

NOTES ON PHYTOSEIID MITES (MESOSTIGMATA: PHYTOSEIIDAE) OF MT. CARMEL (ISRAEL), WITH DESCRIPTIONS OF TWO NEW SPECIES*

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ABSTRACT

Descriptions are given of the phytoseiid mites *Kampimodromus ragusai* n. sp. and *Amblydromella thesbites* n. sp. The following 26 species were recorded from various plants on Mt. Carmel: *Amblyseius bicaudus* Wainstein, *A. cucumeris* (Oudemans), *A. leucophaeus* Athias-Henriot, *A. longilaterus* (Athias-Henriot), *A. messor* (Wainstein), *A. swirskii* Athias-Henriot, *A. zwoelferi* (Dosse), *Euseius scutalis* (Athias-Henriot), *Kampimodromus ericinus* Ragusa di Chiara and Tsolakis, *Neoseiulus barkeri* Hughes, *Typhloseiella isotricha* (Athias-Henriot), *Phytoseius phwnifer* (Canestrini and Fanzago), *Amblydromella ciypta* (Athias-Henriot), *Amblydromella* sp. near *ciypta* (Athias-Henriot), *A. invecta* (Chant), *A. porathi* (Swirski and Amitai), *A. recki* (Wainstein), *Bawus talbii* (Athias-Henriot), *Neoseiulella carmeli* (Rivnay and Swirski), *N. montforti* (Rivnay and Swirski), *Typhlodromus athiasae* Porath and Swirski, *T. emesti* Ragusa and Swirski, *T. exhilaratus* Ragusa, *T. klimenkoi* Kolodochka, *T. setubali* Dosse, *Typhloseiulus simplex* (Chant).

KEY WORDS: Israel, Mt. Carmel, predacious mites, Phytoseiidae.

INTRODUCTION

This paper presents the results obtained in a survey of predacious mites belonging to the family Phytoseiidae carried out since 1967, on Mt. Carmel (Fig. 13). Asterisks in the text refer to species new to Israel.

Mt. Carmel is approximately 48 km long, 23 km broad, with an area of 700 sq. km, projecting into the Mediterranean Sea south of Haifa. The highest summit is Rom haCarmel (546 m a.s.l.); the Muhraqa, reaching 482 m a.s.l., is also remarkable. The altitude of the mount drops gradually to the south and to the west. Mt. Carmel is drained by many wadis, the most important being Nahal Oren. The climate is characterized by the partition of the year into a cold rainy winter and a hot dry summer. Annual rainfall: 600-800 mm. The mean summer temperature is about 24.4°C, the mean winter temperature approximately 12.9°C. Dew formation, which plays an important part in the water balance of plants, is plentiful. The nearness of Mt. Carmel to the sea, the moderate annual rainfall, mild temperatures, as well as high humidity, have strong effects on the fauna and flora.

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The maquis is a very characteristic type of Mt. Carmel plant community. It forms mixed thickets of trees, shrubs, climbing plants and weeds, evergreen plants with leathery leaves being dominant here. In a few places only on Mt. Carmel the maquis developed into evergreen forest. The following associations occupy the maquis: *Ceratonia siliqua*–*Pistacia lentiscus*, *Quercus calliprinos*, *Pinus halepensis*, *Quercus calliprinos*–*Pistacia palaestina*, *Quercus ithaburensis*, transit of *Ceratonia siliqua*–*Quercus calliprinos*. At various locations conifer trees of *Pinus* spp. have been planted. Extensive areas of Mt. Carmel are covered with garigue, which is distinguished by bushes up to 1 m in height. Typical plants here are *Calycotome villosa*, *Rhamnus palaestinus*, *Salvia fruticosa*, *Phlomis viscosa*, *Cistus incanus* and *C. salvifolius*. Batha of *Sarcopoterium spinosum* is comprised of dwarf-shrub vegetation, less than 0.5 m high, and a prolific flora of herbaceous plants. Garigue and batha are stages in the regeneration and degeneration of plant communities where the trees have been ruined as a result of man's activity, or failed to develop for ecological reasons (Pollak, 1984; Zohary, 1973).

The mites were stored in 70% alcohol, cleared in Nesbitt's solution and mounted in Hoyer's fluid. The setal terminology of Chant and Yoshida-Shaul (1992) was followed. The division of the family Phytoseiidae into the three subfamilies Amblyseinae, Phytoseiinae and Typhlodrominae, and the generic nomenclature of Phytoseiinae and Typhlodrominae to some extent follow the system used by Chant and McMurtry (1994).

The type material is in the Collection of the Department of Entomology at the Agricultural Research Organization, Bet Dagan, Israel.

TAXONOMY

Subfamily AMBLYSEIINAE Muma

Amblyseius bicaudus Wainstein, 1962

MATERIAL EXAMINED: Carmel Park, 26.viii.87, Gramineae. Muhraqa, 6.viii.70, *Smilax aspera* (Grinberg, 1971). Zikhron Ya'aqov (center), 11.viii.88, *Cynodon dactylon*. Females only have been recorded.

Amblyseius cucumeris (Oudemans, 1930)

MATERIAL EXAMINED: 1.5 km north-east of Zikhron Ya'aqov, 21.vii.88, 3♀, 1♂, *Cyperus* sp.

Amblyseius leucophaeus Athias-Henriot, 1959

MATERIAL EXAMINED: Nahal Oren, 29.i.70, 1♀, Boraginaceae (coll. Tova Grinberg).

**Amblyseius longilaterus* (Athias-Henriot, 1957)

MATERIAL EXAMINED: Zikhron Ya'aqov (center), 20.v.73, 5♀, undet. Gramineae.

Amblyseius messor (Wainstein, 1960)

MATERIAL EXAMINED: Carmel Park, 26.viii.87, undet. Gramineae. Bet Oren, 5.xi.88, *Ceratonia siliqua* (litter). Zikhron Ya'aqov (Central Bus Station), 14.vii.88, *Asparagus* sp. Females only have been recorded.

Amblyseius swirskii Athias-Henriot, 1962

MATERIAL EXAMINED: Haifa (University of Haifa), 21.vi.88, 1♀, *Laurus nobilis*.

Amblyseius zwoelferi (Dosse, 1957)

SYNONYMY: *Amblyseius zeitunicus* Wainstein and Arutunian, 1970

MATERIAL EXAMINED: Zikhron Ya'aqov (center), 20.vi.77, 1♀, Gramineae.

Euseius scutalis (Athias-Henriot, 1958a)

SYNONYMY: Probably senior synonym of *Euseius rubini* (Swirski and Amitai, 1961); senior synonym of *Euseius delhiensis* (Narayanan and Kaur), *E. gossipi* (Elbadry), *E. libanesi* (Dosse) (de Moraes et al., 1986).

MATERIAL EXAMINED: Haifa (Bahai Shrine), 10.ix.87, *Ceratonia siliqua*; *Pistacia palaestina*. Haifa (French Carmel), 23.i.70, *C. siliqua* (Grinberg, 1971). Haifa (Gan haEm), 3.ix.87, *Cercis siliquastrum*. Haifa (Nahal Lotem), 3.ix.87, *Pistacia palaestina*. Haifa (Western Carmel), 27.iv.88, *C. siliqua*. Haifa (Ahuza), 7.vii.87, *Capparis spinosa*. Nahal Galim, 19.i.70, *Cistus salvifolius*. Muhraqa, 24.ix.69, *Quercus calliprinos* (Grinberg, 1971). Bet Oren, 5.xi.87, Gramineae. Nahal Oren (100 m a.s.l.), 19.i.70, *C. siliqua* (Grinberg, 1971); 5.xi.87, *C. siliqua*. 'En Hod, 12.xi.87, *C. siliqua*. 1 km north-east of Zikhron Ya'aqov, 21.vii.88, common, *Ficus carica* (leaves, lower side), *C. siliqua*; *Morus* sp. 0.5 km north-east of Zikhron Ya'aqov, 21.vii.88, *Pistacia palaestina*. Zikhron Ya'aqov (center), 14.vii.88, abundant, *Rubus sanctus* (leaves, lower side); *C. siliqua*, *Smilax aspera*; 21.vii.88, *Hibiscus* sp. (leaves, lower side), *Ficus sycomorus* (leaves, lower side); 15.v.90, *C. siliqua*. Zikhron Ya'aqov (Newe haBaron), 12.xii.85, *C. siliqua*; 11.viii.88, common, *C. siliqua*. Ramat haNadiv, 24.vii.85, *C. siliqua*. All stages of *E. scutalis* have been recorded.

**Kampimodromus ragusai* Swirski and Amitai n. sp.

(Figs. 1–5)

Female. Dorsal shield (Fig. 1) suboval, with slightly constricted lateral margins; it is slightly chitinized and weakly reticulated on its mid- and/or posterior parts; whereas in some specimens the reticulation is scarcely pronounced. Dorsal shield carries 16 pairs of setae: setae j1, j4, j5 and j6 shorter than the distances between their bases; setae j4, j5 and j6 subequal in length; setae j3, z2, z4, s4, S2 and Z5 very slightly serrated; setae J2, z5, Z1, S5 smooth and short. Setae r3 and R1 on the interscutal membrane. Idiosomal setal pattern: 10A:8C/JV-3:ZV. The shield bears four pairs of solenostomes (gd1, gd2, gd6 and gd9). The crateriform solenostome gd2 is the biggest and gd1 is not discernible in some specimens.

Sternal shield (Fig. 5) slightly chitinized, smooth; it bears three pairs of setae and poroides pv1 and pv2. Genital shield normal, very slightly chitinized; muscle marks (V-line) prominent. Ventrianal shield (Fig. 2) slightly chitinized, striated, longer than wide, with lateral margins concave; it carries three pairs of preanal setae and in some specimens extremely minute pores; ratio of length/width = 1.55–1.96; rA = 0.88–1.06. Three pairs of setae, besides JV5, surround the ventrianal shield. The oblong primary inguinal sigillum (metapodal plate) is much longer (25 [22–31 μ]) than the minute secondary one (9.3 [8–12 μ]). Apex of peritreme reaches the bases of setae z2–z4.

In the insemination apparatus (spermatheca) (Fig. 4) the calyx (cervix) has a shallow-dome form; the slender adductor duct (major duct) is quite prominent and the atrium is adjacent to the calyx.

Eight setae on genu II and IV, seldom seven; seven setae on tibia IV, and in some specimens — five, six or eight. Hind basitarsus carries a short pointed macroseta. The movable digit of the chelicerae (Fig. 3) has one tooth; the fixed one has two subapical teeth, besides the *pilus dentilis*.

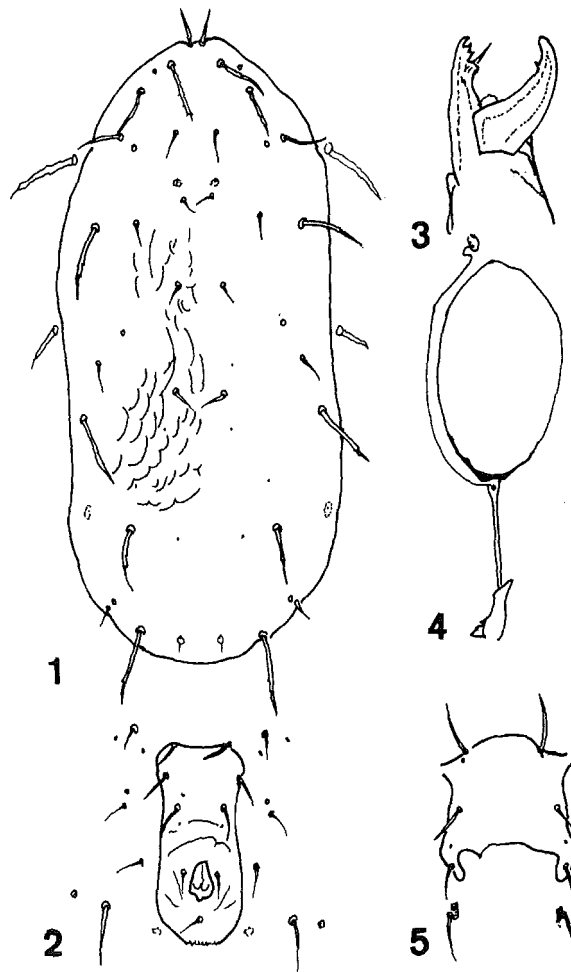
Measurements (in microns): Ds = 278 (266–295); Lva = 91 (86–101); lva at the preanal level = 52 (46–58); lva at the anal level = 49 (43–53); j1 = 17 (15–18); j4, j6 = 14 (12–15); z5 = 14 (12–17); j5 = 13 (10–15); J2 = 15 (13–18); j3 = 29 (27–33); z2 = 27 (25–30); z4 = 31 (28–37); s4 = 34 (32–38); Z1 = 15 (13–22); S2 = 33 (28–37); S5 = 13 (12–15); Z4 = 30 (25–35); Z5 = 38 (33–42); r3 = 36 (32–38); R1 = 23 (17–27); JV5 = 26 (23–28); st = 19 (17–22).

Male. Unknown.

MATERIAL EXAMINED: Holotype ♀ (No. 496f), Bet Dagan (Coastal Plain), 24.v.1962, on *Malus sylvestris*. Paratypes: 2♀, Bet Dagan, 9.viii.1961, on *M. sylvestris*; 1♀, Bat Shelomo (Mt. Carmel), 6.iv.1967, on *Quercus ithaburensis*; 6♀, Daliyat el Karmil (Mt. Carmel), 11.iv.1967, on *Quercus calliprinos*; 1♀, Hexagons Pool (Golan Heights), 7.x.1969, on *Q. ithaburensis* (coll. Tova Grinberg); 1♀, Newe Ya'ar (Yizre'el Valley), 15.xii.1969, on *Q. ithaburensis* (coll. Tova Grinberg).

ETYMOLOGY: This species is named in honor of our colleague and friend Professor Salvatore Ragusa di Chiara.

DIAGNOSIS: *K. ragusai* can be distinguished easily from *K. hmiminai* McMurtry and Bounfour (1989) in having four pairs of solenostomes on the dorsal shield (as opposed to six) and three pairs of preanal setae (as opposed to one). *K. ragusai* differs from *K. judaicus* (Swirski and Amitai, 1961) in having four pairs of solenostomes on the dorsal shield (as opposed to three), by bearing three pairs of setae on the sternal shield (as opposed to two), and by much shorter setae J2 (13–18 versus 42–47 μ) and S5 (12–15 versus 50–54 μ). In the following species five pairs of solenostomes (versus four in *K. ragusai*) are present on the dorsal shield: *K. alettae* Ueckermann and Loots (1985), *K. langei* Wainstein and Arutunian (1973) and *K. ericinus* Ragusa di Chiara and Tsolakis (1994). In *K. alettae* two pairs of preanal setae are present (as opposed to three) and setae J2 (28 μ), Z4 (50 μ) and Z5 (57 μ) are longer. In *K. langei* the setae J2 (25 μ), Z4 (43 μ) and S5 (22 μ) are longer and the macrosetae on hind basitarsus are slightly knobbed. *K. ericinus* has no teeth on the movable digit (versus one in *K. ragusai*), the apex of peritreme reaches j3–z2, as opposed to z2–z4, and the setae J2 (32–38 μ), S5 (22–26 μ), Z5 (46–54 μ) are longer. *K. aberrans* (Oudemans, 1930), *K. keae* (Papadoulis and Emmanouel, 1991) and *K. molle* Ueckermann and Loots (1985) have, similarly to *K. ragusai*, four pairs of



Figs. 1–5. *Kampimodromus ragusai* n. sp., female. 1. Dorsal shield. 2. Ventrianal shield. 3. Chelicera. 4. Insemination apparatus (spermatheca). 5. Sternal shield.

solenostomes on the dorsal shield. The distinguishing characters between them are given in Table 1.

****Kampimodromus ericinus* Ragusa di Chiara and Tsolakis, 1994**

MATERIAL EXAMINED: Neshar, 2.xii.69, *Salvia triloba*. Daliyat el Karmil, 11.v.67, *Quercus ithaburensis* (leaves and inflorescence). Bat Shelomo, 16.ix.70, *Quercus ithaburensis* (Grinberg, 1971, under *Amblyseius aberrans* (Oudemans)). Zikhron Ya'aqov (center), ii.70, *Quercus ithaburensis* (Wysoki and Swirski, 1971). Females only have been recorded.

TABLE 1
Distinguishing characters between *K. ragusai*, *K. aberrans*, *K. keae* and *K. molle*
(Measurements in microns).

	<i>K. ragusai</i>	<i>K. aberrans</i>		<i>K. keae</i>		<i>K. molle</i>	
		(1)	(2)	(3)	(1)	(3)	(1)
J2	13-18	22-29	22-23	20	20	44(41)	42
z4	28-37	32-37	35-37	32-35	32-37	35-44	41
s4	32-38	39-44	38-42	35-40	37-39	44-54	51
Z1	13-22	17-22	12-17	20	20	35-38	36
S5	12-15	10-14	13-17	20-26	22	19-22	19
Z4	25-35	36-41	38	26-29	29-32	35-44	39
st IV	17-22	19-22	18-21	0	12-14	25-30	31
Movable digit	1	0	0	1	1	0	0
Apex peritreme	z3-z4	j2-z3	j2-z3	z4	z4-s4	j2-z3	j2-z3

(1) Ragusa di Chiara and Tsolakis (1994); (2) *Quercus*, Scillato (Sicily), 9.ii.73; (3) Original description.

Neoseiulus barkeri Hughes, 1948

MATERIAL EXAMINED: Haifa (Gan haEm), 3.ix.87, *Casuarina torulosa*. Carmel Park, 26.viii.87, Gramineae. Zikhron Ya'aqov (Carmel Wine Cellars), 21.vii.88, Gramineae. Zikhron Ya'aqov, 14.vii.88, *Pinus* sp.; Gramineae; 15.v.90, Gramineae. Zikhron Ya'aqov (Newe Sharett), 4.viii.88, *Buchloe dactyloides*. Ramat haNadiv, 14.ix.67, undet. Compositae (Swirski and Amitai, 1968). Females only have been recorded.

Typhloseiella isotricha (Athias-Henriot, 1958b)

MATERIAL EXAMINED: Haifa (Ahuza), 17.viii.87, 8♀, *Inula viscosa*, *Capparis spinosa*. Carmel Park, 27.viii.87, 1♀, *I. viscosa* (leaves infested by rust). Bet Oren, 14.ix.68, *I. viscosa* (Amitai and Swirski, 1978); xi.69, ♀, *I. viscosa* (Wysoki and Swirski, 1971). Zikhron Ya'aqov (center), 12.xii.85, 1♀, 1♂, *I. viscosa*.

Subfamily PHYTOSEIINAE Berlese

Phytoseius plumifer (Canestrini and Fanzago, 1876)

MATERIAL EXAMINED: Haifa (Bahai Shrine), 10.ix.87, abundant, *Ficus carica* (leaves, lower side); undet. plant. Haifa (Ahuza), 17.viii.87, *Micromeria serpyllifolia*. Haifa (Gan haEm), 3.ix.87, abundant, *Ficus carica* (leaves, lower side). Haifa (Nahal Lotem), 3.ix.87, *Smilax aspera*; abundant, *Ficus carica* (leaves, lower side); *Celtis australis*. Nahal Galim, 19.i.70, *Cistus incanus*; *Cistus salviifolius*. Muhraqa, 6.viii.70, *Smilax aspera* (Grinberg, 1971). Ancient Quarries, 2.ix.91, *Quercus calliprinos*; *Cistus salviifolius*. Bet Oren, 2.ix.91, *Ficus carica*. Zikhron Ya'aqov (center), 14.vii.88, *Parietaria* sp.; *Inula viscosa*; 15.v.90, *Rubus sanctus*. Zikhron Ya'aqov (Newe haBaron), 11.viii.88, common, *Ficus carica*. All stages of *P. plumifer* have been recorded.

Subfamily TYPHLODROMINAE Chant and McMurtry

Amblydromella crypta (Athias-Henriot, 1960)

SYNONYMY: ?Junior synonym of *Amblydromella foenalis* (Oudemans, 1930).

MATERIAL EXAMINED: Haifa (French Carmel), 10.ix.87, 1♀, undet Labiatae. Haifa (Gan haEm), 3.ix.87, 1♀, *Citrus* sp.; 1♀, *Pinus* sp.; 1♀, *Casuarina torulosa*. Haifa (Nahal Lotem), 3.ix.87, 1♀, *Ruscus aculeatus*; 1♀, *Laurus nobilis*; 1♀, *Hibiscus rosa-sinensis*. Ramat Dania, 26.viii.87, 1♂, Gramineae. Haifa (University of Haifa), 26.viii.87, 2♀, *Pinus brutia*; 1♀ *Quercus ithaburensis*; *Genista sphacellata*; 1♀, *Smilax aspera*. Carmel Park, 26.viii.87, 2♀, *Quercus calliprinos* (leaves with galls formed by the mite *Aceria quercus* [Eriophyidae]). 2 km east of the University of Haifa, 17.ix.87, 3♂, *Pinus* sp. (dry needles); 1♀, *Quercus calliprinos*; 1♀, *Pistacia lentiscus*. Rom haCarmel 1.x.87, 1♀, *Pinus halepensis*; 1♀, *Asparagus aphyllus*; 1♀, 1 lar., *Genista sphacellata*; 1♀, 2♂, *Pistacia lentiscus*; 21.vi.88, 1♀, *Crataegus azarolus*; 1♀, *Quercus calliprinos*. Muḥraqa, 24.ix.69, 5♀, 1♂, *Quercus ithaburensis* (lichens on trunk); 30.viii.90, 1♀, *Pinus halepensis*. Zikhron Ya'aqov (Carmel Wine Cellars), 21.vii.88, 1♀, 1 nym., *Asparagus aphyllus*. Ramat haNadiv, 4.viii.88, 1♀, *Asparagus aphyllus*.

Amblydromella sp. near *crypta* (Athias-Henriot, 1960)

MATERIAL EXAMINED: Rom haCarmel, 1.x.87, 1♀, 1 nym., *Crataegus azarolus*.

Amblydromella invecta (Chant, 1959)

SYNONYMY: *A. sternlichti* (Swirski and Amitai, 1968)

MATERIAL EXAMINED: Isfiya, 11.iv.67, 3♀, *Quercus calliprinos*. Bat Shelomo, 6.iv.67, 9♀, *Quercus ithaburensis* (leaves and inflorescence); 3♀, *Q. calliprinos* (leaves) (Swirski and Amitai, 1968). Zikhron Ya'aqov, xi.68–iii.69, ♀ all through the winter, ♂ not found in i, *Quercus ithaburensis* (Wysoki and Swirski, 1971). Alona Park, 18.viii.88, 2♀, 1♂, 1 nym., *Quercus ithaburensis*.

Amblydromella porathi (Swirski and Amitai, 1967)

MATERIAL EXAMINED: Daliyat el Karmil, 11.iv.67, ♀, *Quercus ithaburensis* (leaves and inflorescence). Muḥraqa, 24.ix.69, 2♀, 1♂, *Quercus ithaburensis*; 3♀, 1♂, *Laurus nobilis*; 6.viii.70, 4♀, *Quercus calliprinos*; 1♀, *Rhamnus palaestinus*; 29.i.70, 1♀, *Quercus ?infectoria* (Grinberg, 1971). 30.viii.90, 1♀, *Laurus nobilis*. Bat Shelomo, 23.x.69, many ♀♂, *Quercus ithaburensis* (Grinberg, 1971). Alona Park, 18.viii.88, 1♀, *Quercus calliprinos*.

Amblydromella recki (Wainstein, 1958)

MATERIAL EXAMINED: Haifa (Bahai Shrine, Western Carmel, Aḥuza) iv, viii, ix, *Ballota rugosa*, *Carthamus tinctorius*, *Cistus* sp., *Phillyrea latifolia*, *Pinus halepensis*, *Sarcopoterium spinosum*. University of Haifa, Carmel Park, 1.5 km east of Haifa (Ramat Dania), vii, viii, ix,

Echinops sp., *Sarcopoterium spinosum*. Rom haCarmel, x, *Cirsium phyllocephalum*, *Cistus incanus*, *Inula viscosa* (leaves, lower side, many whiteflies, no rust), *Sarcopoterium spinosum*. Muḥraqa, viii, ix, *Coridothymus capitatus*, *Quercus calliprinos*. Road between Daliyat el Karmil and Isfiya, viii, undet. Gramineae. Bet Oren, ix, xi, *Carthamus tinctorius*, *Cistus* sp., *Inula viscosa*. Naḥal Oren (100 m a.s.l.), xi, *Pistacia palaestina*. 'En Hod, xi, *Althaea* sp., *Inula viscosa*, *Sarcopoterium spinosum*, *Vitex agnus castus*. Bat Shelomo, vi, viii, *Amaranthus* sp., *Carthamus tenuis*, dry Gramineae. 1–0.5 km north-east of Zikhron Ya'akov, vii, *Calycotome villosa*, *Capparis spinosa*, *Echinops* sp., *Inula viscosa*, *Majorana syriaca*, *Micromeria fruticosa*, *Sarcopoterium spinosum*. Zikhron Ya'akov (Carmel Wine Cellars, Newe haBaron, center, Newe Sharett, Alona Park), v, vii, viii, *Althaea* sp., *Amaranthus* sp., *Asparagus aphyllus*, undet. Boraginaceae, *Calycotome villosa*, *Carthamus tenuis*, *C. tinctorius*, *Chloris gayana*, *Cupressus sempervirens*, *Cynodon dactylon*, undet. Gramineae, dry Gramineae, *Heliotropium* sp., *Hypericum* sp., *Inula viscosa*, *Majorana syriaca*, *Phagnalon rupestre*, *Ruta chalepensis*, *Salvia triloba*, *Salvia* sp., *Sarcopoterium spinosum*, *Smilax aspera*, *Tolpis virgata*, *Verbascum* sp., *Withania somnifera*. Ramat haNadiv, vii, viii, *Echinops* sp., *Majorana syriaca*. Kefar Shumi, vii, *Carthamus tinctorius*, *Verbascum* sp. All stages of *A. recki* have been recorded in iv–xi. During the winter (xii, i), females were found 1.5 km east of Haifa (Ramat Dania), on *Cistus salviifolius* (Grinberg, 1971) and were recorded from other locations and plants (Wysoki and Swirski, 1971, overwintering studies).

****Amblydromella thesbites* Swirski and Amitai n. sp.**

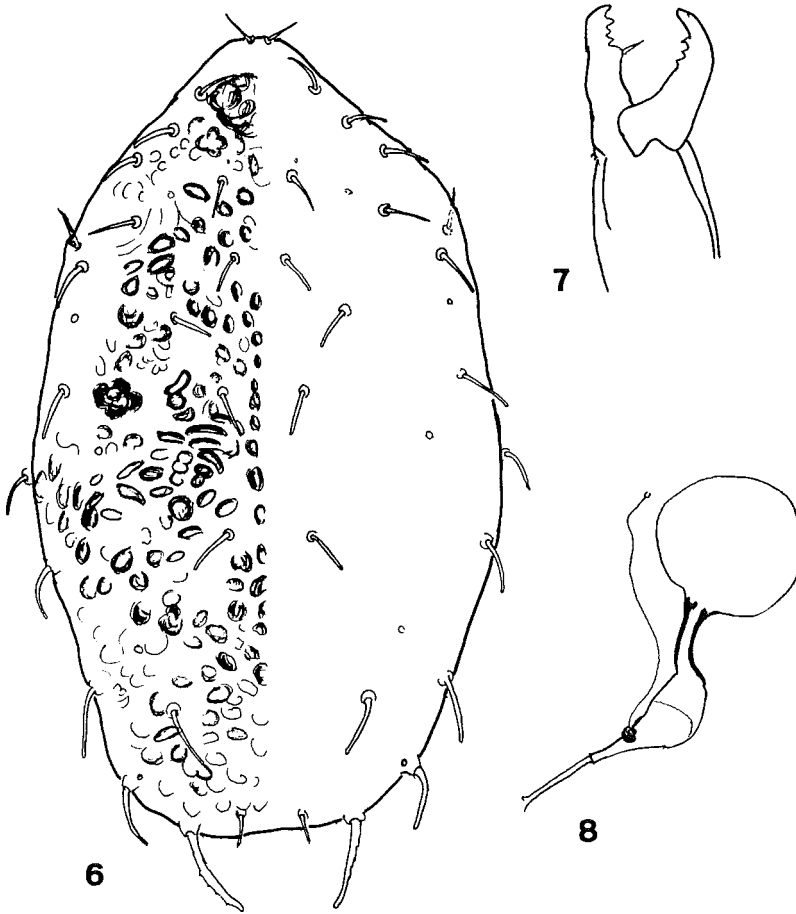
(Figs. 6–12)

Female. Dorsal shield (Fig. 6) suboval, chitinized, strongly ornamented with cells. It carries 18 pairs of setae; some of the setae are truncated. Setae r3 and R1 on the interscutal membrane. Each group of the above setae subequal in length: j1, J2, j3, z3, z4 and s4; j4, j5, j6, z2 and z5. All setae are short, not equal to, or exceeding the distances between their bases and those of the setae following next, except for seta S5, which is subequal to or shorter than the distance between its base and the base of seta Z5; the latter is of moderate length. Idiosomal setal pattern — 12A:8A/JV:ZV.

Sternal shield smooth, barely chitinized; it bears two pairs of setae. Genital shield smooth, chitinized; muscle marks (V-line) prominent. Ventrianal shield (Fig. 9) smooth; subpentagonal in shape, with a convex anterior margin and slightly constricted lateral margins; it carries four pairs of preanal setae; minute solenostomes present or sometimes indiscernible; ratio of length/width = 1.29–1.36; RA = 0.96–1.09. Three pairs of setae, besides JV5, surrounding the ventrianal shield. Primary inguinal sigillum (metapodal plate) (28–33 μ) is much larger than the secondary one (12–18 μ). Apex of peritreme reaches the bases of setae j1.

In the insemination apparatus (spermatheca) (Fig. 8) the neck is swollen; the atrium is not adjacent to the cervix. Seven setae on genu II. Hind basitarsus carries a blunt macroseta.

In the chelicerae (Fig. 7) the fixed digit bears 2 or 3 subapical teeth, besides the *pilus dentilis*; the movable digit has two teeth and in some specimens a third minute tooth is barely discernible.



Figs. 6–8. *Amblydromella thesbites* n. sp., female. 6. Dorsal shield. 7. Chelicera. 8. Insemination apparatus (spermatheca).

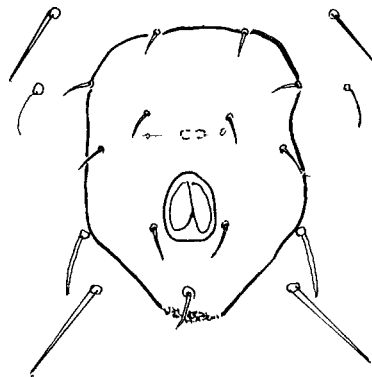


Fig. 9. *Amblydromella thesbites* n. sp., female. Ventrianal shield.

Measurements (in microns): Ds = 382(365–398); Lva = 128(118–134); lva at the preanal level = 93(91–96); lva at the anal level = 96 (91–100); j1 = 22(18–27); j4, j5 = 18(17–20); j6 = 20(18–22); J2 = (20–25); j3 = 22(20–23); z2 = 19(18–20); z3, z4 = 22(20–25); s4, s6, S2 = 25(22–27); S4 = 30(28–32); S5 = 31(28–33); Z4 = 27(25–28); Z5 = (42–50); r3 = 25(23–27); R1 = 22(20–23); JV5 = 37(33–42); st = 35 (33–38).

Male. Dorsal shield (Fig. 10) suboval, chitinized, strongly ornamented with cells. It carries 20 pairs of setae; setae r3 and R1 are placed on the shield.

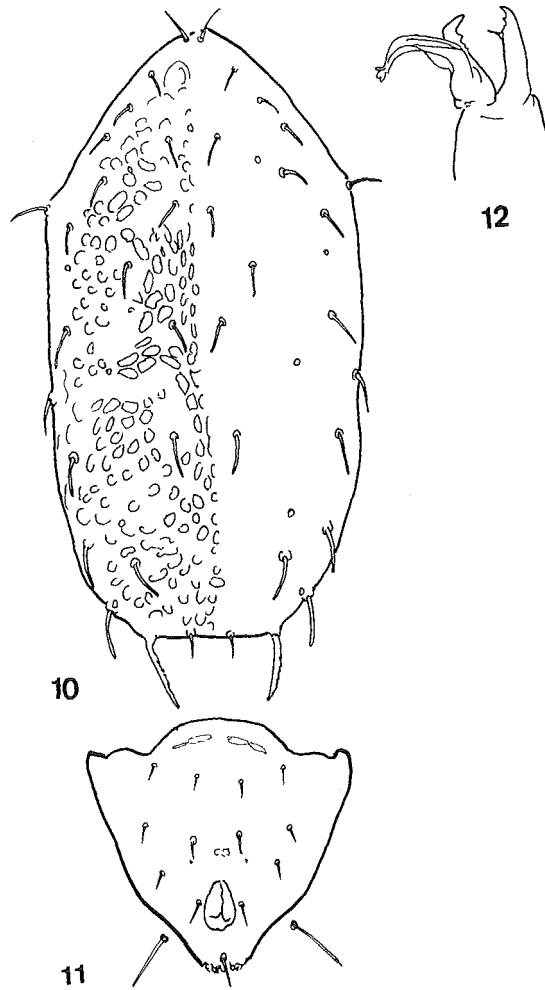
Ventrianal shield (Fig. 11) subtriangular in shape; it carries five pairs of preanal setae and a pair of solenostomes; ratio of length/width = 1.17–1.23. The opisthogastric membrane bears one pair of setae, viz. JV5. Apex of peritreme reaches almost the bases of setae j1. Hind basitarsus bears a blunt macroseta. Structure of the spermatodactyl is given in Fig. 12.

Measurements (in microns): Ds = 309 (302–329); Lva = 123(120–126); lva = 149 (134–154); j1 = 17.5 (17–18); j4, j5 = 14 (13–15); j6 = 16 (15–17); J2 = 18; j3, R1 = 19 (18–20); z2 = 16 (15–17); z3, z4 = 17.5 (17–18); s4 = 18.5 (18–19); s6 = 19.5 (19–20); S2, r3 = 21 (20–22); S4, S5 = 24.5 (23–25); Z4 = 23 (22–25); Z5 = 36 (33–38); z5 = 15 (13–16); JV5 = 22.5 (22–23); st = 27 (25–28).

MATERIAL EXAMINED: Holotype ♀ (No. 2169d) and 3 paratype ♀, Miqwe Yisrael (Coastal Plain), 19.vi.68, on *Maclura pomifera*; 2 paratype ♀, 1 allotype ♂ and 2 paratype ♂, same locality and host, 23.vi.68; one paratype ♀, Miqwe Yisrael, 4.vii.68, on *Argenia sideroxylon*; one paratype ♀, Miqwe Yisrael, 9.vi.88, on *Maclura pomifera*; one paratype ♀, 1.5 km east of Haifa (Ramat Dania), 17.ix.87, on *Ceratonia siliqua*.

ETYMOLOGY: This species is named in honor of the Hebrew prophet Elias Thesbites, many of the important events of his life being associated with Mt. Carmel. It is a noun in apposition.

DIAGNOSIS: Wainstein (1972) erected a new subgenus — *Aphanoseius* — in the genus *Anthoseius* De Leon, 1959, in which he included the following species: *Anthoseius (Aphanoseius) verrucosus* Wainstein (1972) [type species of the subgenus]; *A. (Aph.) clavatus* Wainstein (1972); *A. (Aph.) rubetum* Wainstein (1972); *A. (Aph.) wichmani* (Hirschmann, 1962); *A. (Aph.) ndibu* (Pritchard and Baker, 1962); *A. (Aph.) bakeri* (Garman, 1948, sensu Westerboer and Bernhard, 1963) and *A. (Aph.) caucasicus* (Abbasova, 1970). *A. thesbites* can be distinguished from *A. verrucosus* by the presence of a swollen neck in the insemination apparatus and by the absence of clavate macrosetae on genu and tibia of leg IV. We compared our material to holotypes of *A. clavatus* and *A. rubetum*. In *A. clavatus*, setae Z5 and JV5 and macrosetae on leg IV are clavate (in contrast to *A. thesbites*). *A. thesbites* closely resembles *A. rubetum*, from which it can be distinguished by the following characters: (i) setae j4, j5, j6 are slightly blunt in *A. thesbites* and pointed in *A. rubetum*; (ii) seta Z5 is relatively thick and scarcely serrate in *A. thesbites*, being thinner and serrate in *A. rubetum*; (iii) seta Z4 in *A. thesbites* is thicker than in *A. rubetum*; (iv) in *A. thesbites* the cells on the dorsal shield are scattered all over, whereas in *A. rubetum* they are concentric in some patches. In the insemination apparatus of the following species swollen necks are absent (in contrast to *A. thesbites*): *A. bakeri*, *A. caucasicus* and *A. ndibu*. *A. wichmani* differs by the absence of solenostomes on the ventrianal shield and by having three pairs of setae on the sternal shield (Wainstein, 1972). Females of *A. thesbites* differ from *A. elmassri* (Bayan, 1988) (collected on olive trees in Lebanon), by the presence of a swollen neck in the insemination apparatus and of solenostomes on the ventrianal shield and by the absence of knobbed macrosetae on genu, tibia and basitarsus of leg IV.



Figs. 10–12. *Amblydromella thesbites* n. sp., male. 10. Dorsal shield. 11 Ventrianal shield. 12. spermatodactyl.

Bawus talbii (Athias-Henriot, 1960)

MATERIAL EXAMINED: 0.5 km north-east of Zikhron Ya'aqov, 14.vii.88, *Pistacia palaestina*. Zikhron Ya'aqov (center), 14.viii.88, *Olea europaea*. Females only have been recorded.

Neoseiulella carmeli (Rivnay and Swirski, 1980)

MATERIAL EXAMINED: Haifa (University of Haifa), 26.viii.87, *Quercus calliprinos*. Carmel Park, 26.viii.87, *Salvia* sp. Bet Oren, 2.ix.91, *Phillyrea latifolia*. Nahal Oren, 6.viii.70, 15,

30.viii.72, *Quercus calliprinos* (Rivnay and Swirski, 1980). 1 km north-east of Zikhron Ya'aqov, 21.viii.88, *Styrax officinalis*. Females only have been recorded.

Neoseiulella montforti (Rivnay and Swirski, 1980)

MATERIAL EXAMINED: Haifa (Western Carmel), 10.ix.87, *Quercus calliprinos*. Females only have been recorded.

Typhlodromus athiasae Porath and Swirski, 1965

MATERIAL EXAMINED: Haifa (Bahai Shrine, Western Carmel, French Carmel, Gan haEm, Nahal Lotem, Ahuza), i, viii, ix, *Ailanthus glandulosus*, *Althaea setosa*, *Asparagus aphyllus*, *A. stipulatus*, *Capparis spinosa*, *Casuarina torulosa*, *Celtis australis*, *Ceratonia siliqua*, *Cistus* sp., *Cupressus sempervirens*, *Ephedra campylopoda*, Gramineae (dry), *Inula viscosa*, *Laurus nobilis*, *Lonicera caprifolium*, *Olea europaea*, *O. europaea* var. *oleaster*, *Phillyrea latifolia*, *Pinus halepensis*, *Pinus* sp., *Pistacia lentiscus*, *P. palaestina*, *Quercus calliprinos*, *Rhamnus alaternus*, *Rosmarinus officinalis*, *Rubia tenuifolia*, *Smilax aspera*. Nahal Galim, i, *Cistus salvifolius*, *Smilax aspera*. Carmel Park, viii, undet. Gramineae, *Lonicera etrusca*, *Majorana syriaca*, *Pinus halepensis*, *Quercus calliprinos* (leaves with galls formed by *Aceria quercus* [Acarina: Eriophyidae]), *Rosmarinus officinalis*, *Salvia* sp. University of Haifa, 1.5 km east of Haifa (Ramat Dania), 2 km east of the University of Haifa, vi, viii, ix, *Arbutus andrachne*, *Asparagus aphyllus*, *Ceratonia siliqua*, *Cercis siliquastrum*, *Cistus incanus*, *Cistus* sp., *Cupressus sempervirens*, *Daucus carota* ssp. *maximus*, *Echinops* sp., *Genista fasselata*, *Hypericum thymifolium*, *Laurus nobilis*, *Lycium* sp., *Olea europaea*, *Phillyrea latifolia*, *Pinus halepensis*, *Pinus* sp., *Pistacia palaestina*, *Quercus calliprinos*, *Q. ithaburensis*, *Sarcopoterium spinosum*, *Smilax aspera*, *Thymelaea hirsuta*, *Viscum cruciatum*. Rom haCarmel, vi, x, *Asparagus aphyllus*, *Cirsium phyllocephalum*, *Crataegus azarolus*, *Cupressus sempervirens*, *Pinus halepensis*, *Quercus calliprinos*, *Smilax aspera*. Muhraqa, viii, ix, xi, *Asparagus aphyllus*, *Asparagus* sp., *Calycotome villosa*, *Cistus* sp., *Laurus nobilis*, *Lonicera etrusca*, *Olea europaea*, *Phillyrea latifolia*, *Pinus halepensis*, *Pistacia palaestina*, *Quercus calliprinos*, *Q. ithaburensis*, *Rhamnus palaestinus*, *Rubia* sp., *Ruscus aculeatus*, *Smilax aspera*. Road between Elyaqim and Daliyat el Karmil, Daliyat el Karmil and Road between Daliyat el Karmil and Isfiya, iii, viii, *Asparagus aphyllus*, *Crataegus azarolus*, *Pinus canariensis*, *P. halepensis*, *Ruscus aculeatus*. 'En Hod, xi, *Amaranthus* sp., *Asparagus* sp., *Calycotome villosa*, *Cistus salvifolius*, *Cistus* sp., *Ephedra campylopoda*, *Hedera helix*, *Pistacia lentiscus*, *Vitex agnus castus*. Bet Oren and Ancient Quarries, i, ii, viii, ix, xi, *Calycotome villosa*, *Ceratonia siliqua*, *Cistus* sp., undet. Labiatae, *Lonicera caprifolium*, *Lycium* sp., *Majorana syriaca*, *Pinus* sp., *Phillyrea latifolia*, *Pistacia atlantica*, *P. palaestina*, *P. lentiscus*, *Quercus calliprinos*, *Q. ithaburensis*, *Quercus* sp., *Rosmarinus officinalis*, *Salvia triloba*, *Smilax aspera*, *Stachys* sp., *Ulmus* sp. Sanatorium, ix, *Cistus* sp., *Quercus calliprinos*, *Rhamnus* sp., *Salvia* sp., *Smilax aspera*. Carmel Caves, vii, *Quercus calliprinos*, *Salix* sp. Elyaqim, ii, *Olea europaea*. Bat Shelomo, vi, viii, *Ephedra campylopoda*, Gramineae (dry), *Pinus* sp. Me'ir Shefeya, vi, *Olea europaea*. 100m south-east of Fureidis junction, vii, *Ephedra campylopoda*, *Smilax aspera*. Ma'yan Zevi, vii, *Quercus calliprinos*, *Rubia tenuifolia*, *Ruta chalepensis*, *Viburnum tinus*. 0.5, 1 km north-east of Zikhron Ya'aqov, vii, *Achyranthes aspera*, *Capparis spinosa*, undet.

Gramineae, *Heliotropium europaeum*, *Majorana syriaca*, *Olea europaea*, *Phillyrea latifolia*, *Pistacia lentiscus*, *P. palaestina*, *Punica granatum*, *Quercus calliprinos*, *Rosa* sp., *Solanum* sp. (leaves infested with *Tetranychus urticae* Koch), *Smilax aspera*, *Styrax officinalis*, *Viburnum tinus*. Zikhron Ya'aqov (Carmel Wine Cellars, center, Central Bus Station, Newe haBaron, Alona Park, Newe Sharett), vii, viii, ix, *Achyranthes aspera*, *Adhatoda vasica*, *Amygdalus communis*, *Amaranthus* sp., *Asparagus aphyllus*, *A. palaestinus*, *Asparagus* sp., *Bougainvillea* sp., *Calycotome villosa*, *Ceratonia siliqua*, *Chloris gayana*, *Cichorium pumilum*, *Citrus* sp., *Cotoneaster* sp., *Crataegus azarolus* (infested with whiteflies), *Crepis aspera*, *Cupressus sempervirens*, *Ephedra campylopoda*, *Eriobotrya japonica*, *Gallium* sp., undet Gramineae, *Heliotropium* sp., *Hypericum* sp., *Inula viscosa*, *Morus* sp., *Olea europaea*, *Pallenis spinosa*, *Phillyrea latifolia*, *Pinus brutia*, *P. halepensis*, *Pinus* sp., *Pistacia lentiscus*, *Punica granatum*, *Quercus calliprinos*, *Rhamnus alaternus*, *R. palaestinus*, *Rhamnus* sp., *Rubia tenuifolia*, *Ruta chalepensis*, *Smilax aspera*, undet. Solanaceae, *Tamarix* sp., *Vitex agnus castus*. Ramat haNadiv, v, vii, *Asparagus* sp., *Cistus* sp., *Olea europaea*, *Phillyrea latifolia*, *Pinus pinea*, *Pistacia lentiscus*, *P. palaestina*, *Quercus calliprinos*, *Rhamnus alaternus*, *R. palaestinus*, *Sarcopoterium spinosum*, *Washingtonia filifera*. Kefar Shumi, vii, *Ruta bracteosa*.

All stages of *T. athiasae* have been recorded all the year round.

****Typhlodromus ernesti* Ragusa and Swirski, 1978**

MATERIAL EXAMINED: Haifa (Gan haEm), 3.ix.87, 1♀, *Asparagus stipulatus*. 2 km east of the University of Haifa, 7.ix.87, 1♀, 1♂, *Pinus* sp. Rom haCarmel, 1.x.87, 2♀, *Asparagus aphyllus*; 1♀, *Pinus halepensis*. Muhraqa, 30.viii.90, 1♀, *P. halepensis*. Elyaqim, 15.ii.89, 1♀, *Pinus* sp. Bet Oren, 5.xi.87, 1♀, *Laurus nobilis*. Zikhron Ya'aqov (center), 11.viii.88, 1♀, *Pistacia lentiscus*; 15.v.90, 4♀, 1♂, *Pinus* sp. Zikhron Ya'aqov (Newe haBaron), 11.viii.88, 2♀, *P. halepensis*. Ramat haNadiv, 4.viii.88, 3♀, 2♂, *P. halepensis*; 1♀, *Asparagus palaestinus*; 1♀, *Coridothymus capitatus*. Kefar Shumi, 18.v.89, 2♀, *Pinus* sp.

****Typhlodromus exhilaratus* Ragusa, 1977**

MATERIAL EXAMINED: Haifa (University of Haifa), 26.viii.87, 1♀, *Cistus* sp. Carmel Park, 26.viii.87, 1♀, *Majorana syriaca*. Rom haCarmel, 1.x.87, 3♀, *Coridothymus capitatus*. Bet Oren, 2.ix.91, 1♀, 1♂, *Pinus halepensis*. Sanatorium, 2.ix.91, 4♀, 1♂, *Pinus halepensis*.

***Typhlodromus klimenkoi* Kolodochka, 1980**

MATERIAL EXAMINED: Zikhron Ya'aqov (center), 14.vii.88, 1♀, *Asparagus* sp.

****Typhlodromus setubali* Dosse, 1961**

MATERIAL EXAMINED: Bet Oren, 2.ix.91, 1♀, *Quercus calliprinos*.

***Typhloseiulus simplex* (Chant, 1956)**

MATERIAL EXAMINED: 1.5 km, east of Haifa (Ramat Dania), 29.xi.69, 3♀; 15.xii.69, 3♀, all on

Quercus calliprinos (Grinberg, 1971). Haifa (Ahuzá), 17.viii.87, 5♀, *Q. calliprinos*. Nahal Galim, 19.i.70, 2♀, 1♂, 1 nym., *Q. calliprinos* (Grinberg, 1971). Bet Oren, 9.i.91, 2♀, 1 lar., *Quercus* sp.; 2.ix.91, 3♀, *Quercus ithaburensis* (on lichens); 1♀, 1♂, *Pistacia lentiscus*. Carmel Caves, 27.vii.75, 1♀, *Q. calliprinos*.

DISCUSSION

The following species were recorded from Israel on Mt. Carmel only: *Amblyseius longilaterus*, *A. zwoelferi*, *Neoseiulella carmeli*, *Typhlodromus klimenkoi* and *T. setubali* (see Table 2). *A. longilaterus*, which was detected in Israel once on undetermined Gramineae, was described from material collected in Algeria also on Gramineae (*Cynodon dactylon*), vine and *Sorghum* silage (Athias-Henriot, 1957). *A. zwoelferi*, known from parts of Europe, west Asia and USA, was collected on various trees, shrubs, perennials and annual plants, as well as in a nest of the rodent *Arvicola terrestris* Linnaeus (Rodentia, Muridae) (Abbasova, 1972; Arutunian, 1977; Daneshvar, 1980; Moraes de et al., 1986; Kolodochka, 1978; Mijuskovic and Tomasevic, 1975; Schuster and Pritchard, 1963; Tuttle and Muma, 1973; Wainstein, 1975; Wainstein and Arutunian, 1970). To the best of our knowledge, *N. carmeli* is indigenous to Israel. One female of *T. klimenkoi* was found in Kirghiz (former USSR) on *Pistacia vera* (Kolodochka, 1980). *T. setubali*, originally known from Portugal (Dosse, 1961), was subsequently found also in Germany, Italy, Morocco, Jordan and Spain (Allawi, 1991; Chant and Yoshida Shaul, 1987; Moraes de et al., 1986; McMurtry and Bounfour, 1989; Ragusa and Swirski, 1978).

The following Mt. Carmel phytoseiid mites were recorded from only a few regions of Israel: *Amblyseius leucophaeus*, *Amblydromella thesbites*, *Kampimodromus ericinus*, *K. ragusai*, *Neoseiulella montforti*, *Typhlodromus ernesti*, *T. exhilaratus* and *Typhloseiulus simplex*. *A. leucophaeus* was found in Israel on Mt. Carmel on undetermined Boraginaceae as well as in the Coastal Plain and Northern Negev on *Thymelaea hirsuta* (Swirski and Amitai, 1984). *A. thesbites* was recorded only from Mt. Carmel and the Coastal Plain. *K. ericinus* was recorded from Mt. Carmel, Galilee, Judean Hills, Coastal Plain, Judean Foothills and Yizre'el Valley, on *Quercus*, *Salvia* and *Cistus*. Type locality and habitat of this species — Italy and Greece, on *Rubus* and *Quercus* (Ragusa di Chiara and Tsolakis, 1994). *K. ragusai* was recorded in Israel from Mt. Carmel, Shomron, Coastal Plain and Yizre'el Valley on *Quercus* and *Malus sylvestris*. *Neoseiulella montforti*, in addition to on Mt. Carmel, was found in Israel also in Upper Galilee and in the Coastal Plain on *Quercus*, *Platanus*, *Artemisia* and *Inula*. *T. ernesti* was found in Israel on Mt. Carmel and in Upper Galilee, Hula Valley and the Coastal Plain, on trees and shrubs of the maquis and on citrus. This phytoseiid, originally described from Tuscany (Italy) on *Taxus baccata* (Ragusa and Swirski, 1978), was collected also in Germany, along the Austro-German border, Switzerland and Norway on trees and shrubs (Chant and Yoshida-Shaul, 1987). It seems that *T. ernesti* prefers trees and shrubs to annual plants. *T. exhilaratus* was found, besides on Mt. Carmel, also in the Judean Hills and in the Coastal Plain, on trees and shrubs of the maquis. In the Mediterranean Basin *T. exhilaratus* has been recorded from Italy and Greece on citrus and various trees and shrubs (Papaioannou-Souliotis et al., 1994; Ragusa, 1977; Swirski and Ragusa, 1977). *Typhloseiulus simplex* was found in Israel only in the mountains (Mt. Carmel, Upper and Lower Galilee and Judean Hills) on trees, shrubs and climbing plants (*Rhamnus*, *Quercus*, *Pistacia*, *Styrax* and *Rubia*) (Grinberg, 1971).

Surprisingly, only one female of *Amblyseius swirskii*, which is very common on many plants

TABLE 2
Distribution of Mt. Carmel phytoseiid mites in the various geographical areas of Israel

Species	Shomron		Judean	Coastal	Judean	Jordan	Yizre'el	Negev		Dead Sea
	Galilee	Mts.	Hills	Plain	Foothills	Valley	Valley	N	C	
<i>Amblyseius bicaudus</i>	+			+		+		+	+	+
<i>A. cucumeris</i>			+	+				+	+	+
<i>A. leucophaeus</i>				+				+		
<i>A. longilaterus</i>										
<i>A. messor</i>	+			+	+	+	+	+		
<i>A. swirskii</i>	+		+	+	+	+	+	+		
<i>A. zwoelferi</i>										
<i>Amblydromella crypta</i>				+		+		+		
<i>Am. invecta</i>	+	+		+				+		
<i>Am. porathi</i>	+	+	+	+				+		
<i>Am. recki</i>	+	+	+	+	+	+	+	+	+	
<i>Am. thesbites</i>				+						
<i>Bawus talbii</i>			+	+		+	+			
<i>Euseius scutalis</i>	+	+	+	+	+	+	+	+		+
<i>Kampimodromus ericinus</i>	+		+	+	+		+			
<i>K. ragusai</i>		+		+			+			
<i>Neoseiulella carmeli</i>										
<i>N. montforti</i>	+			+						
<i>Neoseiulus barkeri</i>	+		+	+	+	+	+	+	+	+
<i>Phytoseius plumifer</i>	+		+	+	+	+	+			+
<i>Typhlodromus athiasae</i>	+	+	+	+	+	+	+	+	+	+
<i>T. ernesti</i>	+			+						
<i>T. exhilaratus</i>			+	+						
<i>T. klimenkoi</i>										
<i>T. setubali</i>										
<i>Typhloseiella isotricha</i>	+		+	+						
<i>Typhloseiulus simplex</i>	+		+							

N = Northern. C = Central.

in the various regions of Israel, was detected on Mt. Carmel. *Amblydromella porathi*, *A. invecta* and *Typhloseiella isotricha* were recorded from the Mediterranean phytogeographical zones of Israel (see Table 2). The first species was found in Israel usually on trees and shrubs of the maquis (*Ceratonia*, *Quercus*, *Laurus*, *Olea*, *Phillyrea*, *Rhamnus*, *Crataegus*, *Styrax*) and seldom on apple and *Viola* (Amitai and Swirski, 1978; Grinberg, 1971; Swirski and Amitai, 1968; Wysoki and Swirski, 1971). We have no information on the distribution of *A. porathi* in foreign countries. *A. invecta* was found usually on trees and shrubs (*Quercus*, *Morus*, *Platanus*, *Thymelaea*, *Vitex*), less often on herbaceous plants (*Alcea* and *Viola*) (Amitai and Swirski, 1978; Grinberg, 1971; Swirski and Amitai, 1968; Wysoki and Swirski, 1971). *Typhloseiella isotricha* is very common on *Inula viscosa*. The largest populations were observed by Swirski and Amitai (1984) on those plants infested by rust. Some of the mites were reddish, apparently feeding upon a fungus.

The following species of Mt. Carmel phytoseiid mites were recorded from most regions of Israel: *Amblyseius bicaudus*, *A. cucumeris*, *A. messor*, *Amblydromella recki*, *Bawus talbii*, *Euseius scutalis*, *Neoseiulus barkeri*, *Phytoseius plumifer* and *Typhlodromus athiasae*. *A.*

1. Haifa (French Carmel) (200 m a.s.l.)
2. Haifa (Bahai Shrine)
3. Haifa (Western Carmel) (190 m a.s.l.)
4. Haifa (Nahal Lotem) (100 m a.s.l.)
5. Haifa (Gan haEm) (280 m a.s.l.)
6. Haifa (Ahuza) (290 m a.s.l.)
7. Haifa (Ramat Dania) (350 m a.s.l.)
8. Haifa (University of Haifa) (400 m a.s.l.)
9. Nahal Galim (283 m a.s.l.)
10. 1.5 km east of Haifa (Ramat Dania) (300 m a.s.l.)
11. Nesher (50 m a.s.l.)
12. Junction (Zomet) Nesher–Usfieh (400 m a.s.l.)
13. 2 km east of the University of Haifa (510 m a.s.l.)
14. Rom haCarmel (546 m a.s.l.)
15. Isfiya (512 m a.s.l.)
16. Road between Isfiya and Daliyat el Karmil (410 m a.s.l.)
17. Daliyat el Karmil (420 m a.s.l.)
18. Muhraqa (482 m a.s.l.)
19. Road between Daliyat el Karmil and Elyaqim (464 m a.s.l.)
20. Bet Oren (383 m a.s.l.)
21. Ancient Quarries (300 m a.s.l.)
22. Nahal Oren (100 m a.s.l.)
23. Nahal Oren (200 m a.s.l.)
24. Sanatorium (320 m a.s.l.)
25. En Hod (125 m a.s.l.)
26. Carmel Caves (170 m a.s.l.)
27. Elyaqim (230 m a.s.l.)
28. Bat Shelomo (50 m a.s.l.)
29. Me'ir Shefeya (145 m a.s.l.)
30. 1 km north-east of Zikhron Ya'aqov (100 m a.s.l.)
31. 0.5 km north-east of Zikhron Ya'aqov (149 m a.s.l.)
32. 100 m south-east of Fureidis junction (75 m a.s.l.)
33. Zikhron Ya'akov (Carmel Wine Cellars)
34. Zikhron Ya'aqov (center) (170 m a.s.l.)
35. Zikhron Ya'akov (Newe haBaron)
36. Zikhron Ya'aqov (Central Bus Station)
37. Zikhron Ya'aqov (Newe Sharett)
38. Alona Park (100 m a.s.l.)
39. Ma'yan Zevi (150 m a.s.l.)
40. Ramat haNadiv (100 m a.s.l.)
41. Kefar Shumi (30 m a.s.l.)

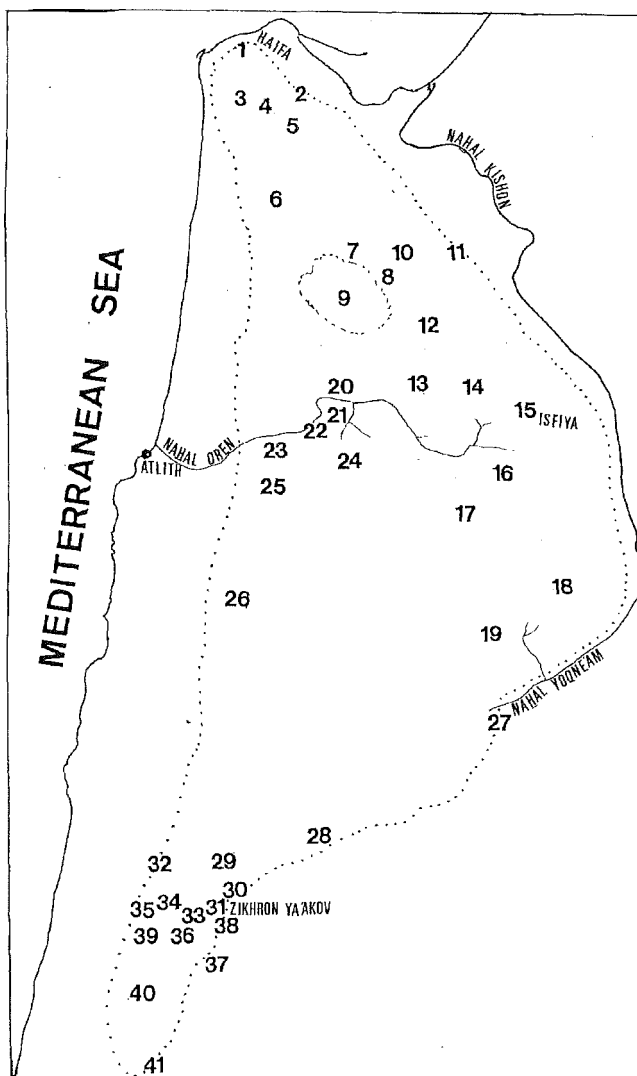


Fig. 13. Collection sites on Mt. Carmel. The dotted line marks the borders of the mountain.

cucumeris was found often (not always) on plants along watercourses (Amitai and Swirski, 1978; Grinberg, 1971; Swirski and Amitai, 1985). Although *Amblydromella crypta* was found only on Mt. Carmel, Coastal Plain, Jordan Valley and Northern Negev, its distribution in Israel is probably much wider. Besides on Mt Carmel, low populations of *B. talbii* were found in Israel also in the Golan Heights, Jordan Valley, Yizre'el Valley, Coastal Plain and Judean Hills on trees, shrubs and Gramineae.

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