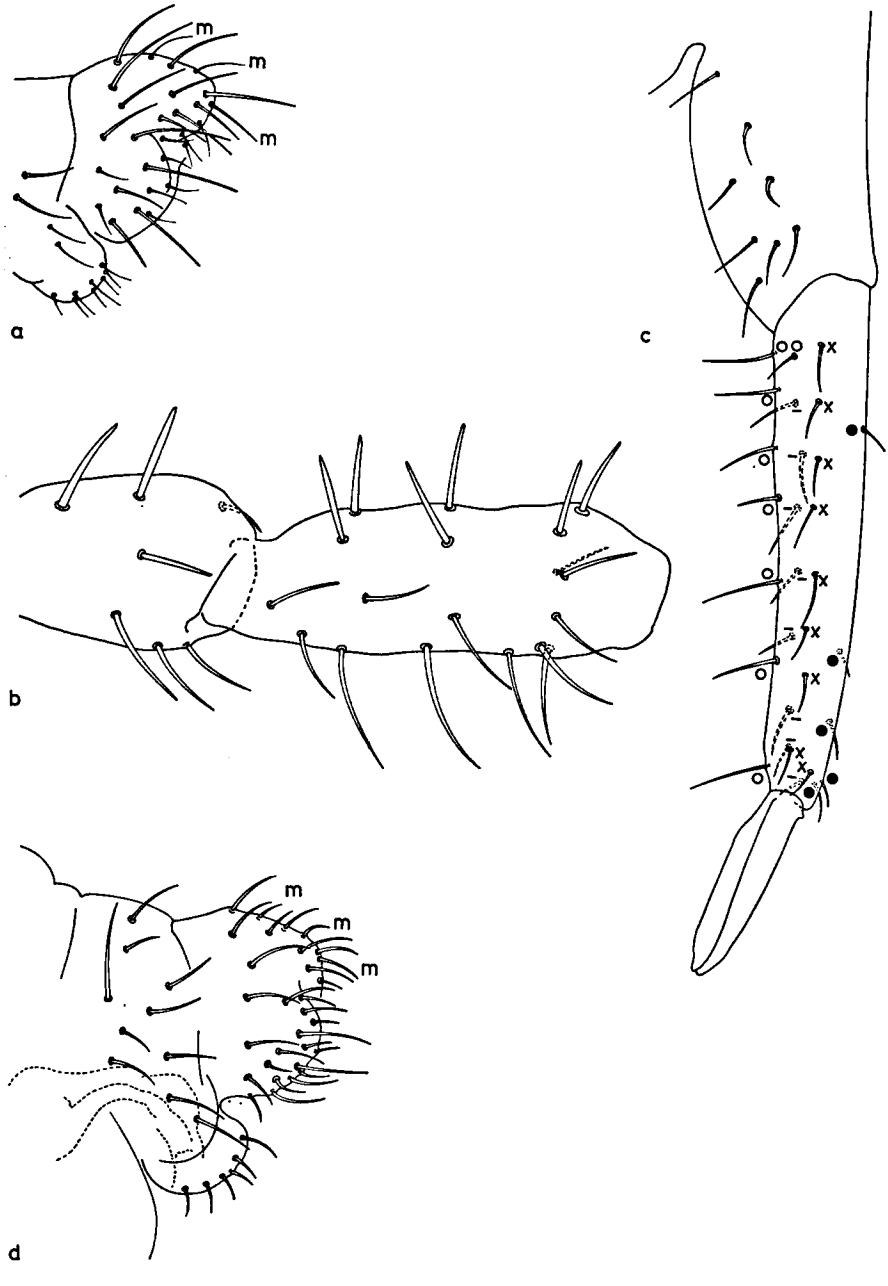

FIG. 7. *Deuterosminthurus pallipes fenyesi* Stach. a, postabdomen of male; b, ant$_{1-2}$ of a male; c, furca.
Deuterosminthurus pandayi n. sp. d, postabdomen of male.

7 ♂ of *nigromaculatus*; sample 21: 10 ♀, 5 ♂ and 8 juv. of *viridis* as well as 1 ♂ that I attribute to *nigromaculatus*.

The vicariance between *viridis* and *nigromaculatus* that I described from the Netherlands (Ellis, 1974b) is repeated here, though with some interesting variants. In the Netherlands *viridis* is restricted almost exclusively to mesophilous pastures, whereas *nigromaculatus* occurs in natural vegetations, that, anyway at times, may be very dry with the result that the vegetation wilts.

In Rhodos I encountered *viridis* in a luxuriant grassy vegetation in an open olive-pistachio grove (sample 1) and in splendid, very rich meadows above Kálathos (sample 21). Large numbers of *nigromaculatus* occurred in a very hot, open river dune landscape (bed of the river Gadourás — (samples 13 and 15)) and in a low, open, sparse and stony vegetation, that was heavily grazed (sample 5, Limín Apostólou Paúlou at Líndos).

Contrary to the situation in the Netherlands, *viridis* occurs in Rhodos in halfnatural habitats. But the fact remains, that this species prefers the proportionally most continuously damp situations that are available.

Almost all herbaceous vegetation on Rhodos wilts completely during the early summer months; this certainly includes the localities where we found *viridis*. Probably, all specimens of *viridis* (and maybe those of *nigromaculatus* as well) then die, and the species makes its comeback somewhere in the early winter half year.

This will probably be the explanation for the proportionally high percentage of adults that is present of this two species, compared e.g. with the *Folsomides* species. (Only 14% of the specimens was immature).

No structural difference could be ascertained between both species. The differential food preference between both, however was very evident. The intestine of *viridis* specimens almost invariably is filled with leaf material, in which epidermal plant cells and vascular tissue are evident, whereas the intestine of a *nigromaculatus* specimen is stuffed for about 70—100% with pollen grains, etc. The only non-ecological or ethological character suitable to distinguish both species is the presence, in *nigromaculatus* of usually blue black specks on the postabdomen. These colour patches, however, may in some individuals be rather faint, and in quite a number of specimens they were not visible. The fact that a large proportion of a given population has the postabdomen with blue patches, and moreover has the intestine filled with predominantly pollen, is, in the absence of better characters, the only way to identify *nigromaculatus*.

Yet the situation is even more complicated than this. *Sminthurus nigromaculatus* was described as a variety of *viridis*, characterized by having two patches on the post-abdomen. A number of other varieties of *viridis* have been described. All of these have either three (var. *trimaculata* Reuter, 1891), two (most varieties) or no postabdominal patches (*viridis* colour forms, e.g. *cinereoviridis* Tullberg, 1871). (In *viridis flavus* Parona, 1884, from Tunis and *elegans* Ionesco, 1915, from Roumania the number of spots is not stated). The first two categories are conveniently lumped under *nigro-*

maculatus, the third under *viridis*. In almost all material referable to *nigromaculatus* from Rhodos, however, I found only one, very well delimited and brightly pigmented spot (fig. 6a, b).

This might be an indication of a distinct specific or subspecific status of the Rhodos material. In order not to complicate by an overhasty action the already confused systematics around *viridis*, I refrain from creating a new taxon. Maybe a study of a richer material, from more localities and collected in other seasons might confirm my suspicion.

In order to make explicit the numerical value of the frequencies of the various forms in the Rhodos material that I attribute provisionally to *nigromaculatus*, I give below in tabular form, a survey of the material studied. Within the localities the material is divided by sex and maturity, and according to the number of spots on the postabdomen.

TABLE III. *Sminthurus nigromaculatus* numbers in the more important samples, according to sex and maturity, and to number of postabdominal spots.

number of spots	♀	♂	juv.
	sample 5		
0	1	—	—
1	11	8	1
2	—	1	—
	samples 13 and 16 combined		
0	11	16	4
1	19	33	6
2	1	1	—

Quite recently, Wallace, 1973, has advocated a rather different partitioning of the *Sminthurus viridis* complex. Basing himself on an extensive material from a wide variety of latitudes within Europe and beyond, this author changes the delimitation of *viridis* and *nigromaculatus* that was essentially based on the opinion of Gisin, 1957, and moreover elevates *S. viridis* var. *marmoratus* Stach, 1924, to the level of a third species.

However, no argument is brought forward why the new system would be necessary, or even superior. Moreover, the system of Wallace is certainly of a much reduced practicability: according to the author only large sets of adult specimens are identifiable, but the set of characters that are available shows a very large overlap.

As long as no detailed analysis is made of the follow-up of a number of populations, from well-defined, natural habitats (preferably in some different parts of the species range), I fear that it will not be possible to settle the confusion around this tantalizing species group. Awaiting the results of such a research, I prefer not to adopt the proposed concept.

Caprainea echinata (Stach, 1930)

Material: 1 ♀ from sample 11; 2 ♂ from sample 20.

This species, for which Dallai, 1970, recently created the genus *Caprainea*, has been recorded from most mediterranean countries.

Neosminthurus natalicius Ellis, 1974

Material: 1 ♂ from sample 19.

The single specimen is in good agreement with the description of this species that I prepared some months ago, after a single specimen from Ibiza, although the subsegmentation of ant_4 is slightly more evident this time. Just as the type specimen, this animal was rather dirty. This is in good agreement with a personal communication by Betsch that *Papirinus* Yosii, 1954, a genus that is closely related to *Neosminthurus*, is also normally covered by a film of mucus, in which dust particles, hyphae, etc. adhere.

Deuterosminthurus pallipes ssp. **fenyesi** Stach, 1926 — nov. comb.

(fig. 6 d-h, 7 a-c)

Deuterosminthurus beckeri Coineau & Delamare, 1961

Material: 19 ♀ and 6 ♂ from sample 4.

The material from Rhodos agrees in most details with *D. pallipes* (Bourlet, 1843). (I know this species fairly well, after material from the Netherlands, Veluwe. This is not too far from the type locality of *D. pallipes:* neighbourhood of Lille, in the Northwest of France). The differences are the following:

— Although the pigmentation of Rhodos and Dutch material is as a rule practically identical, in one female from Rhodos the abdomen has two large irregular badly delimited spots (fig. 6e).
— The general size of the Rhodos material is larger. As an indication I measured the cephalic diameter of 13 females from Rhodos. The mean length was 368 μ with a standard deviation of 25 μ. 13 Females from the Netherlands had a mean cephalic diameter of only 295 μ with a standard deviation of 20 μ.
— The unguis of the Rhodos material bears a strong tooth in all feet. This, of course, was the reason to relate the material to *D. fenyesi* Stach, 1926. However, this is not so exclusively a character as Stach supposed, since also in *D. pallipes* (and in its morphological counterpart *D. repandus* Ågren, 1903) a tooth is present on the unguis. I admit that this tooth is small, and even difficult to observe in some cases. In British material of *pallipes,* kindly loaned to me by Mr. Gough, I could observe the same situation.
— The last, and most intriguing difference is related to the number of median hairs on the postabdomen. As is well known, the female postabdomen of *pallipes* and *repandus* has two medio-dorsal hairs; (a third

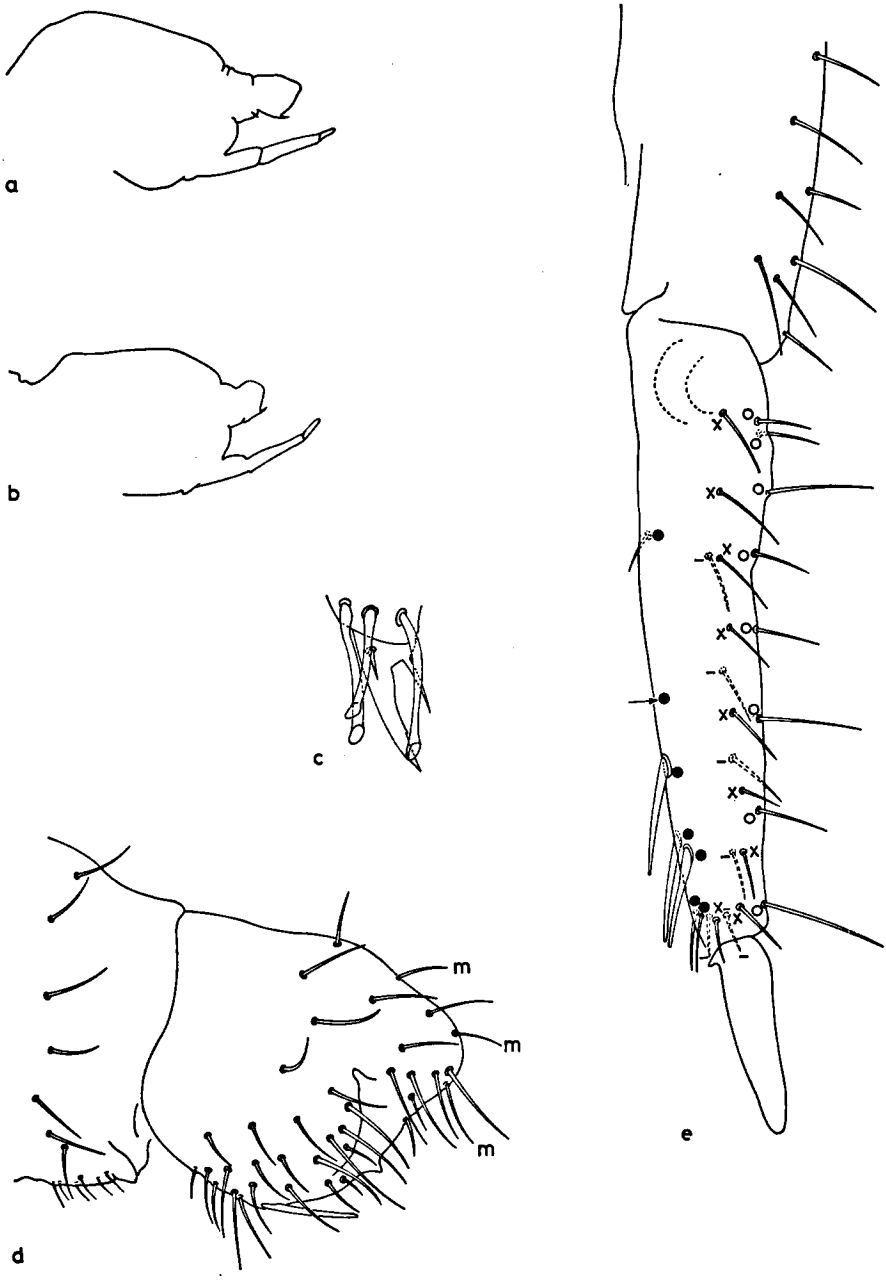

FIG. 8. *Deuterosminthurus pandayi* n. sp. a, body outline of a female specimen; c, unguis P_3; d, postabdomen of a female specimen; e, furca.
Deuterosminthurus repandus (Ågren) from the Netherlands. b, body outline of a female specimen for comparison with fig. 8a.

median seta is situated apically on the postabdomen, and is always directed slightly downward). This is the primitive condition in the genus. In the males only the apical seta is present and the dorsal ones are lacking. I have never seen any *repandus* male making an exception, but from the Netherlands I have one *pallipes* male with one dorsal median hair (the posterior one). In the six males I have from Rhodos, 2 specimens had no medio-dorsal seta at all, 2 had one dorsal seta (in both cases the anterior one), and 1 specimen had two dorsal median setae! (In one male I could make no certain observation, due to the strong pigmentation). It is at present extremely difficult to give an explanation of this phenomenon, that may be related to incompleteness of the sex-determined suppression of the median hairs in the males.

When all this became evident, it was imperative to study the types of Stach's *fenyesi,* since after its description no additional information concerning this species has been published. (After its initial description only one record is published, by Cvijović & Živadinović, 1970, who record *fenyesi,* and *pallipes* as well, from Jugoslavia).

Through the kind assistance of Dr. Szeptycki I have been able to study Stach's original material. This consisted of two slides, and three specimens in alcohol. Both slides, which bore the Museum labels "Zakl. Zool. Inst. Syst. P. A. N. Kraków", were labelled (evidently by Stach himself): "Deuterosminthurus Fenyesi Stach, 1. Biro, Hungaria, Nágrádszakal 5.v.1922". One slide moreover had a text "In fagetis cribri ope legis" (if I read well, in which case it means collected with a net in a beechwood). This slide contains head and abdomen of a specimen (to judge after the simple antennae a female) in rather bad condition. The postabdomen especially is impossible to study. This could be due in part to a vain effort to dissect the post-abdomen. The other slide is moreover labelled "II exempl. Pedes", and it contains one foot. I cannot decide whether this must be P_2 of the specimen in the first mentioned slide, or a foot of a second specimen.

The alcohol material was labelled "Deuterosminthurus Fenyesi Stach", and on the other side of the same strip of paper: "Hungaria-Nágrádszakal 5.V.1922 1. Biró det. Stach. Typus". The tube contained an adult male in comparatively good condition, a very immature specimen (presumably a juvenile female) and a third specimen that was (according to the spinulation of ant_1-$_2$) an adult male but that had the post-abdomen severed off! Maybe a slide, containing this postabdomen might have existed.

I have mounted the three alcohol specimens on slides (in Marc André II) and I have labelled the only adult male in good condition lectotype; the other specimens are labelled paralectotype.

From this description of the material alone it becomes highly probable that Stach did not have at his disposition an adult female, and it must be assumed that he has described the anal appendages of an immature female, which are, of course, hair-like.

Another proof for the same is that Dr. Szeptycki sent me also a tube containing two adult females, labelled "Hungaria, Körmöcbánya Skalka

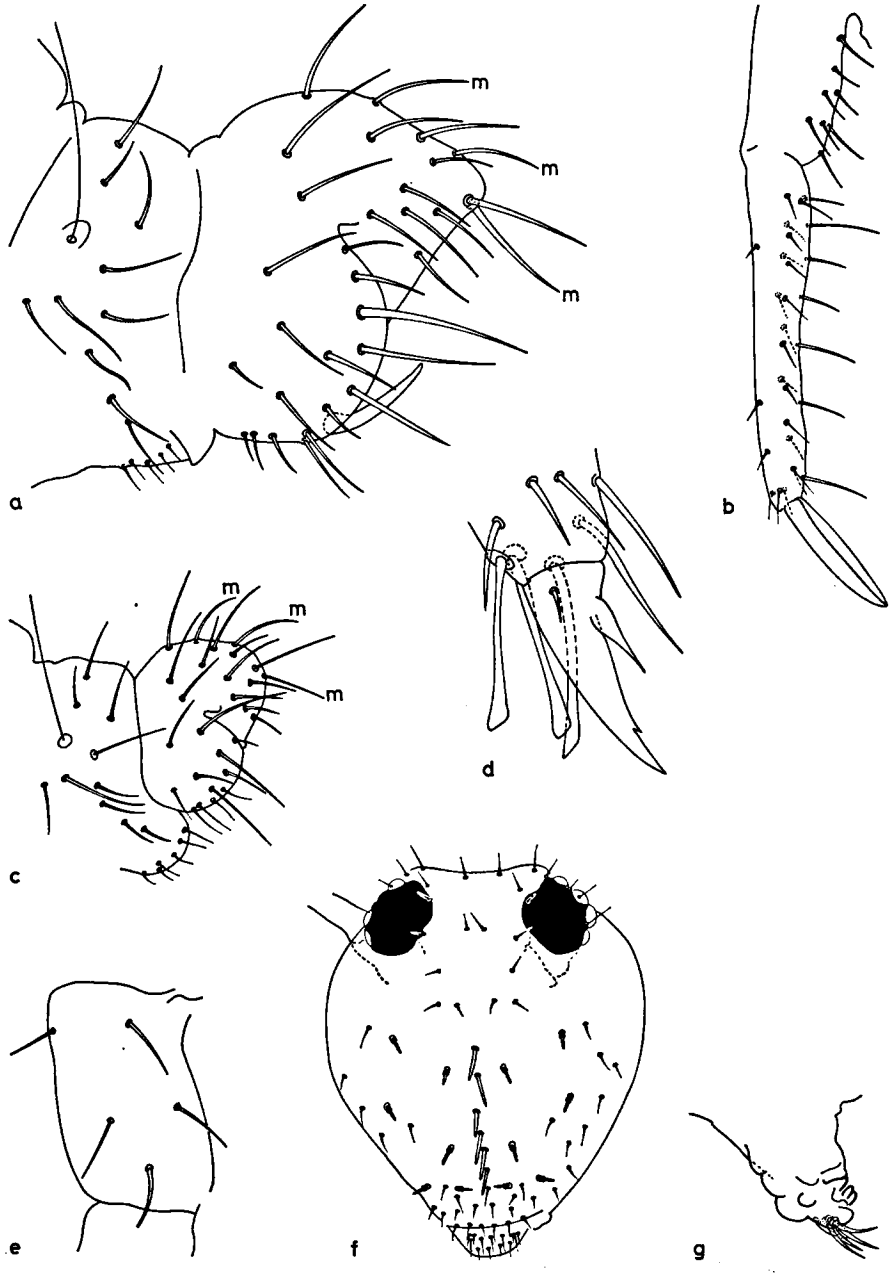

FIG. 9. *Deuterosminthurus sulphureus mediterraneus* n. ssp. a, postabdomen of female; b, furca; c, postabdomen of male; d, unguis P_1.
Dicyrtomina (*Calvatomina*) *articulata* n. sp. e, metatrochanter; f, frontal chaetotaxy; g, retinaculum.

1188, 6.VII.1933 Dudich". (Dr. Szeptycki informed me that Körmöcbánya is what is called presently Kremnica; Stach often used the spelling Kremnitz for the same locality). The tube did not contain an identification label, but came evidently from the same collection as the type material. These females had quite normal, spoon-shaped anal appendages, and deviated otherwise slightly from the original description of *fenyesi* in the pigmentation being darker and more even.

We can conclude safely that the hair-like anal appendage mentioned in the original description was based on the observation of immature material, and that the anal appendage of *fenyesi* is normal and spoon-shaped (fig. 6f). Herewith the assumption of Cassagnau, 1964, that *fenyesi* and *beckeri* are the same, is confirmed, since the only valid difference between both species was in fact the shape of these appendages.

Through the help of Dr. Cassagnau I could study some specimens of *D. beckeri* from the Hautes-Pyrénées, and from the type-locality, Mas Cournette, in the vicinity of Banyuls-sur-Mer. This enabled me to settle the last remaining difference between *fenyesi* and *beckeri: beckeri* was reported in its original description to have the female genital papilla not covered with setae. This is evidently based on an erroneous observation. The condition of the material, unfortunately, did not permit me to state the number of medio-dorsal hairs on the male postabdomen.

A comparison between the type material of *fenyesi* and the material from Rhodos proved (as far as the condition of the types permitted a conclusion) their identity. The lectotype male had a postabdomen with only one dorsal median hair (again the anterior one).

I think the best way to evaluate the similarities and the differences between *fenyesi* and *pallipes* is by making the former a subspecies of the senior taxon. *D. pallipes fenyesi* is thus provisionally characterized by a larger size, a much stronger tooth on the unguis and by having a variable number, ranging from 0—2, of dorso-median hairs in the male postabdomen.

Finally I wish to draw attention to a secondary sexual character in the antennae of the males, present in *D. repandus* and *pallipes* (incl. *fenyesi*), but not in *D. bicinctus* (Koch), *flavus* (Gisin) and *sulphureus* (Koch). The dorsal setae on the first two antennal segments are strongly incrassate and spinelike (fig. 7b). (There is no decreasing expression in this character in *fenyesi*-males with "feminine" postabdomen!).

Deuterosminthurus pallipes fenyesi f. pallida nov. forma

Material: 2 ♀ from sample 4; 1 ♀ and 1 ♂ from sample 23.

The few specimens are completely alike those of *D. pallipes fenyesi,* except that, apart from the eye-patches, they are altogether devoid of pigment. The male has no medio-dorsal setae on the postabdomen. Head diameter of the 3 females is 371 μ.

I have long hesitated on the status I had to attribute to these four speci-

mens. The only difference between *D. pallipes* and *D. repandus* except from their different ecology (Ellis, 1974b) is the fact that *repandus* is unpigmented (eye-patch excepted), and *pallipes* has head and body blue-black. Since the ecology of the four specimens at hand is barely known (in particular I do not know whether they occurred actually mixed with black *pallipes fenyesi* in sample 4), an unpigmented *pallipes* is just as good as a *repandus*!

However, considering the specimens as true *repandus* would require creation of another subspecies, since morphologically they are just as far from *repandus* as they are from *pallipes*.

I admit there is still another possible way to deal with this problem, viz. by considering *pallipes* and *repandus* as two morphs of one polymorphic species. This, sincerely, would be the simplest solution to explain the Greek situation, but it would be rash in connection with what is known from Western Europe. The problem has to be resolved by rearing experiments.

Deuterosminthurus pandayi nov. spec. (fig. 7 d, 8 a, c-e)

Material: 2 ♀ and 3 ♂ from sample 4; 3 ♀ from sample 5. Holotype is a ♂ from sample 4. The specimens from sample 4 are mounted separately; those of sample 5 are mixed with a few *Deuterosminthurus sulphureus mediterraneus* on three slides.

Description. Length of abdomen ♀ 0.9—1.0 mm, head diagonal 0.3 mm, antenna about 0.4 mm; abdomen of ♂ 0.6 mm, head diagonal 0.25 mm, antenna 0.3 mm. Integument normal. Eye-patches black, frontal ocellus distinctly pigmented, sometimes even black; hardly perceptible traces of pigment everywhere over the body, still best developed on antennae, ventral surface of head, and sternum; the general aspect of the specimens as to colour is not different from *flavus* or *sulphureus*.

Antennae, feet, head and body as in *sulphureus*, save one difference: clavate tenent hairs 3, 3, 3. Antenna with 7—9 subsegments. Unguis with a very small tooth at 2/3 from base (fig. 8c). Unguiculus needle shaped, about 2/3 unguis. Longest setae at dorsal surface of tibiotarsus$_3$ twice as long as the joint is thick. Chaetotaxy of postabdomen in both sexes complete i.e. with three median hairs, but the hairs are proportionally short (fig. 7a, 8d). The lack of differentiation among the setae on postabdomen is striking. Appendices anales long (2/3 mucro), slightly bent, dagger-shaped. Shape of postabdomen distinctly elongated, especially in the female sex (fig. 8a). Retinaculum with 3 + 3 teeth, and 3 setulae on the corpus.

Manubrium with 8 + 8 simple setae. Mucro as usual in the genus. Dental chaetotaxy is very characteristic (fig. 8e):

anterior (.): 1 (thin, short), 1 (long, stout), 2 (long, stout), 2 (apical) (in one female, asymmetrically, a fourth thick long seta is present, the location of which is indicated by an arrow in the figure).

postero-extern (×): 1,1,1,1,1,1,1,2 (apical)

postero-intern (—): 1,1,1,1,2 (apical)
posterior (o): 2,1,1,1,1,1,1

This interesting new species is gratefully dedicated to my technician, L. B. Panday.

Discussion. This species stands isolated in the genus *Deuterosminthurus* by the peculiar chaetotaxy of the anterior face of the dens. The basal seta is present, and slender as usual, but of the 1, 1 distal setae the most distal one is duplicated, and all three setae are conspicuously long and thick. The interior row of setae, moreover, has but 4 setae. By these characters *pandayi* approaches *Fasciosminthurus* but in that genus the unguiculus is very different. The shape of the postabdomen, especially that of the female, is prolonged in a peculiar way. The tibiotarsal hairs, claws, ant$_1$-$_2$, and the chaetotaxy of the postabdomen are not specially differentiated in either sex, which relates *D. pandayi* more or less to *D. flavus* and *bicinctus;* since *pandayi* is practically not pigmented, it comes closest to *flavus.*

Deuterosminthurus sulphureus mediterraneus nov. subspec. (fig. 9 a-d)

Material: 1 ♀ from sample 3; 68 ♀, 23 ♂ and 7 juv. from sample 4; 11 ♀, 3 ♂ and 1 juv. from sample 5; 1 ♂ from sample 21; 2 ♀ and 1 ♂ from sample 23. In all 118 specimens, of which 69% ♀, 24% ♂ and 7% juveniles. Holotype is a ♂ from sample 4. All specimens are on slides in Marc André II, almost all in individual preparations.

Discussion and differential diagnosis. The material under consideration agrees in all essential characters with *Deuterosminthurus sulphureus:* tibiotarsi of P_3 with long outstanding dorsal setae, postabdomen in both sexes with 3 median setae, postabdomen of female with the two upper hairs on hind margin of lateral flaps of postabdomen distinctly shorter and thinner than lower two setae (fig. 9a). However, the two strong hairs in the form of a sabre that are so conspicuous the male postabdomen of typical *sulphureus,* are not stronger than the macrochaetae on the lateral flap (fig. 9c).

I have considered the possibility that this might be due to phenotypic neutralisation (Cassagnau, 1964). However, it would be a rare coincidence that the neutralisation would be expressed in all 28 males, without attaining any expression in the female sex; yet I have not seen any reduction in the anal appendages of the females. This makes it very probable that the reduction of the "Säbelborsten" is a useful systematic characteristic.

It seems that there is hardly any difference in size between Dutch and Greek material of *sulphureus.* The head diameter of 16 ♀ from sample 4 was 316 μ (standard deviation 26 μ), whereas the head diameter of 11 ♀ from the Netherlands (Castricum, dune area) was 294 μ (with a standard deviation of no more than 7 μ).

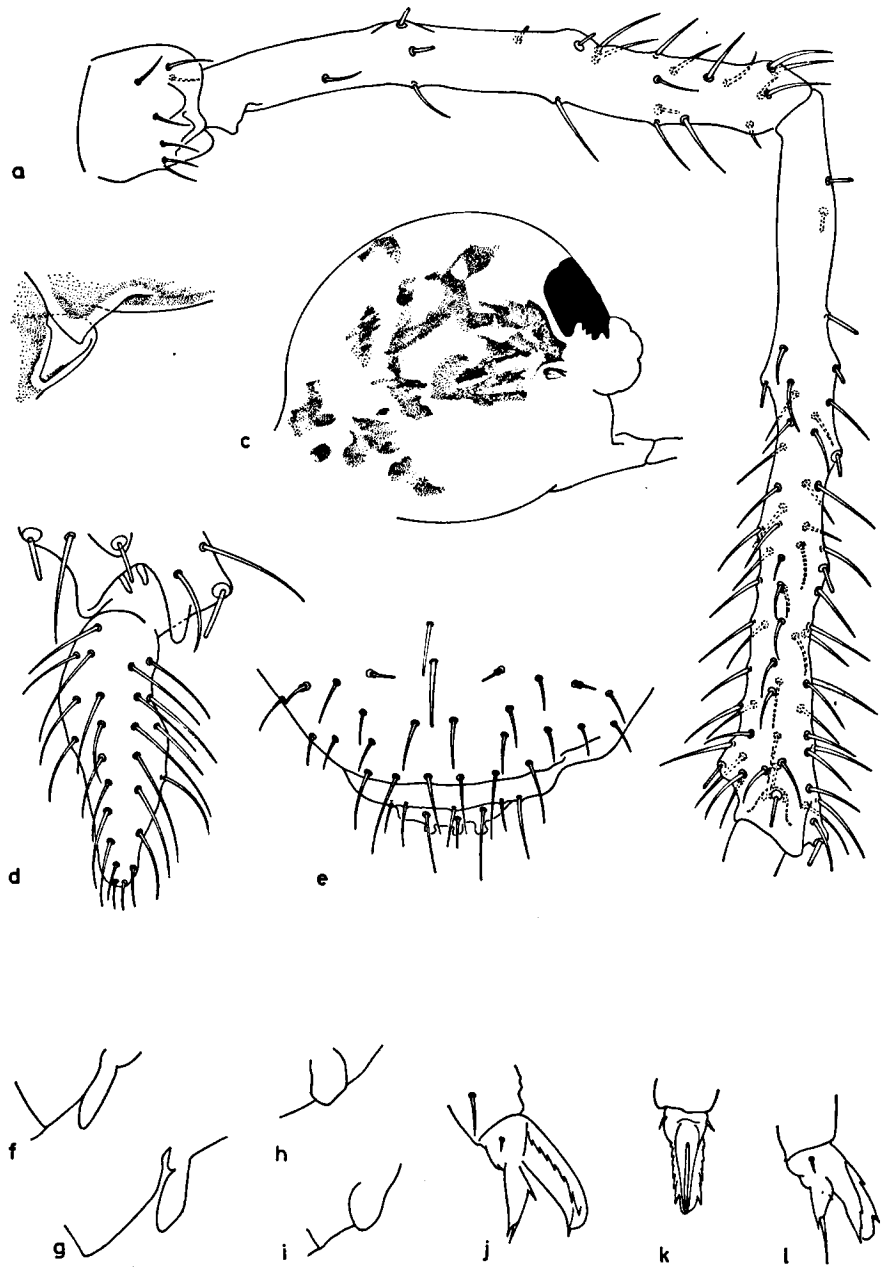

FIG. 10. *Dicyrtomina* (*Calvatomina*) *articulata* n. sp. a, ant$_{1-3}$; b, detail of articulation between ant$_1$ and ant$_2$; c, body pigmentation; d, ant$_4$; e, labral chaetotaxy; f, coxal processus of P_2 of a male; g, the same, female; h, coxal processus of P_3 of a male; i. the same, female; j, unguis P_3; k, unguis P_1; 1, unguis P_1.

Key to the European species of the genus *Deuterosminthurus* Börner, 1901

1a ♂ 2
b ♀ 10
2a ant$_{1-2}$ with dorsal setea short and spinulose 3
b ant$_{1-2}$ with dorsal setae normal 6
3a head and body with dark pigment 4
b dark pigment only in the eye-patch 5
4a unguis with weak tooth . . . . . *pallipes pallipes* (Bourlet)
b unguis with strong tooth . . . . . *pallipes fenyesi* Stach
5a unguis with weak tooth . . . . . *repandus* (Ågren)
b unguis with strong tooth . . . . . *pallipes fenyesi* f. *pallida* n. f.
6a dental chaetotaxy specialized (only 4 interior setae; antero-distal row with 1, 2 long and thick setae) . . . . . *pandayi* n. sp.
b dental chaetotaxy normal (7 interior setae; antero-distal row consists of 1, 1 slender short setae) 7
7a abdomen with two black blotches . . . *bicinctus* (Koch)
b abdomen without pigment 8
8a latero-apical setae of postabdomen strong and curved upward, "as a sabre" *sulphureus sulphureus* (Koch)
b latero-apical setae not differentiated 9
9a tibiotarsus$_3$ with strong setae (about ¾ mucro) *sulphureus mediterraneus* n. ssp.
b tibiotarsus$_3$ with shorter setae (longest about ½ mucro) . . . . . *flavus* (Gisin)
10a Upper 2 + 2 setae at lateral flaps of postabdomen conspicuously shorter and thinner than lower 2 + 2 setae . . . . *sulphureus* sensu lato
b these setae not differentiated 11
11a dental chaetotaxy specialized (interior row with 4 setea; antero-distal group with 1, 2 stronger and long setae) . . . *pandayi* n. sp.
b dental chaetotaxy not modified (interior row with 7 setae, antero-distal group with 1, 1 slender short setae) 12
12a abdomen wholly or partially pigmented 13
b abdomen not pigmented 15
13a abdomen with two dark blotches . . . . *bicinctus* (Koch)
b abdomen uniformly pigmented 14
14a unguis with weak tooth . . . . . *pallipes pallipes* (Bourlet)
b unguis with strong tooth . . . . . *pallipes fenyesi* Stach
15a unguis with weak tooth 16
b unguis with strong tooth . . . . . *pallipes fenyesi* f. *pallida* n. f.
16a medio-dorsal setae on postabdomen about ½ mucro . . . . . *flavus* (Gisin)
b medio-dorsal setae on postabdomen about ¼ mucro . . . . . *repandus* (Ågren)

Note: I am not fully convinced of the strength of separation in entry 16. I have been unable to allocate in this key *D. quadrangulata* Loksa & Bogojević, 1970, described after a single ♀ from Jugoslavia. The species is related to *repandus* by the authors, but I do not understand why. *D. cruciatus* Haybach, 1972, does not belong in *Deuterosminthurus*, as is evident from the structure of the unguiculus.

Fasciosminthurus virgulatus (Skorikow, 1899)

Material: 1 ♂ from sample 1.

The single specimen, that was in a moderate condition, was as far as could be ascertained in good agreement with the descriptions by Altner, 1961,

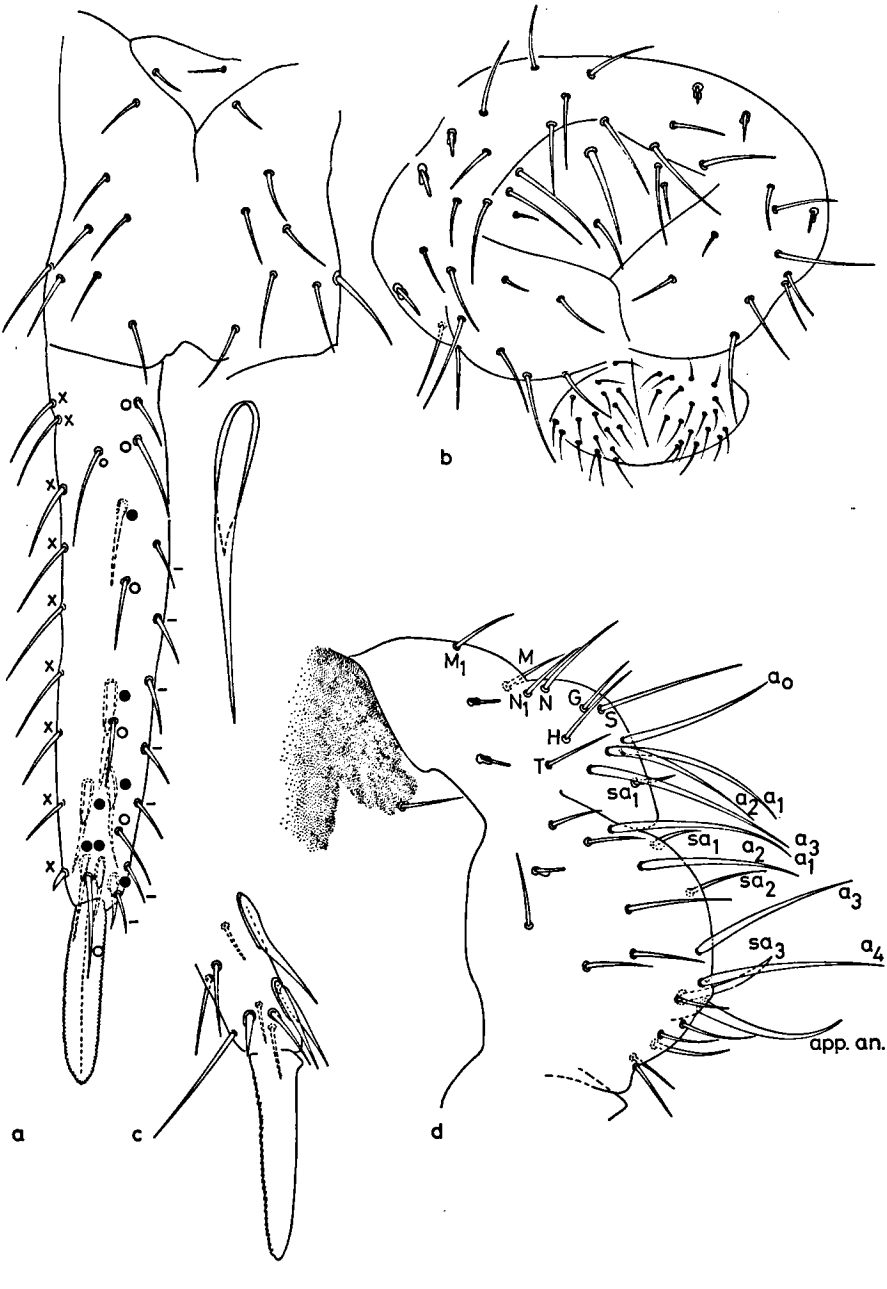

FIG. 11. *Dicyrtomina* (*Calvatomina*) *articulata* n. sp. a, furca, posterior face; b, postabdomen of male; c, apex of dens and mucro, exterior face; d, postabdomen of female.

(after two specimens from Stromboli) and Dallai, 1969, (after a specimen from Montechristo).

Dicyrtomina (Calvatomina) articulata nov. spec (fig. 9 e-g, 10-12)

Material: Holotype ♀ from sample 15; 2 juv. from sample 2; 1 ♀ from sample 11; 1 ♂ and 1 juv. from sample 14; 1 ♂ and 2 juv. from sample 18. All specimens are mounted separately on slides in Marc André II.

Description. Proportionally very small — length of abdomen of ♀ 1.0 mm, of ♂ 0.8 mm; head diagonal 0.5 mm in ♀, 0.4 mm in ♂. Total length of antenna of holotype female 0.8 mm. Relative lengths of antennal segments 18 : 76 : 100 : 16. Pigmentation feeble. Head with some diffuse cloudings and two brown blue spots on the location of anterior and posterior ocelli. The eye-patches are black. Abdomen with irregular brown-blue spots that form an irregular lateral stripe, confluent in an intensely pigmented median spot just in front of the postabdomen, which itself remains free from any pigment (fig. 10c). Feet and furca white, but antennae lively blue over their whole length. Head with a median row of 7 comparatively thin and slender setae. Vertical setae thin and short, hardly spiniform (fig. 9f). Labral chaetotaxy 6/5,5,4 (fig. 10e). Eyes 8 + 8. Between ant_1 and ant_2 a beautiful articulation is present (fig. 10b). This basically is a normal feature in the *Dicyrtomidae,* but here it seems to be more developed than usual. Ant_2 with 5 sensillae, ant_3 with 10 sensillae, 4 of which are situated in an apical whorl. Antennal orgal III normal (fig. 10a, d).

Retinaculum tridentate with a short basal appendix and 3—4 apical setae on the corpus (fig. 9 g). Abdomen without macrochaetae. Between insertion of manubrium and postabdomen are inserted in the abdomen a pair of typical sensillae, 3 + 3 fine but not differentiated setae, and 2 + 2 modified setae that are appressed, with an elongate hair base, and a roughened surface (fig. 12a, b, d). The arrangement of all these elements is very stable. The setae on the feet are all more or less strongly spiniform. The typical specialized macrochaetae on tibiotarsi are not strongly differentiated, slightly rugose. Metatrochanter with 3 + 3 setae (fig. 9e). Due to the small size, the interpretation of the claw is not easy. There is a distinct tunica, and strong, toothed pseudonychia. The internal lamella seems to lack a tooth, but I am not perfectly sure. Unguiculus with a strong internal tooth, a short apical needle, and moreover a subapical needle that is rather long in P_1, but short in P_2 and P_3 (fig. 10 j, k, l). Coxal processes of P_3 short and swollen, those of P_2 almost fingerlike (fig. 10 f-i). Postabdominal chaetotaxy of male as in fig. 11b, that of female as in fig. 11d. On abd_5 M, M_1, N and N_1 are not specialized. The only hairs on the postabdomen that are thickened are the circumanal setae and the appendices anales, which are hardly distinguishable from the circumanal setae except by their bent habit.

Manubrium with 8 + 8 setae. Dental chaetotaxy (fig. 11a):

anterior (.): 3,2,1 ..... 1 — all setae strong and appressed, except the basalmost one, smooth,

FIG. 12. *Dicyrtomina* (*Calvatomina*) *articulata* n. sp. a, ventral chaetotaxy of abd_4; b, the two modified setae from this region; d, ventral chaetotaxy of abd_4, ventral view (upper region is male genital tubercle).
Dicyrtomina (*Dicyrtomina*) *minuta* (O. Fabricus) from the Netherlands. c, ventral chaetotaxy of abd_4 for comparison with fig. 12a.

exterior (×): 9 — distinctly rugose, equidistant, except basal two, setiform except distal spine,

interior (—): 7 — equidistant, smooth, setiform,

posterior (o): 4,3 — erect smooth setiform, a distal row of 4 equidistant setae and a basal group of 3 setae.

Mucro about 1/3 dens, slender and very regularly crenulated at both posterior edges (fig. 11a, c).

Ventral tube with a fine lateral seta and anteriorly a stronger seta in distal position and a digitiform process.

Discussion. D. articulata is presently the only *Calvatomina* having all setae on abd_5 setiform. *D. articulata* at the same time is the first *Calvatomina* within political Europe, if one excludes *D. rufescens* (Reuter, 1890), that is known only from some hothouses in Scandinavia and evidently does not belong to the autochthonous fauna. *D. rufescens* has been amply redescribed by Hüther, 1965. The new species differs from *rufescens*, as well as from *D.* (*Calvatomina*) *pseudorufescens* Hüther, 1965, from the Sudan by having only 2 pairs of modified setae above the manubrial insertion. In the chaetotaxy of its postabdomen *D. articulata* comes close to *Dicyrtomina* (*D.*) *leptothrix* Börner, 1909, from Japan. Apart from the subgeneric character of *Calvatomina* (the strong reduction in the size of the vertical spines) there are some differences in the dental chaetotaxy and in the arrangement of sensillae on ant_3.

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MAPS : Guide and road map of Rodos; Odikí charté Elládos — both edited by ALMA, Aléx. Matsóukis S.A., 69, Leophóros Vasilíssis Friderikis 69 (6[i] stásis), Agh. Anargýri, Athíne.

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