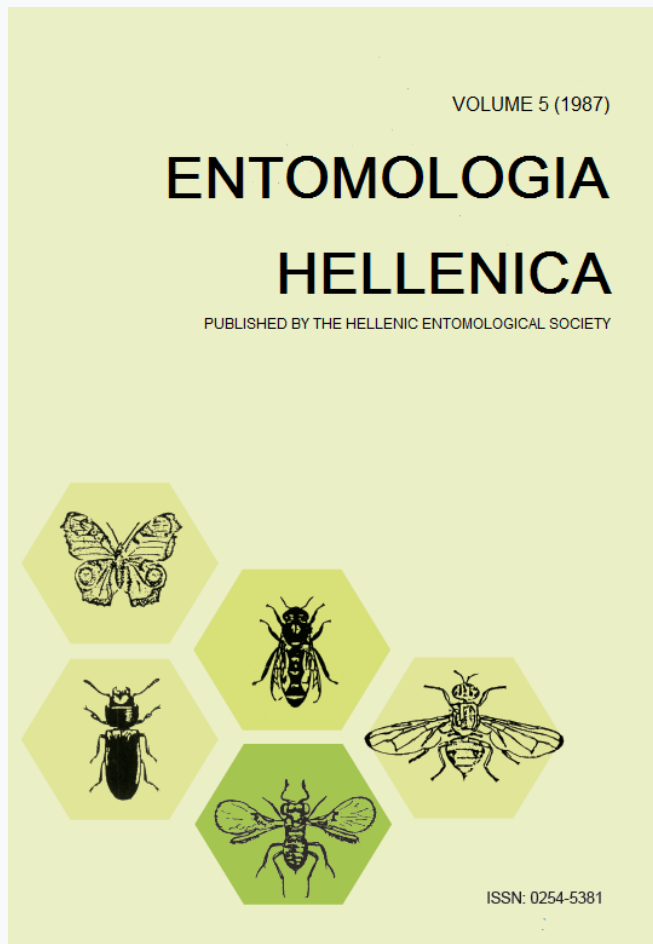


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## A revision of tenuipalpid mites of Greece (Acari: Tenuipalpidae)

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# A Revision of Tenuipalpid Mites of Greece (Acari: Tenuipalpidae)<sup>1</sup>

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## ABSTRACT

The family Tenuipalpidae from Greece is revised and keys to the Greek species of the genera *Aegyptobia*, *Brevipalpus*, *Cenopalpus*, *Pentamerismus* and *Tenuipalpus* are provided. A key to the Greek tenuipalpid genera is also given. The species: *Aegyptobia leiahensis*, *Phytoptipalpus paradoxus*, *Brevipalpus recki*, *Pentamerismus coronatus*, *P. juniperi*, *P. oregonensis*, *Pseudoleptus zelihae*, *Dolichotetranychus floridanus*, *Raoiella macfarlanei* and *Obdulia tamaricis* are recorded for the first time. Two new species *Aegyptobia karystensis* and *Aegyptobia aliartensis* are described and illustrated. Hosts, distributional data and relation to hosts are presented for each species. A reevaluation of the world genera and subgenera of the Tenuipalpidae is presented.

## Introduction

The mites of Tenuipalpidae, commonly known as the false spider mites, have a worldwide distribution. They are phytophagous and many species are of economic importance, because of the severe damage they inflict on several agricultural and horticultural crops. Tenuipalpid mites are small (200-380  $\mu\text{m}$  in length), flat, usually reddish in colour and slow moving. They normally feed on the leaves of plants, most commonly on the lower surfaces near the midrib or veins. Some species feed under leaf sheaths or the floral heads. The most specialized members of the family form plant galls which they utilize as feeding niches. In the present study, 22 genera and more than 600 species of this family are recognized. The knowledge of Greek tenuipalpid mites is mostly confined to the genera *Brevipalpus*, *Tenuipalpus* (Hatzinikolis 1986a, 1986b) and *Cenopalpus* (Hatzinikolis and Emmanouel 1987). From the other genera only *Pentamerismus taxi* was recorded (Hatzinikolis 1970).

## Materials and Methods

The material for this study was collected at the Lycovrysi Acarology Laboratory, during the period

1966-87, from plant samples which were received from Agricultural Institutions, local Agricultural Services, individuals, or were collected by the author. Methods of collecting, killing, preservation, clearing, pigmentation, fixing and mounting were described by Hatzinikolis (1982). Most of the samples were collected in the eastern part of Greece, including Macedonia, and to a lesser extent in western Greece, Thrace and the Islands. The great majority of samples were taken from cultivated fruit trees, vegetables, ornamental plants, fodder, grapes and crops cultivated for the food processing industry. A limited number of samples was also taken from cereals, forest trees and various indigenous plants. All the material is deposited in the collection of the Acarology Laboratory of the Agricultural Research Centre, Lycovrysi, Athens. In the description of new species, all measurements are given in micrometers ( $\mu\text{m}$ ).

## Results and Discussion

The present investigation of the family Tenuipalpidae in Greece has revealed the presence of *Aegyptobia aliartensis* n. sp., *A. karystensis* n. sp., and *Aegyptobia leiahensis*, *Phytoptipalpus paradoxus*, *Brevipalpus recki*, *Pentamerismus coronatus*, *P. juniperi*, *P. oregonensis*, *P. taxi*, *Pseudoleptus zelihae*, *Dolichotetranychus floridanus*, *Raoiella macfarlanei*, *Obdulia tamaricis* in addition to the 43 previously recorded species. The female and deuteronymph of *A.*

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*aliartensis* and the female of *A. karystensis* are described and illustrated. The relation to hosts of all above mentioned species is briefly described; the host range of each species is also given.

The external morphology and the diagnostic characters of genera and species are briefly discussed. Based on those characters, 22 genera are recognized. Keys a) to the genera of Greek tenuipalpid mites based on females, b) to Greek species of the genera *Brevipalpus* and *Cenopalpus* based on females and nymphs, and c) to Greek species of the genera *Aegyptobia*, *Pentamerismus* and *Tenuipalpus* based on females, are provided.

#### Family TENUIPALPIDAE Berlese

Tenuipalpini Berlese, 1913; Tenuipalpidae Sayed, 1950; Baker and Pritchard, 1956; Pritchard and Baker, 1958; Baker and Pritchard, 1960; Wainstein, 1960; Baker and Tuttle, 1964; Livshitz and Mitrofanov, 1967; Mitrofanov, 1973; Collyer, 1973; Chaudhri et al., 1974; Baker et al., 1975; Meyer, 1979; Mitrofanov and Strunkova, 1979; Sepasgosarian, 1983.

Phytoptalpidae Ewing, 1922; Pritchard and Baker, 1952; Reck, 1952; Baker and Pritchard, 1953; André, 1953; Wainstein, 1956; Ehara, 1962.

Pseudoleptidae Oudemans, 1928; Vitzhum, 1942; McGregor, 1949; Baker, 1949.

Trichanemidae Oudemans, 1938; Womersley, 1940; Baker, 1945; Sayed, 1946; Reck, 1951; Reck, 1952; Wainstein, 1956.

The family Tenuipalpidae belongs to the Tetranychoida, a superfamily of prostigmatic mites that is characterized by long, stylet-like strongly recurved proximally chelicerae arising within an evresible stylofore. This family differs from other families in the subfamily (Linotetranychidae, Tuckerellidae and Tetranychidae) in having a simple palpus often with reduced segmentations, and lacking a claw on the terminal segment. In accordance with other mite families the body of Tenuipalpidae is differentiated into two main parts, gnathosoma and idiosoma. The gnathosoma carries the mouth opening and the paired chelicerae and palpi. The chelicerae are modified into stylets and are curved proximally. The palpes are simple and without a claw-like appendage. The number of palpal segments varies from 1 to 5 and the terminal segment is furnished with 1 to 3 sensory rods and setae. The idiosoma is furnished with ornamentation in the form of striation or reticulations. It is differentiated into a rostral shield, simple or developed anteriorly as lobel projection of propodosoma. Dorsal chaetotaxy is of considerable importance to the classification. The propodosoma always bears three pairs of dorsal setae and two pairs of eyes. The hysterosoma has one to

three pairs of dorsocentrals, one pair of humerals and four to seven pairs of dorsolateral setae. Dorsosublaterals, if present, number one to four pairs. The venter is provided with striations, reticulations or it may be smooth. The propodosoma bears a pair of medioventral setae. The metapodosomal venter usually bears two pairs of medioventral setae but they may vary from one to several pairs. The ventral plate bears one pair of setae. The genital shield usually has two pairs of setae (very rarely with one pair). The anal shield carries one to three pairs of anal setae. Four pairs of legs are usually present in adults. A single sensory rod is always present at distal end of tarsi I and II, but two such sensillae are sometimes present on one or both of these tarsi in the adults. The tarsal claw bears several pairs of long outer tenent hairs. The empodium consists of an elongate pad bearing two tenent hairs.

Characters of the family are: the number of marginal hysterosomal and dorsocentral setae, the presence or lack of mediolateral setae, the type of dorsal setae, and the reticulate pattern on the dorsum and venter. Other characteristics include the number of palpal segments and their setation, the setation and the genital region of the female. The family is distinctive in having no palpal claw and wrinkled legs. Tarsi I and II bear solenidia distally; one or two on tarsus I and II in the female and a pair on both tarsus I and II in the male. The body is usually divided into propodosoma and hysterosoma.

The basis of species separation in the family is as follows: the dorsal and ventral chaetotaxy (number, form etc.); the striation, ornamentation and reticulation of the dorsal and venter of the idiosoma; the ventral, genital and anal plates (ornamentation and setation); the palpal characters (number of segments and setation); the chaetotaxy of the legs (number of tactiles and sensories), and the form and reticulation of the rostral shield. According to the present state of knowledge of the family, subdivision into subfamilies and tribes seems to be neither useful nor convenient.

#### a. The genera and the subgenera of Tenuipalpidae

1. *Aegyptobia* Sayed, 1950  
T.s.: *Aegyptobia trågårdi* Sayed, 1950  
*Aegyptobia* Mitrofanov, 1973 (subgenus).  
*Aegyptobiosis* Mitrofanov, 1973 (subgenus).  
T.s.: *Pentamerismus macswaini* Pritchard and Baker, 1952.
2. *Afronychus* Meyer, 1979  
T.s.: *Afronychus amnicus*, Meyer, 1979.
3. *Brevipalpus* Donnadieu, 1875  
T.s.: *Brevipalpus obovatus* Donnadieu, 1875.  
*Brevipalpus* Hatzinikolis, 1986 (subgenus).

- T.s.: *Brevipalpus phoenicis* (Geijkes, 1939).  
 Amissys Chaudhri, Akbar and Rasool, 1974 (subgenus).  
 T.s.: *Brevipalpus achaliensis* (Chaudhri, Akbar and Rasool, 1974).  
*Brachypalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Brevipalpus absens* DeLeon, 1965.  
*Hystripalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Brevipalpus cuneatus* (Canestrini and Fanzago, 1876).  
*Tauripalpoides* Pegazzano, 1975 (subgenus).  
 T.s.: *Brevipalpus mitrofanovi* (Pegazzano, 1975).  
*Tauripalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Brevipalpus recki* Livshitz and Mitrofanov, 1967.
4. *Capedullia* Meyer, 1979  
 T.s.: *Capedullia calendulae* Meyer, 1979.
5. *Cenopalpus* Pritchard and Baker, 1958  
 T.s.: *Brevipalpus spinosus* Donnadieu, 1875.  
*Cenopalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Brevipalpus spinosus* Donnadieu, 1875.  
*Cenopalpoides* Mitrofanov, 1973 (subgenus).  
 T.s.: *Cenopalpus lineola* (Canestrini and Fanzago, 1876).  
*Pritchardipalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Cenopalpus pterinus* Pritchard and Baker, 1958.
6. *Coleacarus* Meyer, 1979  
 T.s.: *Coleacarus lithops* Meyer, 1979.
7. *Dolichotetranychus* Sayed, 1938  
 T.s.: *Dolichotetranychus floridanus* (Banks, 1900).  
*Dolichotetranychus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Dolichotetranychus summersi* Pritchard and Baker, 1952.  
*Stenotetranychus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Dolichotetranychus carnea* (Banks, 1906).
8. *Krugeria* Meyer, 1979  
 T.s.: *Krugeria ramosa* Meyer, 1979.
9. *Larvacarus* Baker and Pritchard, 1952  
 T.s.: *Phytoptipalpus transitans* Ewing, 1922.
10. *Macfarlaniella* Baker and Pritchard, 1952  
 T.s.: *Raoiella queenslandica* Womersley, 1942.
11. *Obdulia* Pritchard and Baker, 1958  
 T.s.: *Obdulia tamaricis* Pritchard and Baker, 1958.
12. *Obuloides* Baker and Tuttle, 1975  
 T.s.: *Obuloides rajamohani* Baker and Tuttle, 1975.
13. *Pentamerismus* McGregor, 1949  
 T.s.: *Tenuipalpus erythreus* Ewing, 1917.  
*Oligomerismus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Pentamerismus taxi* (Haller, 1877).  
*Livshitzia* Mitrofanov, 1973 (subgenus).  
 T.s.: *Pentamerismus tauricus* Livshitz and Mitrofanov, 1970.  
*Brevipalpoides* Reck (synonym).  
 T.s.: *Brevipalpoides juniperi* Reck, 1951.
14. *Phyllotetranychus* Sayed, 1938  
 T.s.: *Phyllotetranychus aegyptiacus* Sayed, 1938.
15. *Phytoptipalpus* Trägårdh, 1904  
 T.s.: *Phytoptipalpus paradoxus* Trägårdh, 1904.  
*Neophytoptipalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Phytoptipalpus albizziae* Pritchard and Baker, 1958.  
*Zaheria* Mitrofanov, 1973 (subgenus).  
 T.s.: *Phytoptipalpus aegyptetrapodus* Zaher and Yousef, 1969.
16. *Priscapalpus* DeLeon, 1961  
 T.s.: *Priscapalpus macropilis* DeLeon, 1961.  
*Deleoniella* Mitrofanov, 1973 (subgenus).  
 T.s.: *Priscapalpus cherreti* DeLeon, 1965.
17. *Pseudoleptus* Bruyant, 1911  
 T.s.: *Pseudoleptus arachavaletae* Bruyant, 1911.
18. *Raoiella* Hirst, 1924  
 T.s.: *Raoiella indica* Hirst, 1924.
19. *Raoiellana* Baker and Tuttle, 1972

- T.s.: *Raoiellana allium* Baker and Tuttle, 1972.
20. *Tegopalpus* Womersley, 1940  
 T.s.: *Tegopalpus conicus* Womersley, 1940.
21. *Tenuipalpus* Donnadieu, 1875  
 T.s.: *Tenuipalpus palmatus* Donnadieu, 1875=*Tenuipalpus caudatus* (Dugès), 1834.  
*Tenuipalpus* (subgenus).  
 T.s.: *Tenuipalpus caudatus* Dugès, 1834.  
*Aegyptopalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Tenuipalpus granati* Sayed, 1946.  
*Colopalpus* Pritchard and Baker, 1958 (subgenus).  
 T.s.: *Colopalpus mattyssei* Pritchard and Baker, 1958.  
*Amblypalpus* Mitrofanov and Strunkova, 1978 (subgenus).  
 T.s.: *Amblypalpus narsikulovi* Mitrofanov and Strunkova, 1978.  
*Deleonipalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Tenuipalpus barticanus* DeLeon, 1965.  
*Extranuipalpus* Reck, 1959 (subgenus).  
 T.s.: *Tenuipalpus quadrisetosus* Lawrence, 1940.  
*Gnathopalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Tenuipalpus rosae* Kadzhaja, 1955.  
*Tuttlepalpus* Mitrofanov, 1973 (subgenus).  
 T.s.: *Tenuipalpus trisetosus* Baker and Tuttle, 1964.
22. *Ultratenuipalpus* Mitrofanov, 1973  
 T.s.: *Tenuipalpus meckeri* DeLeon, 1957.

b. Key to the genera based on females

1. Palpus with one to three segments ..... 2  
 - Palpus with four to five segments ..... 5
2. Palpus with one to three segments, hysterosoma with at most one pair of dorsosublateral setae ..... 3  
 - Palpus with one or two segments, hysterosoma with two or four pairs of dorsosublateral setae ..... 4
3. Hysterosoma without dorsosublateral setae; rostral shield present ..... *Tenuipalpus*  
 - Hysterosoma with one pair of dorsosublateral setae; rostral shield absent ..... *Dolichotetranychus*
4. Hysterosoma with four pairs of dorsosublateral setae ..... *Raoiella*  
 - Hysterosoma with two pairs of dorsosublateral setae ..... *Obdulia*
5. Palpus with five segments ..... 6  
 - Palpus with four segments ..... 9
6. Hysterosoma with three or four pairs of dorsosublateral setae ..... 7  
 - Hysterosoma with two or three pairs of dorsosublateral setae ..... 8
7. Female with four pairs of legs ..... *Aegyptobia*  
 - Female with three pairs of legs ..... *Phytoptipalpus*
8. Rostral shield with narrow acutely pointed lobes; female metapodosoma separated from opisthosoma by transverse striae ..... *Pseudoleptus*  
 - Rostral shield, present, incised and with broad lobes; female metapodosoma not separated from opisthosoma by transverse striae ..... *Pentamerismus*
9. Hysterosoma with one pair of dorsosublateral setae ..... *Cenopalpus*  
 - Hysterosoma without dorsosublateral setae ..... *Brevipalpus*

b1. Genus *Aegyptobia* Sayed

*Aegyptobia* Sayed, 1950; Pritchard and Baker, 1958; Livshitz and Mitrofanov, 1967; Zaher and Yousef, 1969; Mitrofanov, 1973a; Chaudhri et al.,

1974; Meyer, 1979.

Type-species: *Aegyptobia trågardi* Sayed.

*Aegyptobia* is known from Africa, Asia, Europe and North America and contains more than 80 species. This genus is closely related to *Phytoptipalpus*, the only character on which they can be separated is the number of legs in the female. This genus has five-palpal segments. Species have 12 or 13 pairs of dorsohysterosomal setae: three pairs of dorsocentral setae, one pair of humeral setae, four pairs of dorsosublateral setae and four or five pairs dorsolateral setae.

### Description of new species

*Aegyptobia karystensis* n. sp.

#### FEMALE

**D i m e n s i o n s.** Body length 269, including rostrum 315; width 153. Colour red.

**D o r s u m** (Fig. 1). Rostral shield smooth with one long median and a very short lateral lobe on each side. Propodosoma striate dorsolaterally but smooth mediodorsally. Hysterosoma with longitudinal striae forming an inverted V-pattern on dorsocentral portion. All dorsal body setae broadly spatulate, smooth and serrate as follows, 3 pairs of propodosomals (20, 20 and 18 in length), 3 pairs of dorsocentrals (18, 15 and 13 in length), humerals 12 in length, 5 pairs dorsolaterals (12, 16, 16 and 13) and 4 pairs of dorsosublaterals (15, 15, 13 and 13 in length).

**G n a t h o s o m a** (Fig. 2). Venter with one pair of setae 15 in length. Rostrum (Fig. 1) reaching middle of tarsus I. Palpus five-segmented (Fig. 2); second segment with one lanceolate seta, 14 in length; fourth segment with one nude seta (20 in length), and fifth with one sensory peg (6 in length) and two sensory setae (11 and 8 in length) distally.

**V e n t e r** (Fig. 3). Venter of propodosoma smooth dorsolaterally but with transverse striae mediodorsally. Area between anterior and posterior medioventral metapodosomal setae smooth. Area between posterior medioventral setae and ventral plate with transverse striae. Hysterosomal margin smooth. Ventral, genital and anal plates smooth. Medioventral metapodosomal setae nude, 53 in length and anteriors 24 in length. Ventral, genital and anal plates with one, two and three pairs of setae respectively.

**L e g s.** Inclusive counts of setae and solenidia (in parentheses) on the podomeres of legs I-IV: tarsi 8 (1)-8(1)-5-5; tibiae 4-4-4-3; genua 4-3-1-0; femora 4-4-2-1; trochanters 2-1-1-1; coxae 2-2-1-1. Tarsi I (Fig. 4) and II each with one sensory rod dorsodistally; sensory rod measures 7 and 6, respectively. Femora I (Fig. 4) and II and genua I (Fig. 4) and II each with a broadly lanceolate serrate seta dor-

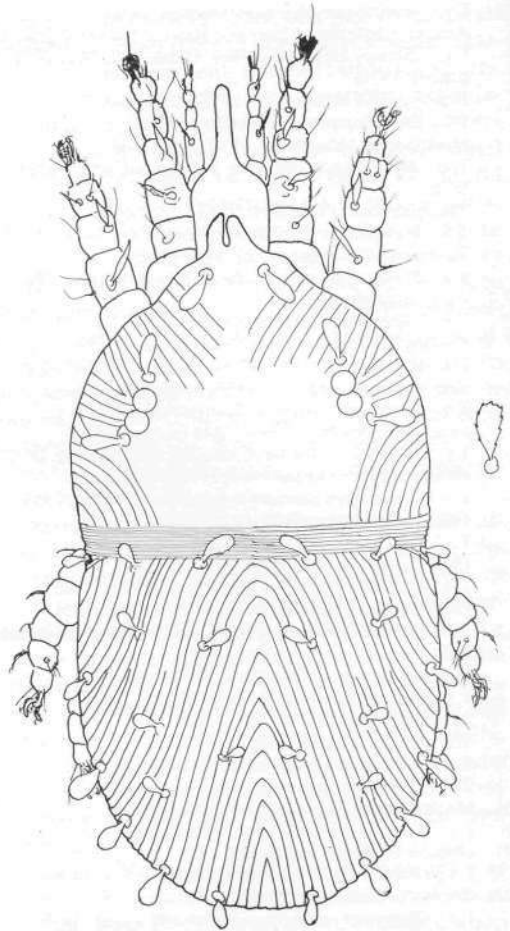


FIG. 1. *Aegyptobia karystensis*, n. sp., holotype, female, dorsal aspect.

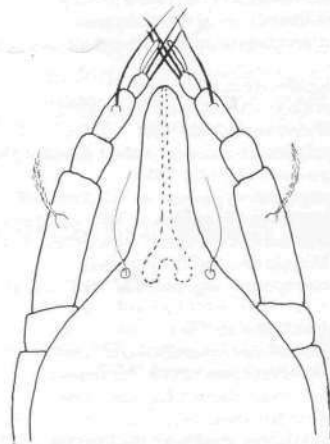


FIG. 2. *Aegyptobia karystensis*, n. sp., holotype, female, gnathosoma.

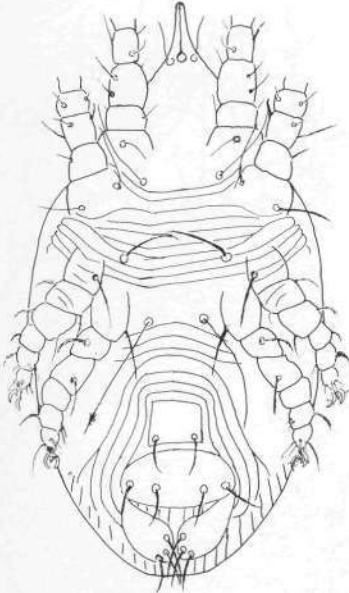


FIG. 3. *Aegyptobia karystensis*, n. sp., holotype, female, ventral aspect.

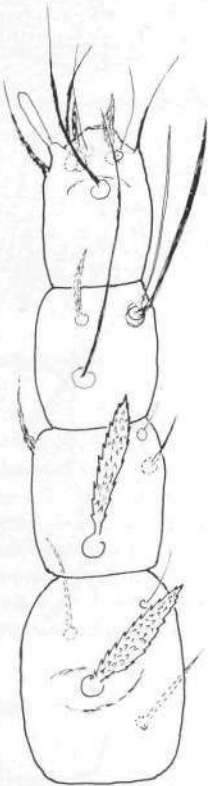


FIG. 4. *Aegyptobia karystensis*, n. sp., holotype, female, tarsus I.

sally. The true claws are uncinata and the empodia are padlike.

MALE. Not known.

#### TYPE MATERIAL

Holotype female and three paratype females, 26 August 1980, Karystos, Evia, Greece (Code Number 23). The material was collected by the author from *Cupressus* sp. and is mounted on two slides which are deposited in the collection of the Acarology Laboratory of Agricultural Research Centre of Athens.

#### ETYMOLOGY

The name of this new species is derived from the region Karystos of Evia.

#### Remarks

This new species is distinctive in having the following characters: pattern of dorsal striations on propodosoma; hysterosoma with longitudinal striae forming an inverted V-pattern on dorsocentral portion; rostral shield smooth with one long median and one very short lateral lobe on each side; all dorsal body setae are broadly spatulate smooth and serrate.

#### *Aegyptobia aliartensis* n. sp.

#### FEMALE

**D i m e n s i o n s.** Body length 22, including rostrum 260; width 123. Colour bright red.

**D o r s u m** (Fig. 5). Rostral shield unlobed with longitudinal striae. Propodosoma with a few longitudinal striae laterally and with transverse striae behind rostral shield. Hysterosoma with striae reaching the dorsolateral setae and transverse striae approximately between second and third pairs of dorsosublateral and dorsocentral setae.

All dorsal body setae broadly lanceolate densely pectinate as follows, 3 pairs of propodosomals (16, 21 and 23 in length), 3 pairs of dorsocentrals (21, 12 and 10), hymerals 21 in length, 5 pairs of dorsolaterals (21, 21, 21, 21 and 18 in length) and 4 pairs of dorsosublaterals which are similar in length.

**G n a t h o s o m a** (Fig. 6). Venter with one pair of setae 8 in length. Rostrum reaching end of genu I (Fig. 5). Palpus five-segmented; second segment with one lanceolate nude seta (22 in length); the fourth with one lanceolate nude seta (15 in length) and fifth with one short sensory peg (5 in length) and two sensory setae (8 and 7 in length) distally.

**V e n t e r** (Fig. 7). Venter of propodosoma with transverse striae and with few longitudinal striae laterally. Venter of hysterosoma smooth between tarsi IV. Striation of the rest of idiosoma as figured.

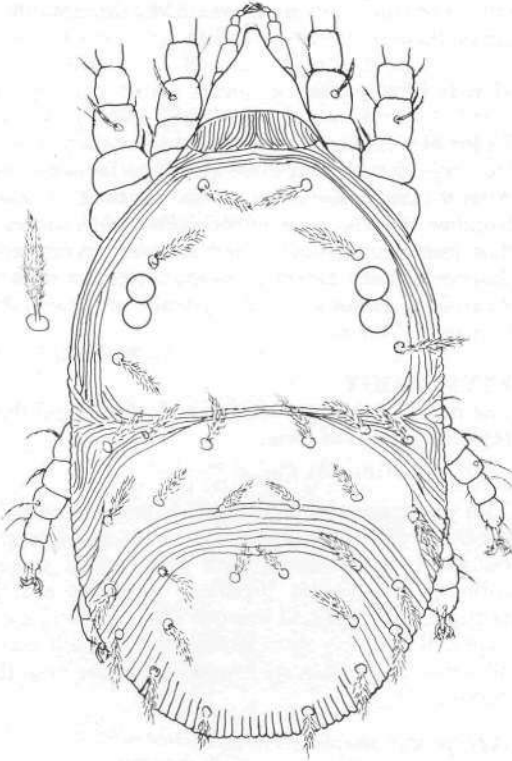


FIG. 5. *Aegyptobia aliartensis*, n. sp., holotype, female, dorsal aspect.

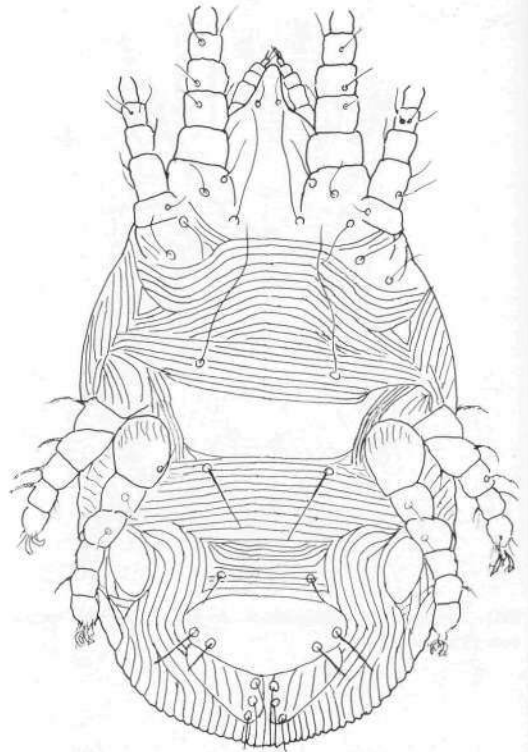


FIG. 7. *Aegyptobia aliartensis*, n. sp., holotype, female, ventral aspect.

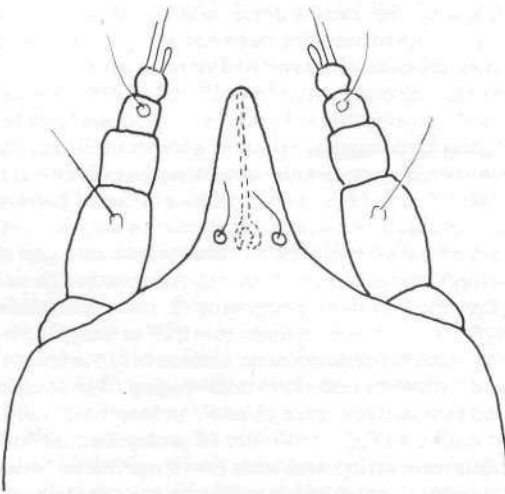


FIG. 6. *Aegyptobia aliartensis*, n. sp., holotype, female, gnathosoma.

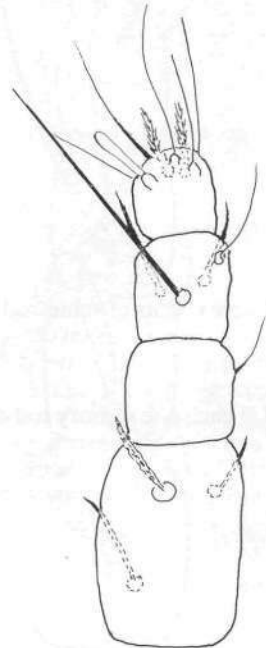


FIG. 8. *Aegyptobia aliartensis*, n. sp., holotype, female, tarsus I.

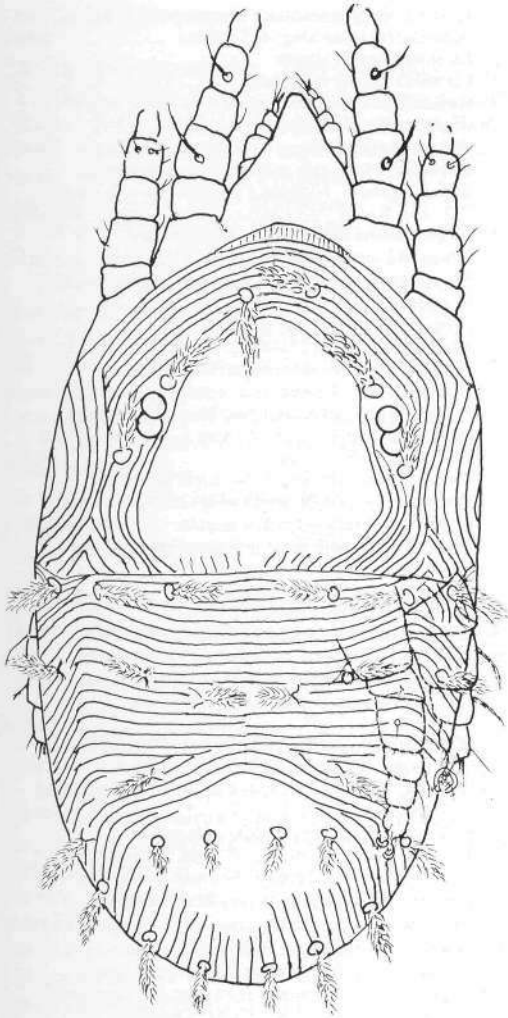


FIG. 9. *Aegyptobia aliartensis*, n. sp., deuteronymph, dorsal aspect.

Legs. Inclusive counts of setae and solenidia (in parentheses) on the podomeres of legs I-IV: tarsi 7 (1)-7(1)-4-4; tibiae 4-4-3-3; genua 1-1-1-0; femora 3-3-2-2; trochanters 1-1-1-1; coxae 2-2-0-1. Tarsi I (Fig. 8) and II each one sensory rod dorsodistally; sensory rod measures 7 and 6 respectively. Femora I (Fig. 8) and II each with a lanceolate seta dorsally. The true claws are unciniate and the empodia are padlike.

MALE. Not known.

NYMPH (Fig. 9).

The dorsal body setae similar to those of the female. The dorsal ornamentation resembles that

of the female, except in the area of the metapodosoma which is striated in the nymph.

**TYPE MATERIAL**

Holotype female. Four paratype females and one paratype nymph, 20 October 1982, Aliartos, Viotia, Greece (Code Number 75/82). The material was collected by the author from *Thuja* sp. and is mounted on three slides which are deposited in the collection of the Acarology Laboratory of Agricultural Research Centre of Athens.

**ETYMOLOGY**

The name of this new species is derived from the town Aliartos of Viotia.

**Remarks**

This new species is having the following characters: pattern of dorsal striation on propodosoma and hysterosoma; rostral shield with longitudinal striae but without lobes; all the dorsal body setae are broadly lanceolate densely pectinate.

**Notes on the species**

*Aegyptobia leiahensis* Chaudhri, Akbar and Rasool

*Aegyptobia leiahensis* Chaudhri, Akbar and Rasool, 1974.

Record: Pakistan.

Host: *Heliotropium*.

New record: Evros, Alexandroupolis, 3 September 1986, on *Helianthus*.

Relation to host: It was found in small populations on both leaf surfaces.

**Key to species based on females**

- 1. Rostrum reaching end of genu I ..... 2
- Rostrum reaching the middle of tarsus I. Rostral shield bilobed and smooth. All dorsal setae lanceolate and densely pectinate ..... *aliartensis*
- 2. All setae slender, spatulate and smooth. Rostral shield deeply notched ..... *leiahensis*
- All setae broadly spatulate, smooth and serrate. Rostral shield unlobed ..... *karystensis*

**b2. Genus *Phytoptipalpus* Trägårdh**

*Phytoptipalpus* Trägårdh, 1904; Sayed, 1942; Pritchard and Baker, 1958; Zaher and Yousef, 1969; Mitrofanov, 1973b; Meyer, 1979.

Type-species: *Phytoptipalpus paradoxus* Trägårdh.

*Phytoptipalpus* contains few species and is known only from Africa and India. This genus can be defined as follows: adult female bears three pairs of legs, while the male four pairs; the palpus is five-segmented; the hysterosoma is provided



with 12 or 13 pairs of dorsal setae: three pairs of dorsocentrals, one pair of humerals, three or four pairs of dorsosublaterals and four or five of dorsolateral setae; the true claws are uncinatate with two rows of tenent setae.

Notes on the species

*Phytoptipalpus paradoxus* Trägårdh  
*Phytoptipalpus paradoxus* Trägårdh, 1904; Sayed, 1942.

Record: Egypt.

Hosts: *Acacia*, *Acacia nilotica*.

New record: Greece, Rodos, 5 August 1974, on *Acacia*.

Relation to host: Two females, one male and one nymph were found on the leaves of *Acacia* sp.

b3. Genus *Cenopalpus* Pritchard and Baker

*Cenopalpus* Pritchard and Baker, 1958; Wainstein, 1960; Ehara, 1966; Livshitz and Mitrofanov, 1967; Chaudhri et al., 1974; Jeppson et al., 1975; Hatzinikolis and Emmanouel 1987.

Type-species: *Brevipalpus spinosus* Donnadieu.

*Cenopalpus* species, some of which are of considerable economic importance, have been recorded from Europe, Africa, Asia and Australia. This genus can be distinguished by the four-segmented palpus, five or six pairs of hysterosomal dorsolateral setae, one pair of dorsosublateral setae, one pair of humerals, and three pairs of dorsocentral setae. Solenidia on tarsi I and II are also slender and tapering. The genital plate is broader than the anterior ventral plate. Information about hosts, distribution, relation to hosts etc. has already been given for the following species (Hatzinikolis and Emmanouel 1987): *C. arbutus* Hatzinikolis and Emmanouel, *C. eriobotryi* Hatzinikolis, *C. lanceolatisetae* (Attiah), *C. lineola* (Canestrini and Fanzago), *C. mespili* (Livshitz and Mitrofanov), *C. pennatisetis* (Wainstein), *C. platanii* (Livshitz and Mitrofanov), *C. pritchardi* Düzgünes, *C. pterinus* Pritchard and Baker, *C. populi* (Livshitz and Mitrofanov), *C. pulcher* (Canestrini and Fanzago), *C. ruber* Wainstein, *C. spinosus* (Donnadieu), *C. bakeri* Düzgünes, *C. pseudospinosus* (Livshitz and Mitrofanov) and *C. wainsteini* (Livshitz and Mitrofanov).

Key to species based on females and nymphs

- 1. Hysterosoma with five pairs of dorsocentral setae ..... 2
- Hysterosoma with six pairs of dorsolateral setae ..... 3
- 2. Rostrum extending beyond end of femur I. Dorsal setae featherlike. Nymphs 1, 2, 4 dorsolateral setae long; 3, 5 minute ..... *pterinus*
- Rostrum reaching before end of femur I. Dorsal

- setae narrowly lanceolate. Nymphs with 1, 2, 3 dorsolateral setae long; 4, 5 minute ..... *arbuti*
- 3. Idiosoma mostly striate ..... 4
- Idiosoma mostly reticulate ..... 5
- 4. Rostral shield shallowly incised; metapodosomal dorsum striate. Nymphs with 1, 2, 3, 4, 5 dorsolateral setae long; 6 small ..... *lineola*
- Rostral shield deeply incised; metapodosomal dorsum smooth. Nymphs 1 dorsolateral seta small; 2, 3, 4, 5, 6 long ..... *wainsteini*
- 5. Propodosoma with dorsal setae narrowly lanceolate to setiform ..... 6
- Propodosoma with dorsal setae broadly lanceolate to spatulate ..... 13
- 6. Rostral shield with 4 or more lobes ..... 7
- Rostral shield with 2 lobes ..... 9
- 7. Propodosomal setae setiform; rostral shield with more than 4 lobes ..... 8
- Propodosomal setae narrowly lanceolate; rostral shield with 4 lobes. Nymphs with 1, 2, 4 dorsolateral setae long; 3, 5, 6 minute ..... *populi*
- 8. Propodosoma with small, rounded, granulate elements dorsally. Nymphs with 1, 2, 3 dorsolateral setae long; 4 very long; 5, 6 minute ..... *pseudospinosus*
- Propodosoma with great polygonal reticulation elements dorsally. Nymphs with 1, 2, 3, 4 dorsolateral setae long; 5, 6 minute ..... *bakeri*
- 9. Rostrum extending to end of femur I ..... 10
- Rostrum extending at last to middle of femur I ..... 11
- 10. Rostrum reaching end of femur I. Propodosoma with smaller, rounded, elements dorsally. Nymphs 1, 2, 3 dorsolateral setae long; 4 flagellate; 5, 6 minute ..... *spinosus*
- Rostrum not reaching end of femur I. Propodosoma with larger, polygonal reticulation elements dorsally. Nymphs with 1, 2, 4 dorsolateral setae long; 3, 5, 6 minute ..... *pulcher*
- 11. Rostrum extending to middle of femur I ..... 12
- Rostrum reaching middle of genu I. Dorsal body setae narrowly lanceolate. Nymphs with 1, 2, 3 dorsolateral setae long; 4 very long; 5 medium; 6 minute ..... *ruber*
- 12. Metapodosomal venter with medial linear texture or reticulation elements between coxae IV polygonal and broader than long. Nymphs with 1, 2, 3, 4 dorsolateral setae long; 5 small; 6 minute ..... *carpini*
- Metapodosomal venter with polygonal elements medially equal breadth and length. Nymphs with 1, 2, 3, 4 dorsolateral setae long; 5, 6 minute ... *mespili*
- 13. Propodosoma with dorsal setae longer than distances between bases of consecutive setae. Nymphs with 1, 2, 3, 4, 5 dorsolateral setae long; 6 small ..... *pennatisetis*
- Propodosoma with dorsal setae shorter than distance between bases of consecutive setae. Nymphs with 1 dorsolateral seta long; 2, 3, 4, 5 small; 6 minute ..... *lancolatisetae*
- 14. Dorsal body setae subs spatulate ..... 15
- Dorsal body setae broadly spatulate. Nymphs with 1, 2 dorsolateral setae long; 4 very long; 3, 5, 6 minute ..... *eriobotryi*
- 15. Metapodosomal venter not reticulate anterior to ventral plate. Nymphs with 1, 2, 4 dorsolateral setae long; 3, 5, 6 minute ..... *platanii*
- Metapodosomal venter reticulate anterior to ventral plate. Nymphs with 1, 2 dorsolateral setae long; 3 small; 4 very long; 5, 6 minute ..... *pritchardi*

b4. Genus *Brevipalpus* Donnadieu

*Brevipalpus* Donnadieu, 1875; Vitzthum, 1931; Vitzthum, 1942; Baker, 1945; McGregor, 1949; Baker, 1949; Reck, 1951; Pritchard and Baker, 1952; Attiah, 1956; Meyer and Ryke, 1959; Wainstein, 1960; Baker and Pritchard, 1960; Livshitz and Mitrofanov, 1967; Mitrofanov, 1973; Chaudhri et al., 1974; Meyer, 1979; Hatzinikolis, 1986. Type-species: *Brevipalpus obovatus* Donnadieu.

*Brevipalpus* is a large genus which contains a number of species of economic importance. They have a wide range of host plants and a worldwide distribution. These mites can be recognized by a four-segmented palpus and the absence of dorsosublateral setae. The known species have 7, 9 or 10 pairs of dorsohysterosomal setae: 1 or 3 pairs of dorsocentral setae, 1 pair of humeral setae, and 5 or 6 pairs of dorsolateral setae.

## Notes on the species

*Brevipalpus recki* Livshitz and Mitrofanov

*Brevipalpus recki* Livshitz and Mitrofanov, 1970.

Records: Italy, U.S.S.R.

New Record: Kavala, Eleptheres, 19 August 1987, on *Quercus*.

Relation to host: This mite has been found in small populations on both leaf surfaces of the host.

Information about hosts, distribution, relation to hosts etc. has already been given for the following species (Hatzinikolis 1986b): *B. atalantae* (Hatzinikolis), *B. californicus* Banks, *B. chalcidicus* (Hatzinikolis), *B. cuneatus* (Canestrini and Fanzago), *B. essigi* Baker, *B. hellenicus* (Hatzinikolis and Kolovos), *B. lewisi* (McGregor), *B. lilium* Baker, *B. macedonicus* (Hatzinikolis), *B. mallorquensis* Pritchard and Baker, *B. obovatus* Donnadieu, *B. oleae* Baker, *B. olearius* Sayed, *B. olivicola* (Pegazzano and Castagnoli), *B. phoenicis* (Geijskes), *B. pini* Baker, *B. russulus* (Boisduval) and *B. sayedi* Baker.

## Key to species based on females and nymphs

1. Hysterosoma with three pairs of dorsocentral setae ... 2
  - Hysterosoma with one pair of dorsocentral setae ..... *recki*
2. Hysterosoma with five pairs of dorsolaterals ..... 3
  - Hysterosoma with six pairs of dorsolaterals ..... 4
3. Tarsus II with a single sensory rod. Nymphs with 3, 4, 5 dorsolateral setae long; 2 middle; 1 small ..... *obovatus*
  - Tarsus II with two sensory rods. Nymphs with 3, 4, 5 dorsolateral setae long; 1, 2 small ..... *phoenicis*
4. Tarsus II with a single sensory rod ..... 5
  - Tarsus II with two sensory rods. Nymphs with 3, 4, 5, 6 dorsolateral setae long; 1, 2 small ..... *californicus*
5. Rostrum extending beyond distal end of femur I ..... 6

- Rostrum not extending beyond distal end of femur I ..... 10
- 6. Rostrum reaching middle of genu I. Propodosoma reticulated mediolaterally, smooth mediadorsally; body setae broadly lanceolate. Nymphs with 1, 4, 6 dorsolateral setae long; 2, 3, 5 small ... *olivicola*
  - Rostrum reaching distal part of genu I. Propodosoma with irregular coalesced areolae; body setae subclavate. Nymphs with 1, 2, 4, 6 dorsolateral setae long; 3, 5 small ..... *olearius*
- 7. Rostrum reaching distal end of genu I ..... 8
  - Rostrum reaching distal end of tibia I. Propodosoma and hysterosoma with pores. Nymphs with 1 and 4 dorsolateral setae long; 2, 3, 5, 6 small ..... *atalantae*
- 8. Propodosoma reticulated but smooth mediadorsally; body setae lanceolate tapering. Nymphs with 4, 6 dorsolateral setae long; 1, 2, 4 small ..... *oleae*
  - Propodosoma reticulated but with areolae posteriorly; body setae lanceolate. Nymphs with 1, 4, 6 dorsolateral setae long; 2, 3, 5 small ..... *macedonicus*
- 9. Hysterosoma with pores. Propodosoma with reticulation elements of different shapes and sizes. Nymphs with fourth dorsolateral seta long; 1, 2, 3, 5, 6 small ..... *hellenicus*
  - Hysterosoma without pores. Propodosoma with reticulation elements of similar shapes and sizes. Nymphs with 1, 2, 4 dorsolateral setae long; 3, 6 medium; 6 small ..... *chalcidicus*
- 10. Podosoma with anterior medioventrals considerably shorter than posterior pair ..... 11
  - Podosoma with medioventral setae subequal in length. Nymphs with third dorsolateral seta flagellate; 1, 2, 4, 5, 6 small ..... *cuneatus*
- 11. Rostral shield with 4 median lobes ..... 12
  - Rostral shield with 2 median lobes. Nymphs with 1, 2, 4 dorsolateral setae long; 3, 5, 6 small ..... *sayedi*
- 12. Hysterosomal pores present ..... 13
  - Hysterosomal pores absent ..... 14
- 13. Propodosoma with an even reticulation pattern mediolaterally. Nymphs with 3 propodosomal setae long; 1, 2 small ..... *lilium*
  - Propodosoma with a very irregular reticulation pattern mediolaterally. Nymphs with 2, 3 propodosomal setae long; 1 small ..... *lewisi*
- 14. Propodosoma with reticulation elements of equal length and width. Nymphs with 4 dorsolateral setae long; 1, 2, 3, 5, 6 small ..... *essigi*
  - Propodosoma with reticulation elements of different shapes and sizes. Nymphs with 3, 4, 5, 6 dorsolateral setae long; 1, 2 small ..... *russulus*
- 15. Hysterosoma with a very wide oval area of transverse striae on the posteromedial portion. Nymphs with all dorsolateral setae minute ..... *pini*
  - Hysterosoma with narrow, almost triangular, area of transverse striae on the posteromedial portion. Nymphs 4, 6 dorsolateral setae long; 1, 2, 3, 5 small ..... *mallorquensis*

b5. Genus *Pentamerismus* McGregor

*Pentamerismus* McGregor, 1949; Pritchard and Baker, 1952; Baker and Pritchard, 1954; Pritchard and Baker, 1958; Baker and Tuttle, 1964; Mitrofanov, 1973; Meyer, 1979.

Type-species: *Tenuipalpus erythreus* Ewing, 1917.

*Pentamerismus* contains a few species found usually on Coniferae. This genus is characterized by a five-segmented palpus, two pairs of dorsosub-lateral, six to seven pairs of dorsolateral hysterosomal setae, three pairs of dorsocentral hysterosomal setae, a genital and a ventral plate, and a broadly ovate body.

#### Notes on the species

*Pentamerismus coronatus* (Canestrini and Fanzago)

*Caligonus coronatus* Canestrini and Fanzago, 1876; Canestrini and Fanzago, 1878; Baker and Pritchard, 1954.

*Tenuipalpus coronatus*, Berlese, 1886; Berlese, 1887; Canestrini, 1899; Vitzthum, 1929; McGregor, 1949.

*Brevipalpoides coronatus*, Reck, 1951.

Records: Italy, U.S.S.R.

Hosts: *Rhododendron*, *Taxus*, *Thuja*.

New record: Evia, Karystos, 10 May 1975 and Attiki, Marathon, 5 September 1980, on *Cupressus*.  
Relation to host: It was found in small populations on leaves.

*Pentamerismus juniperi* (Reck, 1951)

*Brevipalpoides juniperi* Reck, 1951.

*Pentamerismus juniperi* Pritchard and Baker, 1958.

Record: U.S.S.R.

Host: *Juniperus*.

New records: Attiki, Athens, 12 July, on *Cupressus* and *Thuja*.

Relation to host: It was found in large populations on leaves.

*Pentamerismus oregonensis* McGregor

*Pentamerismus oregonensis* McGregor, 1949; Pritchard and Baker, 1952; Pritchard and Baker, 1958; Ehara, 1962; Chaudhri et al., 1974.

Records: Japan, Pakistan, U.S.A.

Hosts: *Cupressus*, *Juniperus*, *Libocedrus*, *Thuja*.

New records: Attiki, Athens, 3 August 1978 and Kriti, Rethymno, 27 September, on *Thuja*.

Relation to host: It was found in small populations on leaves.

*Pentamerismus taxi* (Haller)

*Tenuipalpus taxi* Haller, 1877.

*Pentamerismus taxi*, Baker and Pritchard, 1954.

*Pentamerismus morishitai* Pritchard and Baker, 1952.

Records: England, Spain, Switzerland, U.S.A.

Host: *Taxus*.

New records: France, Montpellier, 8 September 1980, on *Taxus baccata*. Greece, Attiki, Athens, 14 August 1978, on *Juniperus*.

Relation to host: It was found in small populations on leaves.

#### Key to species based on females

1. Hysterosoma with six pairs of dorsolateral setae ..... 2
- Hysterosoma with seven pairs of dorsolateral setae ..... *juniperi*
2. Dorsolateral hysterosomal setae long and serrate ..... 3
- Dorsolateral hysterosomal setae short and peglike ..... *taxi*
3. Dorsolateral hysterosomal setae narrowly lanceolate ..... *oregonensis*
- Dorsolateral hysterosomal setae spatulate ..... *coronatus*

#### b6. Genus *Pseudoleptus* Bruyant

*Pseudoleptus* Bruyant, 1911. Oudemans, 1928; Vitzthum, 1942; Sayed, 1942; McGregor, 1949; Baker, 1949; Pritchard and Baker, 1958; Baker and Tuttle, 1964; Mitrofanov, 1973; Jeppson et al., 1975; Meyer, 1979.

Type-species: *Pseudoleptus arachavaletae* Bruyant.

*Pseudoleptus* contains 10 species known to occur on grasses in North and South America, North Africa and Asia Minor. This genus may be recognized by the following characters: the narrowly bifurcate rostral shield; the palpi having 4 or 5 segments; 2 or 3 pairs of dorsosublateral setae; one pair of humeral, six pairs of dorsolateral and three pairs of dorsocentral setae.

#### Notes on the species

*Pseudoleptus zelihae* Pritchard and Baker

*Pseudoleptus zelihae* Pritchard and Baker, 1958.

Record: Turkey

Host: *Aeluropus* sp.

New record: Viotia and Phthiotis on *Gynodon dactylon*.

Relation to host: This mite has been found in small populations on both leaf surfaces.

#### b7. Genus *Tenuipalpus* Donnadieu

*Tenuipalpus* Donnadieu, 1875; Vitzthum, 1929; Zaher, 1932; Geijkes, 1939; Lawrence, 1940; Sayed, 1942; Lawrence, 1943; Baker, 1945; McGregor, 1949; Sayed, 1950; Reck, 1951; Pritchard and Baker, 1952; Pritchard and Baker, 1958; Meyer and Ryke, 1959; Wainstein, 1960; Baker and Pritchard, 1960; Livshitz and Mitrofanov, 1967; Collyer, 1973; Mitrofanov, 1973; Chaudhri et al., 1974; Meyer, 1979; Hatzinikolis, 1986a.

Type-species: *Tenuipalpus caudatus* Dugès (= *T. palmatus* Donnadieu).

*Tenuipalpus* is a very large genus which contains a number of species of economic importance.

They attack a wide range of host plants and have a world-wide distribution. This genus is recognized by the following characters: the podosoma is usually very broad and the opisthosoma is narrow; there is usually a pair of long, flagellate setae on the posterior margin of the body; the palpi have one, two or three segments; the ventral and genital plates may be fused together to form a genitoventral plate or they may be separated.

Information about hosts, distribution, relation to hosts etc. has already been given for the following species (Hatzinikolis 1986a): *T. caudatus* (Dugès), *T. crassus* André, *T. granati* Sayed, *T. pacificus*, Baker, *T. punicae* Pritchard and Baker, *T. rosae* Kadhava and *T. zhizhilashviliae* Reck.

#### Key to species based on females

1. Hysterosoma with 3 pairs of dorsocentral setae ..... 2
  - Hysterosoma with 1 pair of dorsocentral setae ..... *granati*
2. Hysterosoma with 3 pairs of nonflagellate caudolateral setae ..... 3
  - Hysterosoma with 4 pairs of nonflagellate caudolateral setae ..... 4
3. Hysterosoma with 3 pairs of posterior medioventral setae ..... *crassus*
  - Hysterosoma with 4 pairs of posterior medioventral setae ..... *rosae*
4. Hysterosoma with 1 pair of posterior medioventral setae ..... 5
  - Hysterosoma with 2 pairs of posterior medioventral setae ..... *pacificus*
5. Four pairs of narrowly lanceolate setae caudally ..... 6
  - Four pairs of very broadly lanceolate setae caudally ..... *caudatus*
6. Propodosoma rugose mediodorsally; genu I and II each with two setae ..... *punicae*
  - Propodosoma smooth mediodorsally; genu I and II each with one seta ..... *zhizhilashviliae*

#### b8. Genus *Dolichotetranychus* Sayed

*Dolichotetranychus* Sayed, 1938; Pritchard and Baker, 1952; Baker and Pritchard, 1956; Pritchard and Baker, 1958; Meyer and Ryke, 1959; Baker and Pritchard, 1960; Collyer, 1973; Mitrofanov, 1973; Meyer, 1979.

Type-species: *Stigmaeus floridanus* Banks.

*Dolichotetranychus* contains 15 species and is known from Africa, America, Asia and Australia. This genus can be distinguished by a three-segmented palpus, the absence of a rostral shield and the hysterosoma bearing two pairs of dorsocentral, one pair of dorsosublateral and five pairs of dorsolateral setae.

#### Notes on the species

*Dolichotetranychus floridanus* (Banks)

*Stigmaeus floridanus* Banks, 1906.

*Pseudoleptus floridanus* Oudemans, 1927.

*Dolichotetranychus floridanus* Sayed, 1938; Pritchard and Baker, 1952; Baker and Pritchard, 1956; Ehara, 1966; Meyer, 1979.

Records: Cuba, Egypt, Japan, Java, Hawaii, Honduras, Mexico, Philippines, Puerto Rico, S. Africa, U.S.A.

Hosts: Pineapples, bamboo (*Arundo donax*).

New record: Kriti, Rethymno, 6 July 1986, on bamboo.

Relation to host: This mite was found on both leaf surfaces.

#### b9. Genus *Raoiella* Hirst

*Raoiella* Hirst, 1924; Womersley, 1940; Sayed, 1942; Womersley, 1943; Pritchard and Baker, 1958; Baker and Pritchard, 1960; Mitrofanov, 1973b; Meyer, 1979.

Type-species: *Raoiella indica* Hirst.

*Raoiella* contains only five species known from Africa, Australia and India. This genus has the following diagnostic characters: legs rounded; two palpal segments; no propodosomal shield over rostrum; five pairs of dorsolaterals, four pairs of dorsosublateral and three pairs of dorsocentral setae; tarsal claws with a pair of tenent setae; empodium padlike bearing two rows of tenent setae.

#### Notes on the species

*Raoiella macfarlanei* Pritchard and Baker

*Raoiella macfarlanei* Pritchard and Baker, 1958.

Record: Cyrenaica.

Host: *Olea europaea*.

New record: Arkadia, Leonidion, 6 July 1967, on *Ceratonia silica*.

Relation to host: This mite was found in small population on young shoots and buds.

#### b10. Genus *Obdulia* Pritchard and Baker

*Obdulia* Pritchard and Baker, 1958; Mitrofanov, 1973; Meyer, 1979.

Type-species: *Obdulia tamaricis* Pritchard and Baker.

*Obdulia* contains only one species. This genus can be distinguished by the following characters: palpus a single segment, fused to rostrum; adult bears four pairs of legs; dorsal setal pattern as following: three pairs of propodosomal, one pair of humeral, five pairs of dorsolateral, two pairs of dorsosublateral and three pairs of dorsocentral setae.

#### Notes on the species

*Obdulia tamaricis* Pritchard and Baker

*Obdulia tamaricis* Pritchard and Baker, 1958.

Record: Israel.

Host: *Tamarix maris*.

New record: Attiki, Porto-Rapti, 22 August 1982, on *Tamarix* sp.

Relation to host: This mite was found in large populations on the leaves of *Tamarix*.

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## Αναθεώρηση της Οικογένειας Tenuipalpidae (Acari) στην Ελλάδα

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### ΠΕΡΙΛΗΨΗ

Η οικογένεια αναθεωρείται και δίνονται κλειδιά για τα ελληνικά γένη και τα είδη *Aegyptobia*, *Brevipalpus*, *Cenopalpus*, *Pentamerismus* και *Tenuipalpus*. Τα είδη *Aegyptobia leiahensis*, *Phytoptipalpus paradoxus*, *Brevipalpus recki*, *Pentamerismus coronatus*, *P. juniperi*, *P. oregonensis*, *Pseudoleptus zelihae*, *Dolichotetranychus floridanus*, *Raoiella macfarlanei* και *Obdulia tamaricis* αναφέρονται για πρώτη φορά στην Ελλάδα. Δύο νέα είδη, το *Aegyptobia karystensis* και *Aegyptobia aliartensis* περιγράφονται και εικονογραφούνται. Δίνονται πληροφορίες για τους ξενιστές, την εξάπλωση, τα συμπτώματα προσβολής και την οικονομική σημασία για κάθε είδος ακάρεος που αναφέρεται στην εργασία. Επίσης γίνεται ξαναεκτίμηση των γενών και υπογενών των *Tenuipalpidae*.