

PLANT INHABITING MITES (ACARI : PROSTIGMATA & MESOSTIGMATA) OF SOME NORTHERN TUNISIAN CROPS

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TUNISIA, PHYTOSEIIDAE
TETRANYCHIDAE
TENUIPALPIDAE, ERIOPHYIDAE
APPLE, GRAPEVINE, CITRUS

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POMMIER, VIGNE, AGRUME

SUMMARY: Authors give a report on the results of collections of plant inhabiting mites carried out between 1994 and 2001 in 4 main perenial crops in 5 regions of Northern Tunisia: vegetable productions in greenhouses, apple and citrus orchards, and grapevines. Thirty-seven species, belonging to 8 families of mites were found, among which 30 species are new for the Tunisian fauna.

RÉSUMÉ : Les auteurs présentent les résultats de collectes d'acariens réalisées entre 1994 et 2001 dans 3 cultures pérennes de 5 régions du Nord de la Tunisie: cultures légumières en serres, pommier, agrumes et vigne. Trente sept espèces appartenant à 8 familles d'acariens ont été recensées dont trente sont nouvelles pour la faune tunisienne.

Eight species of tetranychid mites were known from Tunisia (BOLLAND *et al.*, 1998). *Oligonychus afrasiaticus* (McGregor), *Panonychus citri* (McGregor), *Panonychus ulmi* (Koch), *Petrobia tunisiae* Manson, *Petrobia marsai* Manson and *Tetranychus urticae* Koch were reported by several authors (PAGLIANO, 1951; CUENOD, 1958; MILLET, 1959; MANSON, 1964). However, *Eutetranychus orientalis* (Klein) and *Tetranychus evansi* Baker et Pritchard have been actually found by the senior author and reports of these 2 species were included in the world catalogue of BOLLAND *et al.* (1998) without details of collections. These details are reported in this paper.

Only one phytoseiid, *Phytoseiulus persimilis* Athias-Henriot, has been identified from the Gafsa region by RAMBIER (1972).

Thus, up to date the plant inhabiting mite fauna in Tunisia consists only in 7 species (and 2 more already partially cited).

In this paper we report results of surveys carried out during 7 years in 5 regions of the Northern Tunisia (North, West Center, Cap-Bon, Bizerte and Sahel regions), in 3 main crops : apple and citrus orchards, and grapevines.

MATERIAL AND METHODS

Plant inhabiting mites were collected from various cultivated or uncultivated plants from 1994 to 2001, some years during different seasons, by collecting directly on leaves of host-plants. Mites were then

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gently transferred with a fine hairbrush into small plastic vials containing 70° alcohol and 2% of glycerine. Mites were then cleared in laboratories with lactic acid, mounted on slides using HOYER's medium and then identified using a phase contrast microscope.

The generic classification of CHANT & McMurtry (1994) is used for the Typhlodrominae and Phytoseiinae and generic classification of MORAES *et al.* (1986) for the Amblyseiinae.

Specimens of each species are deposited in the mite collections of each collaborating institutes. Some specimens are deposited in the mite collections of at least one other collaborating institute.

The following abbreviations are used in this paper: INRA (Institut National de la Recherche Agronomique; Centre de recherche de Montpellier, France), ENSA.M (Ecole Nationale Supérieure Agronomique de Montpellier, France), ESHE (Ecole Supérieure d'Horticulture et d'Elevage de Chott-Mariem), INAT (Institut National Agronomique de Tunisie).

RESULTS

Thirty-seven species of plant inhabiting mites have been found. Seven of them have been already mentioned and 30 are new for the Tunisian fauna: 13 phytoseiids, 7 tetranychids, 2 tenuipalpids, 4 eriophyids, 1 tarsonemid, 1 tydeid and 1 stigmaeid.

MESOSTIGMATA

PHYTOSEIIDAE

AMBLYSEIINAE:

Euseius scutalis (Athias-Henriot)

[*Typhlodromus scutalis* Athias-Henriot, 1958: 183.]

This species seems very common all around the Mediterranean region. It was described from Algeria (ATHIAS-HENRIOT, 1958) and mentioned in Turkey (COBANOGLU, 1989), and Spain on *Citrus* sp.

(FERRAGUT *et al.*, 1983; GARCIA MARI *et al.*, 1985 and 1986). This species seems common in the driest regions of the northern Tunisia.

PREVIOUS RECORDS : Algeria, Egypt, India, Iran, Israel, Jordan, Turkey, Lebanon, Pakistan (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Mateur (North region), Sousse (Sahel region), Tekilsa and Slimane (Cap-Bon region), on *Malus domestica* Borkh, July 2000; Sousse (Sahel region), on *Citrus* sp., April 2000; Sidi Saheb, near Kairouan (Sahel region), on *Hibiscus* sp. near citrus orchard, May 2001.

Euseius stipulatus (Athias-Henriot)

[*Amblyseius stipulatus* Athias-Henriot, 1960a: 294.]

This species was described from Algeria (ATHIAS-HENRIOT, 1960a & b). It seems to be restricted to Mediterranean coastal regions in France where small populations have been observed on grapevines (KREITER *et al.*, 2000). *E. stipulatus* has been reported in Spain (FERRAGUT *et al.*, 1985 ; GARCIA MARI *et al.*, 1987 ; VILLARONGA *et al.*, 1991), and Italy (NICOTINA *et al.*, 1990 ; NICOTINA & CIOFFI, 1997). It is a common species on citrus leaves throughout the Mediterranean Basin (FERRAGUT *et al.* 1983; GARCIA MARI *et al.*, 1985, 1986). It is also found in Greece in several crops (PAPAIOANNOU-SOULIOTIS *et al.*, 1994) and Turkey (McMURTRY, 1977). *E. stipulatus* seems to feed on red spider mites and eriophyid mites. This species also consume pollen (FERRAGUT *et al.*, 1987).

PREVIOUS RECORDS : Algeria, France, Greece, Italy, Portugal, Spain, Turkey, Yougoslavia (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Bou Argoub, Hammamet, Maamoura, and Tazarka (Cap-Bon region), on *Citrus* sp., July 1994; Beni Khalled, Bou Argoub, Grombalia, Hammamet, Menzel Bouzelfa, Nabeul, Soliman (Cap-Bon region), on *Citrus* sp., November 1994; Intilaka, Korba, and Takilsa (Cap-Bon region), on *Citrus* sp., October 1995; Mateur (North region), Sousse (Sahel region), Tekilsa and Slimane (Cap-Bon region), on *Malus domestica* Borkh, July 2000.

Iphiseius degenerans (Berlese)

[*Seiulus degenerans* Berlese, 1889: 9.]

Described in Italy during the 19^e century (BERLESE, 1889), this species has a wide distribution. It was found in Israel on *Citrus* sp. (PORATH & SWIRSKI, 1965), in *Citrus* sp. and olive trees in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994) and on grapes in Italy (VACANTE & TROPEA GRAZIA, 1987).

PREVIOUS RECORDS : Algeria, Egypt, Greece, Israel, Italy, Kenya, Lebanon, Madeira Islands, Madagascar, Malawi, Portugal, Rwanda, South Africa, Tanzania, Turkey, Georgia, Zaire (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Citrus* sp., April 2000; Sousse (sahel region), on *Hibiscus syriacus* L. near citrus orchard, April 2001.

Neoseiulus barkeri Hughes

[*Neoseiulus barkeri* Hughes, 1948: 142, and 1976: 343 ; *Typhlodromus barkeri* Nesbitt, 1951: 35; *Typhlodromus barkeri* Chant, 1959: 61 ; *Amblyseius barkeri* Athias-Henriot, 1961: 440; *A. mckenziei* Schuster & Pritchard, 1963: 268.]

This species has been used largely in the last twenty years in experiments for biocontrol of thrips, particularly the onion thrips *Thrips tabaci* Lindeman on glasshouse cucumber (HANSEN & GEYTI, 1987 ; HANSEN, 1988 ; BRODGAARD & HANSEN, 1992) and the western flower thrips, *Frankliniella occidentalis* Per-gande. It has been commercially mass-produced in Europe since the beginning of the 1980's (RAMAKERS & LIEBURG, 1982). Selection for non-diapause strains was also effected within the species (VAN HOUTEN *et al.*, 1995). As a thrips predator, it is known to be more effective on first stage larvae of its preys (BAKKER & SABELIS, 1986). *N. barkeri* was reported in vineyards in Sicily (RAGUSA & CIULLA, 1989) and France (KREITER *et al.*, 2000) and in various crops in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994).

N. barkeri is widespread throughout the world (MORAES *et al.*, 1986), and the biological characteristics have been documented because of its use in controlling thrips on Cucurbitaceae in greenhouses (CASTAGNOLI, 1989). It also feeds on red spider mites and eriophyid mites (MOMEN, 1995). This species was found in Israel on *Citrus* sp. (PORATH & SWIRSKI, 1965).

PREVIOUS RECORDS : Algeria, Brazil, China, France, Georgia, Germany, Guinea, Hawaï, Israel, Japan, Italy, Netherlands, Spain, Turkey, Ukraine, United Kingdom, USA (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Beni Khiar (Cap Bon region), on *Oxalis* sp. in citrus orchard, October 1995.

Neoseiulus californicus (McGregor)

[*Typhlodromus californicus* McGregor, 1954: 89.]

N. californicus has been mentioned in various crops in Spain (FERRAGUT *et al.*, 1983; GARCIA MARI *et al.* 1985; GARCIA MARI *et al.*, 1986 ; VILLARONGA *et al.*, 1991), Italy (NICOTINA & CIOFFI, 1997), France (KREITER *et al.*, 2000) and in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994).

This very widespread species (MORAES *et al.*, 1986), which McMurtry and Croft (1997) consider to be specialised, migrates from the grassy layer to fruit trees or grapevines and vice-versa (RAWORTH *et al.*, 1994 ; AUGER *et al.*, 1999). It is a specialist predator of *T. urticae* on annual plants and woody species, and of *P. ulmi* (and perhaps eriophyid mites) on trees and less frequently on grapevines. These biological features have only recently been studied (CASTAGNOLI & AMATO, 1991 ; CASTAGNOLI & SIMONI, 1991 & 1994 ; CASTAGNOLI *et al.*, 1995 ; AUGER *et al.*, 1999).

PREVIOUS RECORDS : Algeria, Argentina, Brazil, Chile, France, Guatemala, Japan, Peru, Spain, Uruguay, USA (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Lycopersicon esculentum* Miller in greenhouses, April 2000 ; Mateur (North region), on *Malus domestica* Borkh, July 2000.

Phytoseiulus persimilis Athias-Henriot

[*Phytoseiulus persimilis* Athias-Henriot, 1957 : 347 ;
Phytoseiulus riegeli Dosse, 1958 : 48 ; *Phytoseiulus tardi* Lombardini, 1959 : 1.]

This species was the only phytoseiid already known from the Tunisia, mentioned from Gafsa (RAMBIER, 1972).

Phytoseiulus persimilis was first collected in Algeria in 1955 and is known mainly from mediterranean climates all around the world (TAKAHASHI & CHANT, 1993). Its distribution of this species was considerably extended during the last 30 years because of its predatory faculties (KOSTIAINEN & HOY, 1996). Many studies deal with this specialist predator (McMURTRY & CROFT, 1997) because of its economic importance, especially in greenhouses to control *T. urticae* populations (VAN LENTEREN & WOETS, 1988). Some studies report for example the close relationships between plants attacked by *T. urticae* and *P. persimilis* (DRUKKER et al., 1997; JANSEN, 1999).

PREVIOUS RECORDS : Algeria, Australia, Chile, France, Greece, Israel, Italy, Lebanon, Lybia, New Caledonia, Peru, South Africa, Spain, USA (MORAES et al., 1986).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Lycopersicon esculentum* Miller and *Cucumis sativus* L. in greenhouses (but not introduced), April 2000; Hammamet, Menzel Bouzelfa and Mraïssa (Cap-Bon region), on *Citrus* sp., November 1994, October 1995, and July 2001; Metline (Bizerte region), on *Malus domestica* Borkh, June 2000.

PHYTOSEIINAE

Phytoseius finitimus Ribaga

[*Phytoseius finitimus* Ribaga, 1902: 178.]

The individuals found in Tunisia probably belong to the species *P. finitimus* which is confused in other studies with *Phytoseius plumifer* Canestrini & Fanzago. A big confusion between these 2 species has

existed during a long time and a tentative solution is presently in progress (DUSO, personal communication and under press in *Acarologia*).

Specimens belonging probably to *P. finitimus* (but this has to be confirmed) has already been reported on grapevines in Spain (FERRAGUT et al., 1985 ; VILLARONGA et al., 1991), Hungary (DELLEI & SZENDREY, 1991), Italy (LIGUORI, 1980 ; CORINO, 1985 ; CASTAGNOLI & LIGUORI, 1986 ; DUSO & REN, 1997), Portugal (CARMONA & FERREIRA, 1989), Greece (PAPAIOANOU-SOULIOTIS et al., 1994) and France (KREITER et al., 2000). *P. finitimus* seems to feed on *P. ulmi* (DUSO & MORETTO, 1994) and various eriophyid mites (RASMY & EL-BANHAWY, 1974b), and it consumes pollen (ZAHER et al., 1969 ; RASMY & EL-BANHAWY, 1975). Local conditions in Corsica, i.e. high relative humidity and very hairy-leaved grapevine varieties, seem to be very suitable for this species (RASMY & EL-BANHAWY, 1974a; DUSO & MORETTO, 1994; KREITER et al., 2000). Several experimental introductions have been carried out in Corsica in various productive vineyards (SALVA, unpublished data). As also noted for *Kampimodromus aberrans* (Oudemans), side effects of pesticides on this species have only been investigated in the field (SENTENAC et al., 1999). This species was also found on *Citrus* sp. in Spain (FERRAGUT et al., 1983; GARCIA MARI et al. 1985).

PREVIOUS RECORDS : Algeria, France, Greece, Iran, Israel, Italy, Russia, Spain, Turkey, USA, Yugoslavia (MORAES et al., 1986).

SPECIMENS EXAMINED : several vineyards in Cap-Bon region, *Vitis vinifera* L., July 1995.

TYPHLODROMINAE

Neoseiulella tiliarum (Oudemans)

[*Typhlodromus tiliarum* Oudemans, 1930: 51.]

This species seems common in many Mediterranean countries, especially in Algeria, France, Greece (PAPAIOANOU-SOULIOTIS et al., 1994) and Yugoslavia.

PREVIOUS RECORDS : Algeria, Austria, Azerbaijan, Canada, England, France, Germany, Greece, Hun-

gary, Italy, Moldavia, Netherlands, Poland, Russia, Switzerland, Turkey, Ukraine, USA, Yugoslavia (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Malus domestica* Borkh, July 2000.

Typhlodromus (Anthoseius) perforatus
(Athias-Henriot)

[*Typhlodromus perforatus* Athias-Henriot, 1960b: 72.]

Biolocal characteristics of this species remain unknown.

PREVIOUS RECORDS : Algeria (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Malus domestica* Borkh, July 2000.

Typhlodromus (Anthoseius) rhenanoides
Athias-Henriot

[*Typhlodromus rhenanoides* Athias-Henriot, 1960b: 85 ; McMurtry & Bounfour, 1989 : 16. *Neoseiulus rhenanoides*, Schuster & Pritchard, 1963 : 205.]

T. rhenanoides seems restricted to Mediterranean coastal regions in France. *T. rhenanoides* has however been reported in French Antilles, Hawaii and California (USA). This species was described from Algeria (ATHIAS-HENRIOT, 1960a & b), but it is always found in small populations on grapevines in France (KREITER *et al.*, 2000). It was also found in *Citrus* sp. in Spain (FERRAGUT *et al.*, 1983; GARCIA MARI *et al.* 1985) and in many crops in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994).

Biological characteristics of this species have been investigated recently. It seems to be polliniphagous (RAGUSA & TSOLAKIS, 1998) but the specific diets have not yet been documented.

PREVIOUS RECORDS: Algeria, Hawaii, Italy, Morocco, Spain, USA, West Indies in Les Saintes islands (MORAES *et al.*, 1986).

SPECIMENS EXAMINED: Hammamet (Cap-Bon region), on *Citrus* sp., November 1994; Bou Argoub (Cap-Bon region), on *Citrus* sp., October 1995.

Typhlodromus (Anthoseius) rhenanus Oudemans
[*Typhlodromus rhenanus* Oudemans, 1905: 128.]

This species was found in Israel on *Citrus* sp. (PORATH & SWIRSKI, 1965) and on grapevines in France (KREITER *et al.*, 2000). Biolocal characteristics of this species remain unknown.

PREVIOUS RECORDS : Algeria, Azerbaijan, Belgium, Canada, Cyprus, France, Hungary, India, Iran, Israel, Italy, Kazakhstan, Madeira Island, Moldavia, Poland, Portugal, Russia, Switzerland, Ukraine, USA (MORAES *et al.*, 1986)

SPECIMENS EXAMINED : Mateur (North region) and Sousse (Sahel region), on *Malus domestica* Borkh, July 2000; Tunis (INAT, North region), on *Urtica dioica* L., June 2000.

Typhlodromus (Anthoseius) recki Wainstein
[*Typhlodromus recki* Wainstein, 1958: 203.]

T. recki has been reported in Spain (FERRAGUT *et al.*, 1985 ; GARCIA MARI *et al.*, 1987 ; VILLARONGA *et al.*, 1991), Sicily (RAGUSA & CIULLA, 1989), Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994) and France (KREITER *et al.*, 2000). The biology of this species has not been investigated.

PREVIOUS RECORDS : Algeria, Armenia, Azerbaijan, Georgia, Greece, Hungary, Israel, Kazakhstan, Lebanon, Turkey, Russia (MORAES *et al.*, 1986).

SPECIMENS EXAMINED : several vineyards in Cap-Bon region, *Vitis vinifera* L., July 1995.

Typhlodromus (Typhlodromus) exhilaratus Ragusa
[*Typhlodromus exhilaratus* Ragusa, 1977: 380.]

This species was found in many crops in France (unpublished data), Italy and Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994). Many studies deal with this species in Italy because of its dominance in several Italian vineyards (CASTAGNOLI & LIGUORI, 1986; CASTAGNOLI *et al.*, 1989, LIGUORI & GUILDI, 1990).

PREVIOUS RECORDS: Greece, Italy (MORAES *et al.*, 1986), France (unpublished data).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Malus domestica* Borkh, July 2000.

Typhlodromus (Typhlodromus) phialatus
Athias-Henriot

[*Typhlodromusphialatus* Athias-Henriot, 1960b: 100.]

T. phialatus, which was thought to be strictly endemic to Mediterranean region, is much more widespread as it was detected in several regions from France (KREITER et al., 2000), but always in low densities. It is commonly found on various crops in the Mediterranean Basin, especially on citrus fruit in Spain (FERRAGUT et al., 1983; GARCIA MARI et al. 1985, 1986) and on grapevines in Spain (FERRAGUT et al., 1985 ; GARCIA MARI et al., 1987 ; VILLARONGA et al., 1991), and Greece (PAPAIOANNOU-SOULIOTIS et al., 1994).

In addition, it has been reported in eastern Europe (MORAES et al., 1986). It feeds on red spider mites and consumes pollen (FERRAGUT et al., 1987).

PREVIOUS RECORDS : Algeria, Germany, Jordan, Moldavia, Russia, Spain, Ukraine (MORAES et al., 1986).

SPECIMENS EXAMINED : El Gobba and Hammamet (Cap-Bon region), on *Citrus* sp., June 1994; Monastir (Sahel region), on *Citrus* sp., November 1994; several vineyards in Cap-Bon region, on *Vitis vinifera* L., July 1995; Slimane (Cap-Bon region) and Sousse (Sahel region), on *Malus domestica* Borkh, July 2000.

With *Phytoseiulus persimilis* already known, the number of known species of phytoseiid mites in Tunisia is now of 14.

PROSTIGMATA

TETRANYCHIDAE

Bryobiinae

Bryobia rubrioculus (Scheutten)

[*Sannio rubrioculus* Scheutten, 1857: 104; *Bryobia rubrioculus* (Scheutten) van Eyndhoven, 1956: 45;
Bryobia arborea Morgan & Anderson, 1957: 385.]

PREVIOUS RECORDS : several countries in the world and especially in Algeria, Lebanon and Morocco (BOLLAND et al., 1998).

SPECIMENS EXAMINED : Mateur (North region) and Sousse (Sahel region), on *Malus domestica* Borkh, August 2000; Sousse (Sahel region), on *Malva* sp. near greenhouses and orchards, April 2001.

Petrobia (Tetranychina) harti (Ewing)

[*Neophyllobius harti* Ewing, 1909: 405.]

This species was also found in *Citrus* sp. in Spain (FERRAGUT et al., 1983; GARCIA MARI et al. 1985).

PREVIOUS RECORDS : several countries in the world, and especially Egypt, and Israel (BOLLAND et al., 1998).

SPECIMENS EXAMINED : Beni Khiar and Bir Bou Regba (Cap-Bon region), on *Oxalis* sp. in a citrus orchard, October 1995.

TETRANYCHINAE

Eotetranychus carpini (Oudemans)

[*Tetranychus carpini* Oudemans, 1905: 79.]

This species was recorded on grapes in many countries of southern Europe, for example in France (KREITER et al., 2000), Italy (VACANTE & TROPEA GRAZIA, 1987) and Greece (PAPAIOANNOU-SOULIOTIS et al., 1994).

PREVIOUS RECORDS : several countries in the world and especially in Algeria, Lebanon, and Morocco (BOLLAND et al., 1998).

SPECIMENS EXAMINED : Grombalia and Khlidia (Cap-Bon region), on *Vitis vinifera* L., in June 2000.

Eotetranychus pruni (Oudemans)

[*Tetranychus pruni* Oudemans, 1931: 195.]

This species has been reported on various *Prunus* sp. in Greece (PAPAIOANNOU-SOULIOTIS et al., 1994).

PREVIOUS RECORDS : several countries, especially in Algeria and Morocco (BOLLAND et al., 1998).

SPECIMENS EXAMINED : Metline (Bizerte region), Sousse (Sahel region), and Slimane (Cap-Bon region), on *Malus domestica* Borkh, June 2000.

Eutetranychus orientalis (Klein)

[*Anychus orientalis* Klein, 1936: 3; Sayed, 1946: 143;
Eutetranychus orientalis (Klein), Baker & Pritchard,
1960: 464.]

Eutetranychus orientalis is an important pest of *Citrus* sp. in the Middle East, Africa and Asia (JEPPISON *et al.*, 1975) but can be found on a lot of other plants (WALTER *et al.*, 1995). This species seems very common in all the Mediterranean area on grapes and citrus (HASSAN *et al.*, 1986; PAPAIOANNOU-SOULIOTIS *et al.*, 1994).

PREVIOUS RECORDS : several countries in the world, especially Egypt, Israel, Jordan, and Lebanon (BOLLAND *et al.*, 1998).

SPECIMENS EXAMINED : Beni Khar, Bir Bou Regba, Bou Argoub, El Gobba, Hammamet, Khlidia, Mraïssa, Mrazga, Nabeul (Cap-Bon region), Sousse (ESHE) and Kairouan (Sahel region), Tunis (INAT, North region), on *Citrus* sp., November 1994, July and October 1995, October 2000, and July 2001; Sousse (ESHE, Sahel region), on *Ricinus communis* L., April 2001.

Panonychus citri (McGregor)

[*Tetranychus citri* McGregor, 1916 : 284.]

This species was also found in *Citrus* sp., especially in Italy (VACANTE & TROPEA GRAZIA 1985), in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994), in Spain (FER-RAGUT *et al.*, 1983; GARCIA MARI *et al.* 1985) and in France, in Corsica and the French Riviera (KREITER *et al.*, unpublished data).

This species was already known from Tunisia on *Citrus* sp. (MILLET, 1959).

PREVIOUS RECORDS : several countries in the world, and especially in Lebanon, Libya, Morocco and Tunisia (BOLLAND *et al.*, 1998).

SPECIMENS EXAMINED : Hammamet (Cap-Bon region), on *Citrus* sp., October 1995.

Panonychus ulmi (Koch)

[*Tetranychus ulmi* Koch, 1836: 11.]

This species is a serious pest, especially of many fruit trees and grapevines in many countries of the world (BOLLAND *et al.*, 1998).

PREVIOUS RECORD : Brazil, Congo, Maurice, Morocco, Mozambique, Portugal, Puerto Rico, Réunion, Rodrigues and Seychelles islands, Spain, USA, Virgin islands, Zambia, Zimbabwe (BOLLAND *et al.*, 1998).

SPECIMENS EXAMINED : Sbiba (West center region), Metline (Bizerte region) and Mornag (North region), on *Malus domestica* Borkh, July 2000.

Tetranychus evansi Baker and Pritchard

[*Tetranychus evansi* Baker and Pritchard, 1960: 540.]

This species is a serious pest of tomato, potato and tobacco crops in wide areas of Brazil (FLECHTMANN, 1967; RAMALHO & FLECHTMANN, 1979), United States (SCHUSTER, 1959; OATMAN *et al.*, 1967; BAKER & TUTLE, 1994) and Zimbabwe (BLAIR, 1983, 1990). It was described from Mauritius (BAKER & PRITCHARD, 1960) and was then found in all islands of the Indian Ocean (GUTIERREZ, 1974; GUTIERREZ & ETIENNE, 1986).

This species was mentioned from Tunisia in the World Catalogue of Bolland *et al.* (1998) but it was actually first discovered in October, 1995, in a citrus orchard near Hammamet.

PREVIOUS RECORD : Brazil, Congo, Mauritius island, Morocco, Mozambique, Portugal, Puerto Rico, Reunion island, Rodrigues and Seychelles islands, Spain, USA, Virgin islands, Zambia, Zimbabwe (BOLLAND *et al.*, 1998).

SPECIMENS EXAMINED : Hammamet (Cap-Bon region), on *Datura inoxia* L. in a citrus orchard, October 1995; Mateur (North region), in buds of

Malus domestica Borkh, from January to June, 1998; Tunis (INAT, North region), on *Solanum nigrum* L., July 2001.

Tetranychus turkestanii (Ugarov & Nikolski)

[*Eotetranychus turkestanii*
Ugarov and Nikolski, 1937: 28.]

This species have been found on many plants in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994) and is present in all the countries of the Mediterranean area.

PREVIOUS RECORDS : several countries of the world, and especially Algeria and Morocco (BOLLAND *et al.*, 1998).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Lycopersicon esculentum* L. in greenhouses, June 1994; Menzel Bouzelfa (Cap-Bon region), *Citrus* sp., November 1994.

Tetranychus urticae Koch

[*Tetranychus urticae* Koch, 1836 : 10.]

This species is found all over the world. It was mentioned on *Citrus* sp. in Spain (FERRAGUT *et al.*, 1983; GARCIA MARI *et al.* 1985) and Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994), and Tunisia (CUENOD, 1958).

PREVIOUS RECORDS : several countries of the world, and especially Algeria, Morocco, and Tunisia (BOLLAND *et al.*, 1998).

SPECIMENS EXAMINED : Sousse (SAHEL region), on *Lycopersicon esculentum* Miller and *Cucumis sativus* L. in greenhouses, June 1994; Hammamet, Mraïssa, Soliman (Cap-Bon region), on *Citrus* sp., June and November 1994, November 1995; Beni Khalled and Menzel Bouzelfa (Cap-Bon region), on *Citrus* sp., November 1994; Grombalia (Cap-Bon region), on *Citrus*, November 1995 and July 1998; Korba (Cap-Bon region), on *Citrus*, November 1995; El Gobba (Cap Bon region), on *Citrus*, July 1998; Kasserine and Sbiba (West Center region), Metline

(Bizerte region), Mateur, Djedaïda, Mornag and Tunis (North region), Sousse (Sahel region), on *Malus domestica* Borkh, *Solanum nigrum* L., *Convolvulus arvensis* L., *Amaranthus retroflexus* L., *Calendula arvensis* L., *Malva nicaensis* All., *Urtica dioica* L. and *Ecballium elaterium* (L.) Rich., June 1999.

With *O. afrasiaticus*, *P. tunisiae* and *P. marsai*, already reported but not found in our survey, the number of Tetranychidae from the Tunisian fauna is now of 13.

TENUIPALPIDAE

Brevipalpus lewisi McGregor

[*Brevipalpus lewisi* McGregor, 1949: 17.]

This species has been found all over the world. It was mentioned on grapes and *Citrus* sp. in Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994).

PREVIOUS RECORDS : Australia, Columbia, Egypt, France, Hungary, India, Japan, Russia, Spain, Taiwan, USA, Yugoslavia (GHAI & SHENHMAR, 1984).

SPECIMENS EXAMINED : Hammamet, Korba, Mraïza (Cap-Bon region), on *Citrus* sp., October 1995; Mraïza (Cap-Bon region), on *Cydonia oblonga* Miller near a citrus orchard, October 1995; Sousse (ESHE, Sahel region), on *Citrus* sp., October 1995.

Tenuipalpus granati Sayed

[*Tenuipalpus orchidarum* Sayed, 1942: ; *Tenuipalpus granati* Sayed, 1946 : 100.]

This species is found all over the Mediterranean area. It was mentioned on grapes in Egypt (HASSAN *et al.*, 1986), Greece (PAPAIOANNOU-SOULIOTIS *et al.*, 1994), and Sicily (VACANTE & TROPEA GRAZIA, 1987).

PREVIOUS RECORDS : Egypt, Greece, India, Israel, Morocco, Russia (GHAI & SHENHMAR, 1984).

SPECIMENS EXAMINED : several vineyards in Cap-Bon region, on *Vitis vinifera* L., July 1995.

ERIOPHYIDAE

Aceria sheldoni (Ewing)

[*Eriophyes sheldoni* Ewing, 1937: 193.]

PREVIOUS RECORDS : several countries, in all citrus growing areas of the World (AMRINE & STASNY, 1994).

SPECIMENS EXAMINED : Maamoura and Somoa (Cap-Bon region), on *Citrus* sp., October 1995; El Gobba, Khlidia, Tekilsa (Cap-Bon region) and Sousse (Sahel region), on *Citrus* sp., June 2000.

Phyllocoptruta oleivorus (Ashmead)

[*Typhlodromus oleivorus* Ashmead, 1879: 160; *Phyllocoptruta oleivorus* (Ashmead) Keifer, 1938: 193.]

PREVIOUS RECORDS : several countries, in all citrus growing areas of the World (AMRINE & STASNY, 1994).

SPECIMENS EXAMINED : Hammamet (Cap-Bon region), on *Citrus* sp., October 1995.

Aculops lycopersici (Massee)

[*Phyllocoptes lycopersici* Massee, 1937: 403.]

PREVIOUS RECORDS : on *Lycopersicon esculentum* L. in several countries of the World (AMRINE & STASNY, 1994).

SPECIMENS EXAMINED : Tekilsa (Cap Bon region), on *Lycopersicon esculentum* L., in open field, June 1997; Sousse (ESHE, Sahel region), on *Lycopersicon esculentum* L. in greenhouses, April 2000 and April 2001; Sidi Thabet (North region), on *Lycopersicon esculentum* L. (in greenhouses and in open field), June 2000.

Aculus schlechtendali (Nalepa)

[*Phyllocoptes schlechtendali* Nalepa, 1890: 41.]

PREVIOUS RECORDS : on *Malus domestica* Borkh in several countries of the World (AMRINE & STASNY, 1994).

SPECIMENS EXAMINED : Kasserine (West center region), Mateur (North region), Sousse (Sahel region), Slimane, and Tekilsa (Cap Bon region) on *Malus domestica* Borkh, June 2000.

TARSONEMIDAE

Phytonemus pallidus (Banks)

[*Tarsonemus pallidus* Banks, 1899: 294.]

PREVIOUS RECORDS : on *Fragaria sativa* L., in several countries of the World (LINDQUIST, 1986).

SPECIMENS EXAMINED : Nabeul (Cap-Bon region), on *Fragaria sativa* L., May 2000.

TYDEIDAE

Lorryia formosa Cooreman

[*Lorryia formosa* Cooreman, 1958 : 7.]

This species was also found in *Citrus* sp. in Spain (FERRAGUT et al., 1983; GARCIA MARI et al. 1985).

PREVIOUS RECORDS : many countries of the World, in all areas of citrus production, especially in Algeria, and Morocco (GERSON & SMILEY, 1990).

SPECIMENS EXAMINED : All visited localities of the Citrus growing region of Cap-Bon, on *Citrus* sp., June and November 1994, and October 1995; Sousse (ESHE, Sahel region), on *Citrus* sp., October 1995; Tunis (INAT, North region), on *Citrus* sp., June 2000.

STIGMAEIDAE

Zetzellia mali Ewing

[*Caligonus mali* Ewing, 1917: 499.]

This predatory mite is common in vineyards and orchards of the Mediterranean area. It was often observed preying on mobile forms of Eriophyid mites, for example on *Calepitrimerus vitis* (Nalepa) and *Colomerus vitis* (Pagenstecher) on vines (VACANTE & TROPEA GRAZIA, 1987).

PREVIOUS RECORDS : many countries in the Northern Hemisphere (GERSON & SMILEY, 1990).

SPECIMENS EXAMINED : Hammamet (Cap-Bon region), on *Citrus* sp., October 1995 ; Mateur and Mornag (North region) and Sousse (Sahel region), on *Malus domestica* Borkh, June 2000.

ANYSTIDAE

Anystis baccarum (L.)

[*Anystis baccarum* Linné, 1758:]

PREVIOUS RECORDS : several countries of the World (GERSON & SMILEY, 1990).

SPECIMENS EXAMINED : Sousse (Sahel region), on *Malus domestica* Borkh, June 2000.

CONCLUSION

Thirty-seven species of plant inhabiting mites are presently recorded from some crops of the Northern Tunisia.

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