

**NOTES ON PREDACIOUS MITES (ACARINA: PHYTOSEIIDAE)
FROM TURKEY, WITH DESCRIPTION OF THE MALE OF *PHYTOSEIUS*
ECHINUS WAINSTEIN AND ARUTUNIAN***

E. SWIRSKI and S. AMITAI

*Div. of Entomology, Agricultural Research Organization,
The Volcani Center, Bet Dagan, Israel*

ABSTRACT

The following 19 species of phytoseiid mites are recorded from various plants in Turkey: *Amblyseius barkeri* (Hughes), *A. ornatus* (Athias-Henriot), *A. aff. potentillae* (Garman), *A. swirskii* Athias-Henriot, *Euseius finlandicus* (Oudemans), *E. rubini* (Swirski and Amitai), *Kampimodromus aberrans* (Oudemans), *Typhlodromus athiasae* Porath and Swirski, *T. cotoneastri* Wainstein, *T. tiliae* Oudemans, *Anthoseius recki* (Wainstein), *A. sternlichti* (Swirski and Amitai), *Typhloctonus tiliarum* (Oudemans), *Paraseiulus amaliae* (Ragusa and Swirski), *P. erevanicus* Wainstein and Arutunian, *P. soleiger* (Ribaga), *P. subsoleiger* Wainstein, *Phytoseius* (*Ph.*) *finitimus* Ribaga and *Ph. (Dubininillus) echinus* Wainstein and Arutunian. The male of *Ph. (D.) echinus* is described.

INTRODUCTION

Phytoseiid mites were collected on apple and other plants by Prof. Dr. Zeliha DUzgunes, Dr. Sultan Kilic (A.U. Ziraat Fakultesi, Entomoloji Kursusu, Diskapo, Ankara) and Dr. E. Sekeroglu (University of (Cukurova, C.U. Ziraat Fakiiltesi, Adana).

The setal nomenclature of Garman (1948) and Nesbitt (1951), as well as the spermatodactyl terminology of Wainstein and Kolodochka (1974) were followed.

Depository collections mentioned hereafter are abbreviated as follows: AROI - Agricultural Research Organization, Division of Entomology, Bet Dagan, Israel. BM - British Museum (Natural History), London.

IAO - Institute of Acarology, Ohio Agricultural Research and Development Center, Wooster, Ohio, U.S.A. IBIWR - Institute of Biology of Inland Waters, USSR Academy of Sciences, Borok, Yaroslavl District, USSR.

*Contribution from the Agricultural Research Organization, The Volcani Center, Bet Dagan, Israel, No. 324-E, 1981 Series.

- IEAP – Istituto di Entomologia Agraria, Università di Palermo, Palermo, Italia.
LAEPP – Laboratoire d'Acarologie de l'École Pratique des Hautes Études, Paris, France.
MHNP – Muséum National d'Histoire Naturelle, Paris, France.
RNHL – Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.
USNM – United States National Museum, Washington, D.C., U.S.A.

Amblyseius barkeri (Hughes, 1948)

TYPE LOCALITY AND HABITAT: Germinating barley plumules, London Docks, England.

LOCATION OF TYPES: ? BM (Chant, 1959).

MATERIAL EXAMINED: Balcali-Adana, 7.V.1981, 1♂, 2♀, on strawberry, (coll. E. Şekeroglu).

Amblyseius ornatus (Athias-Henriot, 1957)

TYPE LOCALITY AND HABITAT: *Rubus* sp., Bareki, Algeria.

LOCATION OF TYPES: MHNP.

MATERIAL EXAMINED: Bursa, 7.VIII.1979, 1♀; Yalova, 24.IX.1979, 2♀, all on apple, (coll. S. Kiliç).

NOTE: These specimens were compared and found to be identical with paratype females, kindly lent to us by Dr. M.H. Naudo (MHNP).

Amblyseius aff. *potentillae* (Garman, 1958)

TYPE LOCALITY AND HABITAT: On *Potentilla*, intercepted from The Netherlands, at Hoboken, New Jersey, U.S.A.

LOCATION OF TYPES: USNM.

MATERIAL EXAMINED: Sakarya, 30.IX.1979, 1♀, (coll. S. Kiliç).

NOTE: Mites collected by us in Greece (Swirski and Ragusa, 1977) are very similar to *A. potentillae* from The Netherlands and Italy. As regards the specimen from Turkey, more material is needed for final conclusions.

Amblyseius swirskii Athias-Henriot, 1962

TYPE LOCALITY AND HABITAT: Holotype and paratype ♀♀ on *Prunus amygdalus*, at Bet Dagan, Israel Sept. 1961. Males on citrus at Gan Efrayim, Israel, Aug. 1962 (Porath and Swirski, 1965).

LOCATION OF TYPES: LAEPP and in Mme Athias-Henriot's collection.

MATERIAL EXAMINED: Dortyol, 1.VIII.1981, 1♂, 2♀, on grapefruit, (coll. E. Şekeroglu).

Euseius finlandicus (Oudemans, 1915)

TYPE LOCALITY AND HABITAT: *Salix caprea*, Abo, Finland (Nesbitt, 1951).

LOCATION OF TYPES: RNHL (Nesbitt, 1951).

MATERIAL EXAMINED: Aksu, 7.VIII.1979, 2♀; Ayas, 28.VIII.1979, 1♀; Çiflik Köy, 6.VIII.1979, 2♀; Laçın, 23.V.1980, 1♀; Nigde, 3.VIII.1980, 1♂, 2♀; Paşakoy, 20.IX.1980, 1♂, all on apple. Nigde, 3.VII.1980, 1♀; on pear. Nigde, 3.VII.1980, 1♂, 1♀, on weed. (all collected by S. Kiliç).

Euseius rubini (Swirski and Amitai, 1961)

TYPE LOCALITY AND HABITAT: Females and males on *Ricinus communis*, at Azor, Israel, May 1960, Aug. 1961; on *Ipomoea* sp., Tel Aviv, Aug. 1960; on *Pyrus malus*, Bet Dagan, Israel, Aug. 1961.

LOCATION OF TYPES: AROI; deposited also in MHNP.

MATERIAL EXAMINED: Isel, 11.XI.1980, 3♀, on *Vitis* sp; Köprükoy-Adana, 7.VII.1981, 1♂, 2♀, on lemon; Adana, 31.X.1980, 1♂, 2♀, on mulberry. (all collected by E. Şekeroglu).

Kampimodromus aberrans (Oudemans, 1930)

TYPE LOCALITY AND HABITAT: *Tilia platyphyllos*, Arnhem, The Netherlands (Nesbitt, 1951).

LOCATION OF TYPES: Holotype, a nymph, in RNHL (Nesbitt, 1951).

MATERIAL EXAMINED: Akyurt, 28.VIII.1979, 1♀; Ayas, 7.IX.1980, 2♀; Bağlum, 27.VII.1979, 2♀; Bilecik, 21.IV.1970, 1♀; Bunyan, 9.VIII.1979, 2♀; 31.VIII.1979, 3♀; Burda, 7.VIII.1979, 4♀ and one larva; Çankiri, 11.VII.1979, 3♂, 2♀; Cubuk, 28.VIII.1979, 3♀; Geyve, 30.IX.1979, 1♀; Ilgaz, 11.VII.1979, 1♀; Kalecik, 15, 17.IX.1979, 1♂, 13♀; Kastamomi, 31.VII.1980, 1♂, 1♀; Konya, VII.1979, 1♀; Lacin, 23.V.1980, 1♀; Nallihan, 16.VI.1979, 1♀ and 1 nymph; Niksar, 23.VII.1980, 1♀; Ortacak, 20.VIII.1979, 1♂, 2♀; Pasaköy, 20.IX.1980, 1♀; Pazar, 20.VIII.1979, 1♀; Yalova, 24.IX.1979, 3♀, all on apple. Kalecik, 15.IX.1979, 6♀, on *Morus nigra*. Nigde, 3.VII.1980, 2♀, on weed. (all collected by S. Kiliç).

Typhlodromus athiasae Porath and Swirski, 1965

TYPE LOCALITY AND HABITAT: On citrus, Rehovot, Israel, Jan. 1961, 9♀, 1♂; the ♂ allotype was collected on a grapefruit tree at Kefar Yehoshu'a, Israel, in June 1963. Additional paratypes of both sexes were removed from various plants in different localities of Israel.

LOCATION OF TYPES: AROI. Deposited also in the following institutions: IAO, MHNP, IBIWR.

MATERIAL EXAMINED: Balcali-Adana, 8.V.1980, 1♂, 1♀; 21.XI.1980, 1♀ and

one nymph; 21.VIII.1981, 1♀ all on *Pinus* sp. (all collected by E. Şekeröglü).

NOTE: *T. athiasae* was collected on citrus by McMurtry (1977) in Antalya and Kemer (Turkey).

Typhlodromus cotoneastri Wainstein, 1961

TYPE LOCALITY AND HABITAT: *Cotoneaster* sp., Georgia, USSR; also found there on *Prunus cerasifera*, *Pinus* sp. and *Picea*.

LOCATION OF TYPES: IBIWR.

MATERIAL EXAMINED: Baglum, 27.VII.1979, 2♀, on apple, (coll. S. Kiliç).

Typhlodromus tiliae Oudemans, 1929

TYPE LOCALITY AND HABITAT: *Tilia platyphyllos*, Arnhem, The Netherlands (Nesbitt, 1951).

LOCATION OF TYPES: RNHL (Nesbitt, 1951).

MATERIAL EXAMINED: Yalova, 6.VIII.1979, 1♀, on apple, (coll. S. Kiliç).

NOTE: for the identity of this species see Abbasova (1970).

Anthoseius rechi (Wainstein, 1958)

TYPE LOCALITY AND HABITAT: *Salvia nemorosa*, Tbilisi, Georgia, USSR. Found also in Greece (Swirski and Ragusa, 1977).

LOCATION OF TYPES: IBIWR.

MATERIAL EXAMINED: Baglum, 27.VII.1979, 1♀ on *Vitis vinifera*, (coll. S. Kiliç). Geyve, 30.IX.1979, 1♀, on apple, (coll. S. Kiliç). Burdur, 9.IV.1980, 2♀, on weed, (coll. S. Kiliç). Kaledran, 2.V.1981, 1♂, 4♀, (coll. E. Şekeröglü).

Anthoseius sternlichti (Swirski and Amitai, 1968)

TYPE LOCALITY AND HABITAT: Holotype and paratype ♀♀ on *Quercus ithaburensis*, Hagoshrim, Hule Valley, Israel, April 1967. Allotype ♂ and additional paratype ♀♀ on *Q. calliprinos* and *Q. ithaburensis* in different locations.

LOCATION OF TYPES: AROI.

MATERIAL EXAMINED: Adana, 17.VII.1978, 1♂, 3♀, on apple, (coll. S. Kiliç). Hasanbeyli-Adana, 9.VIII.1980, 1♂, 2♀; Bahce-Adana, 15.IX.1980, 2♀ (coll. E. Şekeröglü).

Typhloctonus tiliarum (Oudemans, 1930)

TYPE LOCALITY AND HABITAT: On *Tilia* sp., Dahlem, Germany (Nesbitt, 1951). Found also in Crete, Greece (Swirski and Ragusa, 1976).

LOCATION OF TYPES: RNHL (Nesbitt, 1951).

MATERIAL EXAMINED: Akyurt, 28.VIII.1979, 3♀; Ayas, 28.VIII.1979, 3♀; Bunyan, 9.VIII.1979, 3♀; Kastamonu, 31.VII.1980, 1♀; Kayseri, 16.VII.1980, 1♂, 1♀, 1 nymph; Nallihan, 16.VI.1979, 1♀ (all collected on apple by S. Kiliç).

Paraseiulus amaliae (Ragusa and Swirski, 1976)

TYPE LOCALITY AND HABITAT: On lemon, Bagheria and Palermo, Sicily. Allotype ♂ and ♀♀ on lemon on Corfu island, Greece (Ragusa and Swirski, 1976). In Israel this mite was reported on *Citrus* spp. under *Typhlodromus talbii* Athias-Henriot (Porath and Swirski, 1965). Specimens collected in Greece on citrus by McMurtry (1977) probably also belong to *P. amaliae*.

LOCATION OF TYPES: IEAP and AROI.

MATERIAL EXAMINED: Üç Başk, 20.VIII.1979, 1♀, on apple, (coll. S. Kiliç).

Paraseiulus erevanicus Wainstein and Arutunian, 1967

TYPE LOCALITY AND HABITAT: Erevan, Armenia, USSR.

LOCATION OF TYPES: IBIWR.

MATERIAL EXAMINED: Keskin, 25.IV.1980, 1♀, on apple, (coll. S. Kiliç).

Paraseiulus soleiger (Ribaga, 1902)

TYPE LOCALITY AND HABITAT: On citrus, Portici, Italy (Nesbitt, 1951).

LOCATION OF TYPES: Unknown (Nesbitt, 1951).

MATERIAL EXAMINED: Nigde, 3.VII.1980, 2♀; Paşaköy, 20.IX.1980, 1♀ (coll. S. Kiliç); Pozante-Adana, 12.VIII.1981, 2♂, 4♀ (coll. E. Şekeroglu), all on apple.

Paraseiulus subsoleiger Wainstein, 1962

TYPE LOCALITY AND HABITAT: On apple, *Cephalotaxus*, avocado and other plants in Kazachstan and Georgia, USSR.

LOCATION OF TYPES: IBIWR.

MATERIAL EXAMINED: Aksu, 7.VIII.1979, 1♀; Başdere Ürgüp, 9.VIII.1979, 1♀; Iilgaz, 2.VII.1979, 1♀; Nallihan, 16.VI.1979, 1♀, all on apple; Ankara, 14.VIII.1979, 1♀, on *Salix* sp., (all collected by S. Kiliç).

Phytoseius (Phytoseius) finitimus Ribaga, 1904

TYPE LOCALITY AND HABITAT: *Buddleia madagascariensis*, Portici, Italy (Denmark, 1966).

LOCATION OF TYPES: Female should be in Ribaga's collection in Portici, but was apparently lost (Denmark, 1966).

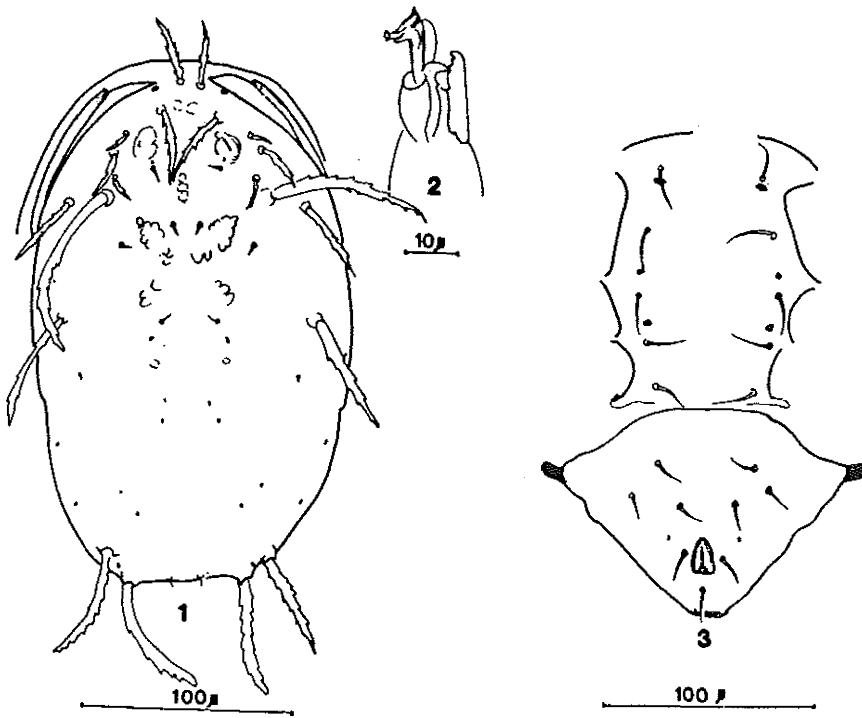
MATERIAL EXAMINED: Sakarya, 30.IX.1979, 1♀; Givesun, 15.VII.1980, 2♀. Tasova-Amasyn, 23.VII.1980, 2♀, (all collected on apple by S. Kiliç). Sarp/Artvin, 22.VI.1979, 1♀, on citrus, (coll. S. Kiliç). Balcali-Adana, 6.VI.1980, 1♂, 2♀, on *Rubus* sp., (coll. E. Şekeroglu).

Phytoseius (Dubininellus) echinus Wainstein and Arutunian, 1970

TYPE LOCALITY AND HABITAT: Females on wild strawberries in Armenia, USSR; found also in Armenia and Georgia, USSR on apple, prune, medlar and sloe.

LOCATION OF TYPES: IBIWR. Males in AROL.

DESCRIPTION OF MALE (Based on 3 specimens) (Figs. 1-3). Dorsal shield (Fig. 1) slightly sclerotised, smooth, slightly ornamented. The shield bears 15 pairs of setae: 5D, 2M, 7L, 1S; setae D_1 , L_1 , L_3 , L_5 , L_6 , M_2 serrate; setae L_2 , L_4 very slightly serrate.



Figs. 1-3. *Phytoseius (Dubininellus) echinus* Wainstein and Arutunian, male. 1. Dorsal shield. 2. Chelicera with spermatodactyl. 3. Ventrianal and genitosternal shields.

Genitosternal shield (Fig. 3) smooth, with five pairs of setae and three pairs of poroides. Ventrianal shield (Fig. 3) subtriangular in shape; chitinised, smooth or with few striae; it carries three pairs of preanal setae. A single pair of setae (VL_1) on the

interscutal membrane. Apex of peritreme reaches bases of setae D_1 - L_1 or L_1 . Macrosetae on leg IV pointed or blunt.

Fixed digit of the chelicerae (Fig. 2) bears *pilus dentilis* and two minute subapical teeth; the movable digit has one tooth and the spermatodactyl. In the spermatodactyl (Fig. 2) ramus well developed, antiramus and velum small.

Measurements (in microns): Dorsal shield = 232-249; Lva = 105-106; lva = 133-164; D_1 = 27-30; D_2 , D_3 , M_1 = 3; D_4 = 4-5; L_1 = 35-37; L_2 = 8-12; L_3 = 27-35; L_4 = 12-15; L_5 = 78-88; L_6 = 53-61; L_7 = 56-71; M_2 = 50-61; S_1 = 38-44; VL_1 = 28-33; sge = 17-19; sti = 42-55; st = 22-29.

MATERIAL EXAMINED: Çiflik Köy, 6.VIII.1979, 1♀; Geyve, 30.IX.1979, 1♂, 2♀; Dadayl Kastamonu, 31.VII.1980, 2♀; Akyazi-Tokat, 23.VII.1980, 1♂, 1♀ and one nymph; Tasova-Amasya, 23.VII.1980, 1♂ (all collected on apple by S. Kiliç).

REFERENCES

- Abbasova, E.D. 1970. Little known and new species of the predacious mites (Phytoseiidae) of the fauna of Azerbaijan. *Zoologicheskii Zhurnal*, 49:45-55. (in Russian)
- Amitai, S. and Swirski, E. 1978. A new genus and new records of phytoseiid mites (Mesostigmata: Phytoseiidae) from Israel. *Israel Journal of Entomology*, 12:123-143.
- Athias-Henriot, C. 1957. *Typhlodromus ornatus* n. sp. et *Typhlodromus longilaterus* n. sp. (Acarina: Phytoseiidae), méso-stigmates prédateurs d'Algérie. *Revue de Pathologie Végétale et d'Entomologie Agricole de France*, 36:215-222.
- Athias-Henriot, C. 1962. *Amblyseius swirskii*, un nouveau phytoséiide voisin d'*A. andersoni* (Acaria: anactinotriches). *Annales de l'Ecole Nationale d'Agriculture d'Alger*, 3:1-7.
- Chant, D.A. 1959. Phytoseiid mites (Acarina: Phytoseiidae). Part I. Bionomics of seven species in Southeastern England. Part II. A taxonomic review of the family Phytoseiidae, with descriptions of 38 new species. *Canadian Entomologist*, Supplement 12:1-166.
- Denmark, H.A. 1966. Revision of the genus *Phytoseius* Ribaga, 1904 (Acarina: Phytoseiidae). *Florida Department of Agriculture, Division of Plant Industry*, Bull. 6:1-105.
- Garman, P. 1948. Mite species from apple trees in Connecticut. Connecticut Agricultural Experiment Station, Bull. no. 520:1-27.
- Garman, P. 1958. New species belonging to the genera *Amblyseius* and *Amblyseiopsis*, with keys to *Amblyseius*, *Amblyseiopsis* and *Phytoseiulus*. *Annals Entomological Society of America*, 51:69-79.
- Hughes, M.A. 1948. The mites associated with stored food products. *Bulletin Ministry of Agriculture, Fisheries and Food*, 168 pp.
- McMurtry, J.A. 1977. Some predaceous mites (Phytoseiidae) on citrus in the Mediterranean region. *Entomophaga*, 22:19-30.
- Nesbitt, H.H.J. 1951. A taxonomic study of the Phytoseiinae (family Laelaptidae) predaceous upon Tetranychidae of economic importance. *Zoologische Verhandlungen*, 12:1-64.
- Porath, A. and Swirski, E. 1965. A survey of phytoseiid mites (Acarina: Phytoseiidae) on citrus, with a description of one new species. *Israel Journal of Agricultural Research*, 15:87-100.
- Ragusa, S. and Swirski, E. 1976. Notes on predacious mites of Italy, with a description of two new species and of an unknown male (Acarina: Phytoseiidae). *Redia* 59:179-196.
- Swirski, E. and Amitai, S. 1961. Some phytoseiid mites (Acarina: Phytoseiidae) of Israel, with a description of two new species. *Israel Journal of Agricultural Research*, 11:193-202.
- Swirski, E. and Amitai, S. 1968. Notes on phytoseiid mites (Acarina: Phytoseiidae) of Israel, with description of one new species. *Israel Journal of Agricultural Research*, 3:95-108.
- Swirski, E. and Ragusa, S. 1976. Notes on predacious mites of Greece, with a description of five new species (Mesostigmata: Phytoseiidae). *Phytoparasitica*, 4:101-122.
- Swirski, E. and Ragusa, S. 1977. Some predacious mites of Greece, with a description of one new species (Mesostigmata: Phytoseiidae). *Phytoparasitica*, 5:75-84.

- Wainstein, B.A. 1958. New species of the genus *Typhlodromus* (Parasitiformes, Phytoseiidae) from Georgia (U.S.S.R.). *Journal Akademii Nauk Gruzinskoi SSR*, 21:201-207. (in Russian)
- Wainstein, B.A. 1961. New species of the genus *Typhlodromus* (Parasitiformes, Phytoseiidae) from Georgia (U.S.S.R.). *Trudy Instituta Zoologii Akademii Nauk Gruzinskoi SSR*, 18:153-162. (in Russian)
- Wainstein, B.A. 1962. Some new predatory mites of the family Phytoseiidae (Parasitiformes) of the U.S.S.R. fauna. *Revue d'Entomologie de l'URSS*, 41: 230-240. (in Russian)
- Wainstein, B.A. and Arutunian, E.S. 1967. New species of predatory mites from the genera *Typhlodromus* Scheuten and *Paraseiulus* Muma (Parasitiformes, Phytoseiidae). *Zoologicheskii Zhurnal*, 46:1764-1770. (in Russian)
- Wainstein, B.A. and Arutunian, E.S. 1970. New species of predaceous mites of the genera *Amblyseius* and *Phytoseius* (Parasitiformes, Phytoseiidae). *Zoologicheskii Zhurnal*, 49:1497-1504. (in Russian)
- Wainstein, B.A. and Kolodochka, L.A. 1974. New species of the genus *Anthoseius* (Parasitiformes, Phytoseiidae). *Zoologicheskii Zhurnal*, 53:628-632. (in Russian)