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Collembola of Northern Israel, II

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ABSTRACT As a result of a recent taxonomic survey of the Collembola of northern Israel, two species, *Seira dori* sp. n. and *Onychiurus nevoi* sp. n., 1 subspecies, *Orthonychiurus gridelli hermonicus* ssp. n. and one form, *Lepidocyrtus lignorum triangulata* are described. Two species, *Allaphorura zschokkei* and *Protaphorura levantina*, are revised. Of the 3 species of the genus *Seira* recorded, 2 are European species and the third, new species, shows affinity to the African and Indian fauna.
KEY WORDS Collembola / Entomobryidae / Onychiuridae / Israel

Introduction

The Collembola fauna of the Levant is still very poorly known. Christiansen (1956, 1957, 1958) described more than 80 species from Lebanon and Western Syria. Handschin (1942) listed 28 species of Collembola from Israel (then called Palestine). The collembolan fauna of Israel was revisited only lately (Gruia, 1995, Gruia et al., 1999). The latter paper includes a partial list of the Collembola fauna of northern Israel. The present paper (part II) is following the former study by Gruia et al. and adds 6 species to the Israeli fauna; 3 taxa are described for the first time and 3 previously reported species are revised. Only with the third part (in prep.), a first comprehensive list of the collembolan fauna of Israel will be published later.

Research area. The most intensive studies of soil Collembola in Israel were carried out at Mt. Carmel (32°44'N, 35°01'E), mainly in the contrasting north-facing (NFS) and south-facing (SFS) slopes of the valley of Lower Nahal Oren. Samples were collected also on Mt. Hermon, adjacent to the Lebanese region studied earlier by Christiansen (1956). Both sites have been described in detail in Gruia et al., 1999 ("Material" and Fig. 1). The present study includes 3 additional sites: a new site on the northern foothills of Mt. Carmel-an Eocene hill south to Kishon River, at Giv'at Hamore (loc. 10, Fig. 1 in Gruia et al., 1999) and at Sha'ar Hagai, west of Jerusalem (Central Israel) were sampled as well.

Collecting and mounting methods. See Gruia et al., 1999.

(B, P) = leg. M. Broza and D. Poliakov.

Holotypes are deposited at Institutul de Speologie "Emil Racovitza", Bucharest, Romania (ISB), and paratypes at the University of Haifa at Oranim (UHO).

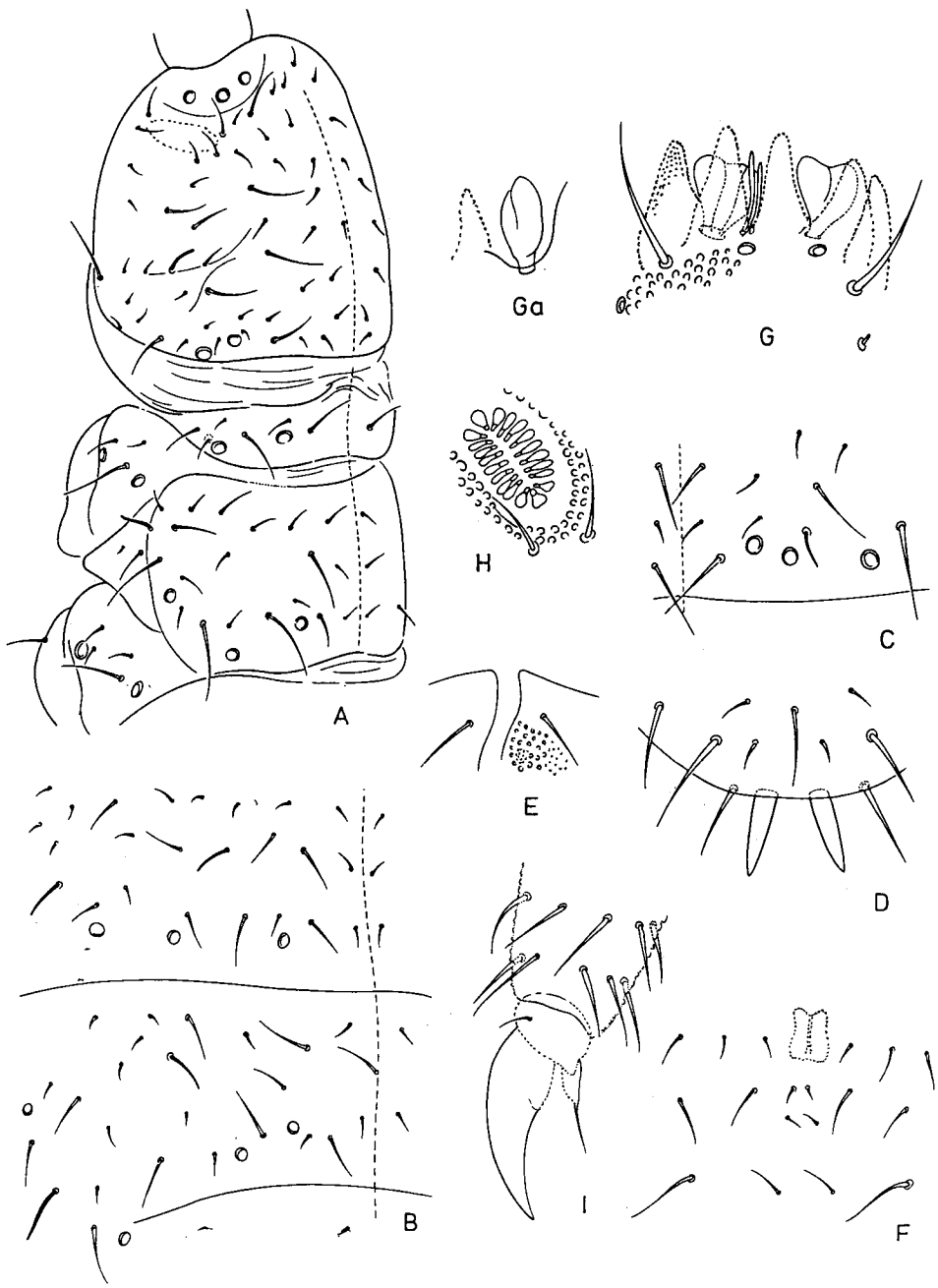

Fig. 1. *Allaphorura zschokkei* (Handchin): A, chaetotaxy of head and thorax I-II; B, chaetotaxy of abd. III-IV; C, chaetotaxy of abd. V; D, chaetotaxy of abd. VI; E, chaetotaxy of thor. sternite III; F, rudiment of furca; G, sensory organ of III antennal segment; Ga, sensory club, lateral view; H, postantennal organ, I. claw III.

Allaphorura zschokkei (Handschin, 1919) Fig. 1 A-I

Length 0.9-1 mm, white, finely granulated, base of antennae weakly marked. Chaetotaxy formed by microchaetae and macrochaetae on the medio-dorsal and lateral part of tergites. First antennal segment bears 8 setae. Head with seta d_0. Thorax I with 5-6 setae in a row (Fig. 1 A). Microsensilla "s" on thor. II and III. Sensillae formula: 1/0, 1+mi, 1+mi /1, 1, 1+1, 1+1, 1+1, 1 (Fig. 1 A-D). Sensilla on thorax and abd.V clear (Fig. 1 A, C). Abd. IV with mesochaeta m_0, abd. VI with two rows of setae, a_0 present (Fig. 1 D). 1+1 setae on second and third sternites of thorax (Fig. 1 E). Ventral tube with 6+6 setae. Furcal rudiment typical for the genus (Fig. 1 F), followed by small, fine granulated area with 4 small setae in two rows.

Antennal segment IV with two slightly thickened sensilla and a microsensillum at the posterior half. Antennal organ III with 5 large, finely granulate, guard papillae, 2 smooth sensory clubs, 2 smooth sensory rods and small ventro-lateral sensilla (Fig. 1 G, Ga). Postantennal organ with 20-21 simple vesicles (Fig. 1 H).

Dorsal pseudocelli: 32/233 /33343, ventral pseudocelli: 2/000/0112, subcoxae 2: Claw simple, untoothed with empodial appendage acuminate, 1/2 length of claw (Fig. 1 I). No ventral organ. Small spiniform anal spines without distinct papillae.

Material examined: 2 male 2 females, 6 ex., 22-XI-1997, Lower N.Oren, NFS, under *Pistacia lentiscus* L. (B, P) (UHO).

Remarks: Gisin (1957) studied rich material from Mt. Jura and Haut-Valais, Switzerland, and noted the position of pseudocelli and the chaetotaxy of thor. I, abd. IV and VI. In comparison, the Israeli specimens have p_3 on thor. I, a macrochaeta on abd. IV, 2 macrochaetae and a long sensillum between the 2 lateral pseudocelli. W. Weiner (pers. comm.) considered the above characters for specimens of *A. zschokkei* from Mt. Sudety (Poland). She found small differences in c and v head rows and in abd. IV chaetotaxy.

The length of the empodial appendage is a major difference between the populations of Mt. Jura and Sudety and of Israel, 2/3 of claw's length VS 1/2, respectively. *A. zschokkei* was known from Europe and Asia Minor only. *A. hortensis* Gisin, 1949, close to *A. zschokkei,* was found by us in Israel as well (Gruia et al., 1999). We observed differences in chaetotaxy typical for *Allaphorura: A. hortensis* has 3 rows of setae on abd. VI and also 2 distinct and stout sensilla on antennal IV segment, in *A. zschokkei,* they are hardly visible.

Protaphorura levantina (Christiansen, 1956) Fig. 2 A-E

Length of adult males: 1.5-1.6mm, females, 1.5-1.8mm, white, fine and uniformly granulate (diameter of 1 grain < microchaeta base), base of antennae distinct, with a small number of non-acuminate microchaetae and macrochaetae. Head without seta d_0 and with setae p_2 in front of setae p_1 and p_3. Thorax I with i3m (Fig. A). Microsensillum "s" and the 5+5 central microsetae present on thorax II and III, setae p_1

anterior to setae p_2 (Fig. 2 B). Abdomen I-IV with setae s-s', on tergite IV, s' ca. twice length of s (Fig. 2 C). Abdomen V without seta s', seta s is long (M/s = 11/7), seta p_0 present. Abdomen VI with two anal spines, on short papillae, of the same length as inner edge of claw. Two pairs of pre-spine setae, unequal and slightly convergent. Anal spine s/M = 8 /11 (Fig. 2 C). Ventral chaetotaxy: thoracic sternites I-III have 1+1 (1+2), 2+2, 2+2 setae, ventral tube with 7+7 (9+9) on distal part and 2+2 (1+1) setae on basal part, rudiment of furca on abd. sternite IV, seta mp missing (Fig.2 D), B_{11}' on anal lobes absent.

Antennae slightly shorter than head. Antenna IV with sensillum ms in a dorso-external position at the basal part. Sensory organ of third antennal segment with 5

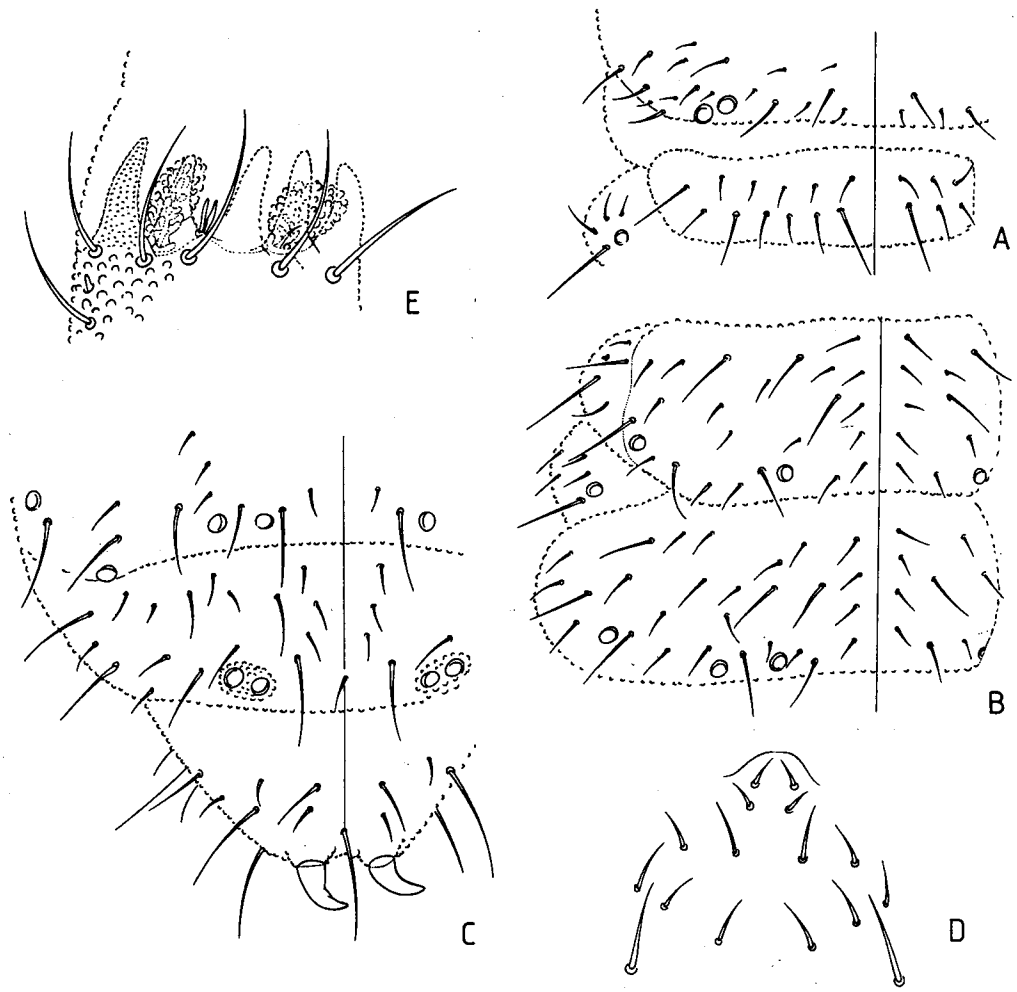

Fig. 2. *Protaphorura levantina* (Christiansen, 1956): A, posterior chaetotaxy of head and thorax I; B, chaetotaxy of thorax III and abd. I; C, chaetotaxy of abd. IV-VI; D, rudiment of furca; E, sensory organ of III antennal segment.

setae at the base of 5 fine granulated protective papillae: pair of smooth rods, 2 "mulberry-like" sensory clubs and a small ventro-lateral sensilla (Fig. 2 E). Postantennal organ with 26-28 simple vesicles. Dorsal pseudocellar formula 32/022/33342, ventral formula: 1(1+0)/000/000, subcoxae: 1.

Claw untoothed or with inner tooth, empodial appendage without basal lamella, acuminate, length 2/3 that of inner edge of the claw. Male ventral organ absent.

Material examined: 4 ex., Mt. Carmel, Lower N. Oren, 9-IV-1996, SFS, 9 ex., 22-XI-1997, NFS, 23 ex., 22-IX-1997, SFS, 9 ex., NFS, 5 ex., Mt. Carmel-North, Eocene Hill, 22-III-1998, 2 ex., Sha'ar Hagai, 15-VI-1996 (all B, P) (UHO).

Remarks: The species was described by Christiansen (1956) from Mt. Lebanon (mainly from 1900m alt.) and Syria. We found it also in Mt. Carmel, Israel in large numbers (150-500m alt.) especially in soil sampled during autumn. We collected it also from pine forest near Jerusalem.

Our specimens fit the description of Christiansen, 1956. In the present paper we enhanced the diagnosis by some chaetotaxy characters. Our specimens don't have s' seta on abd. tergite V, as *O. pulvinatus* do (Gisin 1954, from Switzerland). This species is very close to *P. levantina.* In general, dorsal chaetotaxy except thorax I tergite is identical with that known from *P. armata* Tullberg (Gisin 1952). Christiansen (1956) had already concluded that: "The species is distinguished from all others of the *armatus* group by a combination of characters, particularly the presence of 2 pairs of pseudocelli on the posterior borders of the head and fifth abdominal segment, the absence of ventral pseudocelli and the relationship of M/s".

By including these two species (*pulvinata* and *levantina*) in the genus *Protaphorura,* the generic diagnosis (Weiner, 1996), should be slightly enlarged to include abdominal tergite IV and V with 4-5 and 2-3 pseudocelli per half of tergite.

***Onychiurus nevoi* n. sp.** Fig. 3A-E

Fairly fine granulation, postantennal organ with 15-16 compound vesicles, antennal III-organ with 4 large guard papillae, dorsal pseudocelli: 32/122/33343, ventral pseudocelli: 3/011/3212, subcoxa 2, sensillae formula: 2/0,1+mi,1+mi/2,2,2,2+2,1+1,1, ventral organ absent. Length 1.3-1.5 mm, body robust, white, granulation fairly fine (diameter of one grain = mesochaeta base). Area with a very fine granulation includes bases of antennae, basal part of antenna III, anterior and posterior part of thorax and abd. I-III, subcoxae. Bases of antennae well marked.

Chaetotaxy formed of short simple setae and macrochaetae. Seta d_0 present on head. Thorax II and III with microsensilla "s". Sensillae formula: 2/0,1+mi,1+mi/2,2,2,2+2,1+1,1 (Fig. 3 A, B). Sensilla on abd. IV and V distinct. Abdominal segment IV with p_0, abd. VI with two rows of setae, a_0 present. Ventral tube with 4+4 setae.

Furcal rudiment typical for the genus, the area finely granulated with four small setae (Fig. 3D).

Antennae slightly shorter than head. Antenna IV with a very small subapical

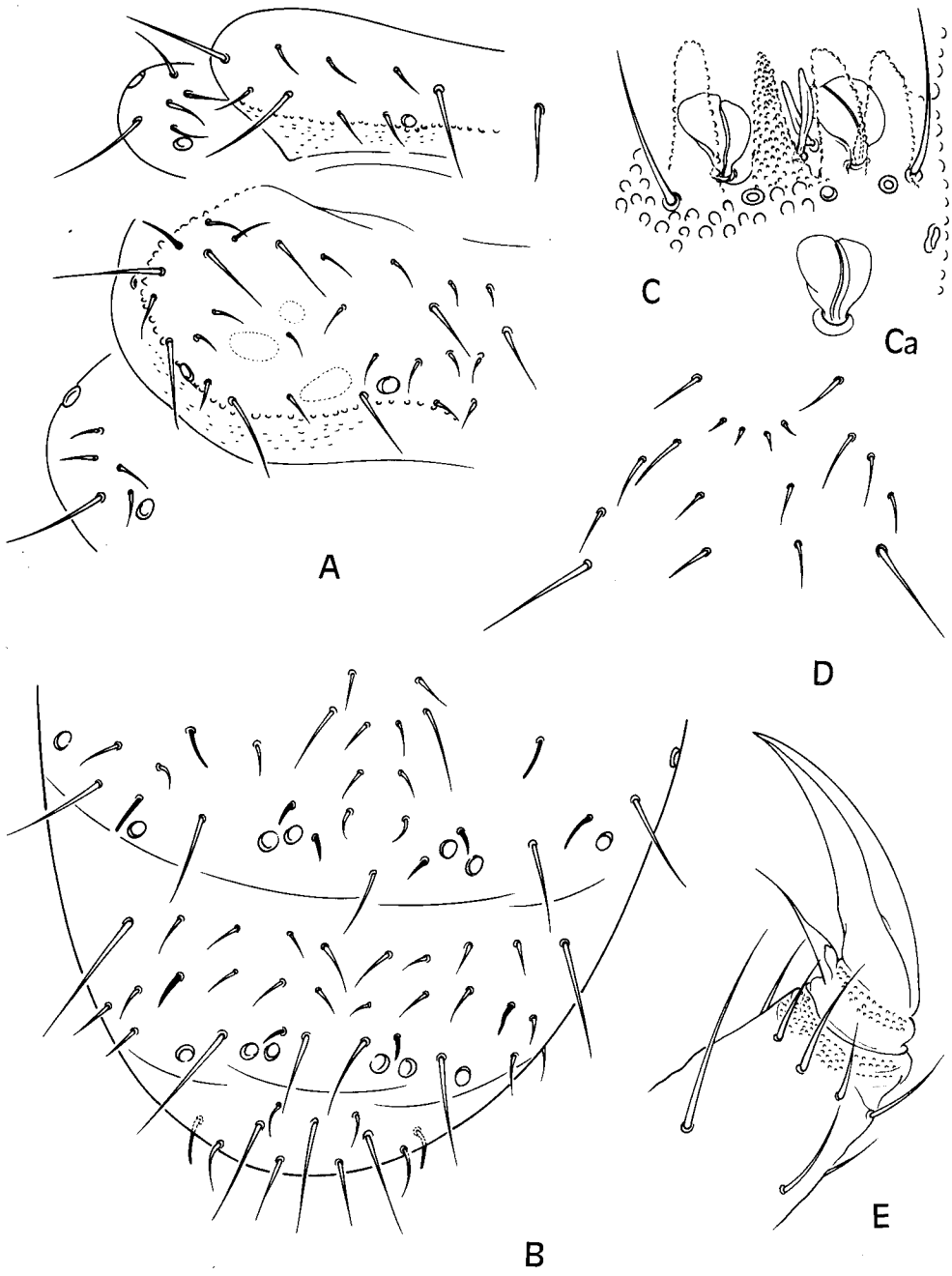

Fig. 3. *Onychiurus nevoi* n. sp.: A, chaetotaxy of thorax I-II; B, chaetotaxy of abd. IV-VI; C, sensory organ of III antennal segment; a, ovoid sensory club; D, rudiment of furca; E, claw III.

organ and one sensillum (ms) in a dorso-external position, ca. 1/4th the length of the segment. Sensory organ of antennal segment III consisting of 5 setae at the basis of 4 large, very finely granulated papillae, guarding two ovoid, smooth, sensory clubs and two smooth sensory rods. A small sensillum occurs on the ventral side (Fig.3C). The sensory clubs with one rib in the middle, slightly oblique (Fig. 3C).

Postantennal organ with 15-16 compound vesicles.

Pseudocellar formula, dorsally: 3(2+1)2/122/33343, ventrally: 3/011/2-3212, two pseudocelli on each subcoxa (Fig. 3 A, B). Abd. IV and V with the dorso-median pseudocelli drawn nearer and edged by sensilla, distance between dorsal pseudocelli approximately 7-8 times their diameter, and only 4-5 times between the first two pseudocelli.

Claw untoothed (Fig. 3 E), empodial appendage filiform without basal lamella, ca. 1/2 of inner edge of claw. Ventral organ not observed. Anal spines absent.

Holotype: Adult male, 1,5 mm, ISRAEL, Mt. Carmel, Lower N. Oren, 18-IV-1997, NFS, under *P. lentiscus*. M. Broza and D. Poliakov (ISB). **Paratypes**: 12 ex., Mt. Carmel, Lower N. Oren, 18-IV-1997, NFS, 2 ex., 25-V-1996, SFS, 29 ex., 9-III-1997. SFS: 15 ex., 28-IV-1997, SFS, 4 ex., 22-XI-1997.SFS, 7 ex., NFS, under oak, 2 ex., Nahal Kelach, 22-XII-1995, 2 ex., Mt. Carmel-North, Eocene Hill, 22-III-1998, all M.Broza and D. Poliakov (UHO).

Remarks: The new species appears to be close to *O. fazii* (Christiansen, 1956) from Lebanon and Syria and to *O. variabilis* (Stach, 1954) from Eastern Europe, by the same structure of the sensory organ of antennal segment III and postantennal organ, and by absence of anal spines. *O. nevoi* n.sp. differs from these species by the pseudocellar formula.

	nevoi n. sp.	*fazii*	*variabilis*
Dorsal pseudocelli	32/122/33343	32/123/33333	32/133/33343
Ventral pseudocelli	3/011/3212/2	0/000/1111/2	2/.../1112/2

Onychiurus fazii is geographically the closest taxon. Christiansen (1956) considers it to be a "species complex". He presents several variable features: the number of pseudocelli -"the dorsal surface of the third and fourth abdomen segments may have four pseudocelli" or, "the ventral pseudocelli may be entirely absent while in a few forms a single pair of ventral occur on the head", the length of the empodial appendage, the presence of the ventral organ, "some populations lack this entirely even in adult specimens, while other populations have a well developed ventral organ". However, Christiansen didn't make correlation between these features.

In contrast, the populations of *O. nevoi* from Mt. Carmel are characterized by a constancy of characters; the sole variation is on abd. I sternite where 2 or 3 pseudocelli may occur. Sensilla clearly visible on abd. IV-V only, the remaining are difficult to distinguish.

None of the males have a ventral organ-they may be subadults; generally, the

species of this genus have a ventral organ (*O. fazii, O. variabilis, O. silvarius*).

It should be emphasized that the endogenous samples collected at Mt. Carmel contain a mixture of *O. nevoi* and *Orthonychiurus gridelli hermonicus,* below, impossible to separate without clearing the specimens.

Etymology: The new species is named in honor of Prof. Eviatar Nevo, the founder and head of the Institute of Evolution, University of Haifa, on the occasion of his 70th birthday.

***Orthonychiurus gridelli hermonicus* n. ssp.** Fig. 4 A-G

Orthonychiurus gridelli hermonicus n.ssp. differs from the type species by the presence of two pseudocelli on the subcoxae and by having a tooth on the claw. Length 1.5-1.6 mm, robust, white, fine granulation (diameter of one grain CA. 2/3 microchaeta base). Around pseudocelli, grains are bigger and with more distance between them. Basis of antenna marked by a very finely granulated, narrow strip, followed by normal granulation of the head, 3 pseudocelli in this zone, surrounded by a special arrangement of the granules (Fig.4 A).

Chaetotaxy formed of simple setae and macrochaetae. Seta d_0 present on head. Thorax II and III with microsensillum "s". Abd. segment IV with m_0 and abd. VI with three rows of setae, not seen well from angle of drawing, a_0 present (Fig. 4 B). B11' seta on anal lobes present (Fig. 4 C). Finely granulated area, with two small setae, on furcal rudiment (Fig. 4 D).

Antennae slightly shorter than head. Antenna IV with a very small subapical organ and microsensillum in the basal part. Sensory organ of antennal segment III of 5 setae at the basis of 4 large, granulated papillae, guarding two smooth, straight, sensory clubs with one rib in the middle, two smooth sensory rods and small ventro-lateral sensillum. The four papillae have a fine granulation, similar with that of the body, the granules in rows (Fig.4 E).

Postantennal organ with 12-13 compound vesicles.

Pseudocellar formula: dorsal surface 32/022/33333, no pseudocelli on ventral surface, 2 pseudocelli on each subcoxa. On abd. IV-V, the dorso-medial pseudocelli edged by two long macrochaetae (Fig. 4 A-B).

Claw with inner tooth and a pair of lateral teeth, empodial appendage filiform without basal lamella, ca. 3/4 of the inner edge of the claw (Fig. 4 F). No clear ventral organ (Fig. 4 G). Anal spines absent.

Holotype: male, 1,6mm, Mt. Hermon, 1600m, 15-V-1992, under *Juniperus,* D. Poliakov (ISB). **Paratypes**: 14 ex., Mt. Hermon, 1600m, under *Juniperus,* 15-V-1992, 4 ex., 1350 m, 12-X-1997. 5 ex., Mt. Carmel, Lower N.Oren, NFS, 18-V-1992, 1 ex., 22-XII-1994, 5 ex., 18-IV-1997, 23 ex., 22-XI-1997, under oak, 1ex., 22-XI-1997, SFS, 3ex., Nahal Kelach, 22-XI-1994, (B, P) (UHO).

Remarks: *Onychiurus gridelli,* from Brescia, Italy, was described by Denis in 1938. By its characters and according to the nomenclature proposed by Weiner in 1996, the

Fig. 4. *Orthonychiurus gridelli hermonicus* n. ssp.: A, chaetotaxy of head and thorax I-II; B, chatotaxy of abd. IV-VI; C, chaetotaxy of anal lobes; D, rudiment of furca; E, sensory organ of III antennal segment; F, claw III; G, chaetotaxy of III sternite abd. (male).

species is integrated in the genus *Orthonychiurus* Stach, 1954. The two populations of *O. gridelli*-from Israel and from Italy differ in number of pseudocelli on subcoxae (2 and 1 respectively) and the presence of teeth on the claw in the Israeli population only.

Considering the ventral organ, Denis (1938) mentioned "pas de trace d'organe ventral male", and Gisin (1949) considered *O. gridelli* as the juvenile form of *O. stachi* Denis, 1938. We have examined 7 adult males and we did not observe a distinct ventral organ, we noted only a series of 4-5 setae on abd. II and a medial row of 2+2 or 3+3 on abd. III (Fig. 4 G). Female abd. II setae are the same.

As we have mentioned before, *O. gridelli hermonicus* n.ssp. is sympatric with endogenous *O. nevoi* n. sp., in Mt. Carmel at Nahal Oren. In Mt. Hermon, at 1600 m in *Juniperus* litter, there is an unispecific population of *Orthonychiurus* only.

Etymology: the subspecific name refers to the type locality.

***Seira dori* n. sp.** Fig. 5 A-F

White-yellowish with black-blue pigmented transverse strip on abd. III, chaetotaxy: interocular zone with 9 macrochaetae, anterior row of thor. II with 4+6, abd. I with 5, and abd. II with 3 macrochaetae. Length 1.5-1.6 mm, body with white-yellowish color, black-blue pigment on antennae, on the interocular zone and on abdominal tergite III (Fig. 5 A). There are variations in the intensity of the pigmentation: on abd. III pigmentation disposed in a continuous, transversal and diffuse strip or spot of pigment advancing to tergite II (Fig. 5 B). On antennal segments pigment is diffuse, more intense towards the extremities, central spot in the interocular zone united through traces of pigment between the two ocular spots, 8+8 ocelli.

Ratio of the lengths of body segments (head, thorax I-II, abd. I-V), measured on the dorsal axis ~ 3,8: 2: 1,5: 1,2: 1: 1,5: 5: 1.

Antennae slightly shorter than half of the body length, with scales on the segment I-II, segment IV not annulate. Cephalic diagonal/ant. I: II: III: IV ratio ca. 7/2,5: 3,8: 4,3: 5,3.

Head chaetotaxy: 9 macrochaetae on central area, between ocular and frontal spots 8-9 macrochaetae (Fig. 5 B). Body chaetotaxy: thorax II, posterior row-13 (5+2+6) +1, anterior row-4+5−6 macrochaetae, thorax III-12 (4+4+4) +2 macrochaetae, abd. I-V-5, 3, 1, 4+4 -5+4, 6 macrochaetae (Fig. 5 C). Only 3 macrochaetae present on abd. II (Fig. 5 Ca).

Claw with a pair of basal and two distal teeth, subapical tooth larger. Empodial appendage slightly truncated in apical part (Fig.5 D). Tenent hair capitate, ca. 1/3 internal edge of claw. Trochanteral organ with 9 spiny setae (Fig. 5 E). Ventral tube with 9 +9−11+11 distal ciliated setae. Ratio between manubrium : dens: mucro ~ 32,5: 46: 1.

Holotype: male, 1.5mm, ISRAEL, Mt. Hermon, 1600m, 1-VI-1997, NFS of N. Havushit, under *J. drupacea*, M. Broza, D. Poliakov (ISB). **Paratypes**: 2 ex., Mt.Carmel, Lower N. Oren, 5-V-1995, SFS, under *P. lentiscus*, 3 ex., 12-X-1997, 2 ex., 9-II-1998 NFS, under oak, 2 ex., Giv'at Hamore, 16-V-1997, 1 ex., Sha'ar Hagai, 17-V-1997, 1 ex., Mt.

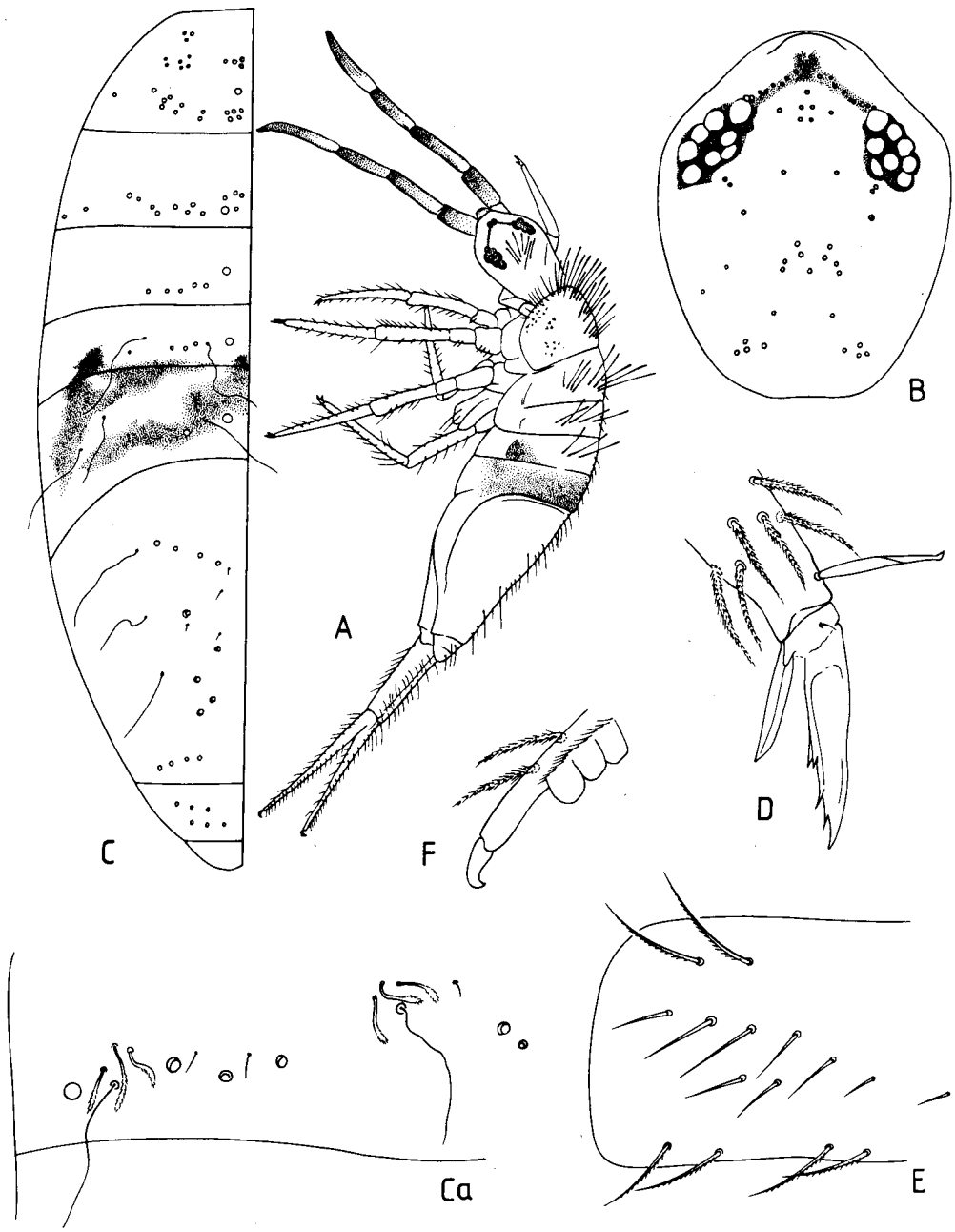

Fig. 5. *Seira dori* n. sp.: A, body, lateral view; B, head chaetotaxy; C, dorsal body chaetotaxy; Ca, chaetotaxy of abd. II; D, claw III; E, trochanteral organ; F, mucro.

Hermon, 1600m, 1-VII-1997 (B, P) (UHO).

Remarks: *Seira dori* n. sp. is close to *S. elisae* Gers et Deharveng 1985, described from Morocco (Haut-Atlas) and to *S. dinizi* described from Canary Island and South Portugal (da Gama, 1988). Both are Mediterranean species.

	dori	*elisae*	*dinizi*	*lateralis*	*flavovirens*
Head					
-interocular spots	9	5	?	?	?
-central zone	9	9	9	?	?
Thor. II:					
-anterior row	4+6	4+4	4+3	?	?
-posterior row	5+2+6−7+1	5+2+6	6+2+6	3+3+4	4+2+6/+1
Thor. III	4+8/+2	4+6/+1	6+8	3+5	6+7
Abd. I	5	5	5	5	5
Abd. II	3	4	3	3	3
Abd. IV	4+5+4	4+5+4	4−5+5+3	?	?

All these species are very similar in coloration and body chaetotaxy. Coloration: the new species presents a unique strip of pigment on abd. III, as in the light colored individuals of *S. elisae,* but differs in having no pigment on the coxae. Chaetotaxy: the same number of macrochaetae present in the central zone of the head and abd. I. Chaetotaxy of abd. IV and the medial groups of thoracic chaetotaxy are the same as in *S. elisae* and the number of macrochaetae on abd. II is the same as *S. dinizi.*

The presence of only 3 macrochaetae on abd. II is a feature frequent in the African species, e.g., *S. flavovirens* Börner, 1903 from Eastern Africa. This is also true for *S. lateralis* Yosii 1966, from India, the closest Asian species, which shows the same combination of features as in our species-5 macrochaetae on abd. I and 3 on abd. II (see Table). *S. dinizi* is the only other European species that shows the same reduction of the number of abd. II macrochaetae. On other tergites (if indicated), the chaetotaxy is totally different, as it is in the body pigmentation (spot of pigments on each tergite).

Of the species described by us from Mt. Carmel and Mt. Hermon (present study and Gruia et al., 1999), species strictly related with Eastern Mediterranean forms, only *S. dori* has affinities with Indo-African forms.

Etymology: This new species is named in honor of Dr. Menachem Dor (1901-1998), a great spirit, the author of ‹The Zoological Lexicon› (1965) and ‹Animals in the time of the Bible, Mishna and Talmud› (1997) (in Hebrew).

Seira ferrarii Parona, 1888

Material examined: 2 ex., Mt. Carmel, Lower N. Oren, SFS, 17-V-1995, 1 ex., Mt. Carmel-North, Eocene Hill, 22-III-1998, under *Quercus ithaburensis* Boiss (B, P) (UHO).

Seira saxatilis Gisin et Gama, 1962

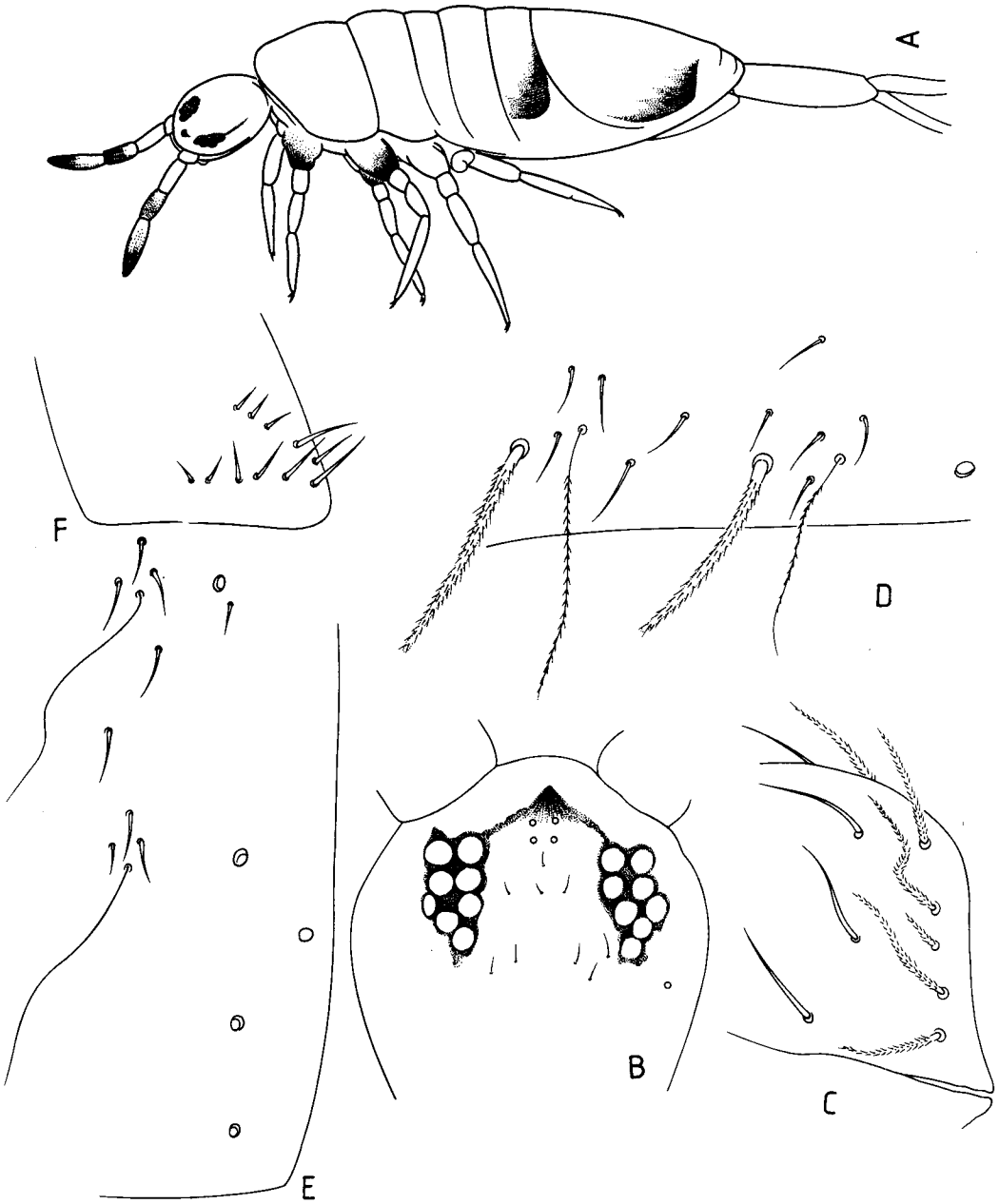

Fig. 6. *Lepidocyrtus lignorum* (Fabricius, 1775) triangulata form: A, body, lateral view; B, head chaetotaxy; C, labial chaetotaxy; D, chaetotaxy of abd. tergite II; E, chaetotaxy of abd. IV; F, trochanteral organ.

Material examined: 1ex., Mt. Carmel, 1-VII-1993. M.Broza, (UHO).

Lepidocyrtus lignorum (Fabricius, 1775), **"triangulata" n. form** Fig. 6 A-F

Length: 1.2-1.4mm, white-yellowish with black-bluish pigment (in ethanol) disposed on frontal zone of head, coxae I and II, lateral part of abd. III (the spot appeared triangular) and the latero-posterior part of abd. IV (Fig. 6 A). Pigment diffuse on third and fourth antennal segments. 8+8 ocelli. Ratio between antenna/head diagonal ca. 1.4. Antennal segments I: II: III: IV ratio ca. 1: 3,5: 3,4: 6,4. Antennal segment I+II with scales. Apical antennal bulb present.

Labial formula M_1 M_2 R E L_1 L_2, $M_1 < M_2$, R seta ciliated, ca. 1/3 M_2 (Fig. 6 C). Formula of dorsal chaetotaxy R00?/00/0101+ 3 (the presence of P macrochaeta is not clear, it may be missing or may have a strongly lateral position-Fig. 6 B), on abd. IV pseudopore is placed between M_1 and M_2 macrochaetae (Fig. 6 E). Chaetotaxy of abdominal tergite II: p a B q_1 q_2 (Fig. 6 D), abd. IV without s microchaeta (Fig. 6 E).

Claw identical with the type form, with small internal and external teeth, tenent hair spatulate. Trochanteral organ with 11-12 spiny setae (Fig. 6 F). Femur with scales. Dentes without basal tubercle.

Material examined: 4 ex., Mt. Carmel, N. Oren, 8-IV-1997, SFS, near shrubs, 3 ex., 17-V-1995, 5 ex., 26-V-1996, 5 ex., 22-XI-1997, NFS, 12 ex., 18-IV-1997, 2 ex., Reches Etz'ba, 26- IV-1996, 5 ex., 15-XII-1995, N. Kelach: 2 ex., 25-XI-1991, 4 ex., 18-VII-1993, 3 ex., Mt. Hermon, 1600m, 1-VII-1997, under *Juniperus* (B, P) (UHO).

Remarks: On many occasions (see Gruia et al., 1999) we emphasized the similarity between the collembolan fauna of Israel and that of Crete. We refer again now to Ellis, 1974 dealing with 2 specimens from central Crete (from clay under litter of *Quercus*), which he attributed to ‹*L. lignorum* the ? form›. This form present the same pigmentation as the presently described individuals. In comparison with the type form (unpigmented), the triangulata form is singled out by its characteristic pigmentation.

This form is relatively widespread in the north of Israel, having been collected in various localities on Mt. Carmel as well as on Mt. Hermon. From our observations, it is the most widespread species of *Lepidocyrtus* from this zone (unhappily, our endogenous samples comprised many juveniles).

General discussion

The collembolan fauna of Israel is part of the Euro-Mediterranean region sensu Christiansen and Bellinger (1995). Some endemic characters of the Israeli population do exist, as noted above for the genus *Protaphorura*, *A. zschokkei*, and *O. gridelli hermonensis*. However, as more data become available, the more intimate affinity to the Collembola fauna of both Crete (Greece), (Ellis 1974) and Lebanon (Christiansen, 1956) becomes apparent. Lebanon is bordering Israel to the north and in the present paper we discussed the affinity between the neighboring faunas in the description of *D.*

nevoi sp. nov. and in the revision of *P. levantina*, first described from Lebanon (Christiansen, 1956). However, the completed biogeographic puzzle of the Eastern Mediterranean fauna requires further clarification.

Another important find is the presence in Mt. Carmel, of *Seira dori* sp. nov., which we consider to be an African-Indian element, occurring sympatrically with two European species of *Seira*, *S. ferrari* and *S. saxatilis*. This combination of species emphasizes once again the role of the Levant as a biogeographic bridge.

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