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## SOME TETRANYCHOID MITES OF MICHIGAN

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Tetranychoid mites are plant feeders, and many of them are of considerable economic importance. Prior to the present study, only seven species of these mites were known from Michigan; *Oligonychus ilicis* (McGregor) (McGregor, 1931); *Tetranychus mcdanieli* McGregor (McGregor, 1931; Pritchard and Baker, 1955); *Eurytetranychus buxi* (Garman) (Ries, 1935; McGregor, 1950); *Tetranychus atlanticus* McGregor (Tuttle and Baker, 1964); *Bryobia praetiosa* Koch, *Panonychus ulmi* (Koch), and *Tetranychus telarius* (L.) (Ghate and Howitt, 1965).

During 1966-1968, surveys of many counties were made and 21 species of tetranychoid mites, belonging to the two families Tetranychidae and Tenuipalpidae, were collected. Due to lack of funds, many counties were not surveyed, and in some cases, specific determinations could not be made because of the lack of males. It is expected that future surveys of other counties will yield many more species. For excellent illustrations of the species reported in this paper, and other details, readers are referred to Baker (1949); McGregor (1950); Pritchard and Baker (1952, 1955, 1958); Reeves (1963), and Tuttle and Baker (1964, 1968).

All collections, unless otherwise stated, were made by the author. Collection records are arranged alphabetically by counties. Numbers in parentheses at the end of collection data are my collection numbers. *Eurytetranychus buxi* and *Oligonychus ilicis*, previously reported from Michigan, were not collected in the present study. The total number of tetranychoid mites now known from Michigan is 23.

## TETRANYCHIDAE

1. *Bryobia praetiosa* Koch

*Bryobia praetiosa* Koch, 1836: 8.

This is mainly a grass-infesting species. It has world-wide distribution, and invades houses in fall and winter in many parts of the world. This species is very close to *Bryobia rubrioculus* but differs from it in having a tactile seta on tarsus III and IV proximal and approximate to the solenidion, and about one-half to three-fourths of its length.

*Collection records* -- Chippewa County: Sheridan Park, July 29, 1968, from *Cornus canadensis* (68-52); Ingham County: Michigan State University campus, East Lansing, September 9, 1967, from *Elymus* sp., grape, and grass (67-60, 62, 67); Oakland County: Highland Recreation Park, May 18, 1968, from *Arisaema triphyllum* (68-51F); St. Clair County: Algonac State Park, June 1, 1968, from *Acer* sp., and *Prunus* sp. (68-14, 15); Washtenaw County: University of Michigan campus, Ann Arbor, September 10, 1967, from grass (67-72); Wayne County: Wayne State University campus, Detroit, April 13, 1967, from dead pigeon lying on grass (67-3); Prentis and Lysander streets, Detroit, July 30, 1967, from *Saponaria* sp. and grass (67-28, 29); Dearborn, August 27, 1967, from grass (67-46); Wayne State University campus, Detroit, April 23, 1968, from *Taraxacum officinale* (68-13F).

2. *Eotetranychus multidigituli* (Ewing)

*Tetranychus multidigituli* Ewing, 1917b: 497.

*Eotetranychus multidigituli*, Pritchard and Baker, 1955: 163.

This species is known only from honey locust. Tibia II in the female has five tactile setae and the peritreme anastomoses distally. The dorsal hysterosomal setae both in male and female are shorter than the interval between their bases. The aedeagus is bent ventrally and has a terminal knob.

*Collection records* – Wayne County: Wayne State University campus, Detroit, September 10, 1967, from *Gleditsia triacanthos* (67-77); Tuxedo, September 17, 1968, from *Gleditsia triacanthos* (68-55).

### 3. *Eotetranychus populi* (Koch)

*Tetranychus populi* Koch, 1838: 14.

*Eotetranychus populi*, Pritchard and Baker, 1955: 189.

This species is known from poplar and willow. The peritremes in both the sexes anastomose distally and tarsus II is with proximal member of duplex setae much shorter than distal member. The female genital flap has longitudinal striae on the anterior portion. The aedeagus has a medial curve.

*Collection record* – Oakland County: Northwestern Highway and Telegraph Road, August 11, 1967, from *Salix* sp. (67-33).

### 4. *Eurytetranychus buxi* (Garman)

*Neotetranychus buxi* Garman, in Ries, 1935: 57.

*Eurytetranychus buxi*, Pritchard and Baker, 1955: 103.

This species was first recorded from Oakland and Wayne Counties, Michigan, on boxwood. It is widespread in the United States and is known mainly to infest boxwood. It is distinctive in having the dorsal body setae about as long as the intervals between the bases of next setae. The sensory setae on tibia III and IV are absent in the female. The aedeagus is dorsally bent. The species was not collected in the present study.

### 5. *Oligonychus aceris* (Shimer)

*Acarus aceris* Shimer, 1869: 320.

*Oligonychus aceris*; Pritchard and Baker, 1955: 297.

This species is known from maple, feeding on the lower surface of the leaf. The body setae in adults are set on small tubercles. The tibia I in females has only six tactile setae and one sensory seta which is more than half as long as the dorsal tactile seta. The aedeagus is ventrally bent.

*Collection records* – Ingham County: Michigan State University campus, East Lansing, September 9, 1967, from *Acer* sp. (67-66); Oakland County: Pontiac Lake Recreation Area, June 24, 1967, from *Acer* sp. (67-8); St. Clair County: Algonac State Park, June 1, 1968, from *Acer* sp. (68-14).

### 6. *Oligonychus endytus* Pritchard and Baker

*Oligonychus endytus* Pritchard and Baker, 1955: 301.

This species is known previously from California and has been found on the dorsal side of oak and chestnut leaves. The adults are distinctive in having long and thick dorsal body setae which are borne on strong tubercles. Tibia I in Michigan specimens (females) bears five tactile setae and one sensory seta which is less than half as long as dorsal tactile seta. The aedeagus is ventrally bent.

*Collection records* — Chippewa County: One half-mile south of St. Mary's River, Sugar Island, July 27, 1968, from *Acer* sp., and *Cornus* sp. (68-38, 39, 40).

#### 7. *Oligonychus ilicis* (McGregor)

*Tetranychus ilicis* McGregor, 1917: 586.

*Oligonychus ilicis*, Pritchard and Baker, 1955: 305.

McGregor (1931) reported *O. ilicis* occurring on raspberry in Berrien County, Michigan. No other record of this species is known from Michigan. It is distinctive in that the females have seven tactile setae on tibia I and only three tactile setae proximal to duplex setae on tarsus I. The outer sacral setae in females are smaller than the inner sacral. The aedeagus in the male is close to *Oligonychus platani* (McGregor).

#### 8. *Oligonychus propetes* Pritchard and Baker

*Oligonychus propetes* Pritchard and Baker, 1955: 366.

Hysterosomal integumentary striae in females are transverse between the third pair of dorsocentral setae and inner and outer sacral setae, and peritremes end into a simple bulb.

*Collection record* — St. Clair County: Algonac State Park, June 1, 1968, from *Forsythia* sp./*Cornus* sp. (68-17).

#### 9. *Oligonychus ununguis* (Jacobi)

*Tetranychus ununguis* Jacobi, 1905: 239.

*Oligonychus ununguis*, Hirst, 1920: 59.

This species, which is known from many parts of the United States and Europe, infests conifers. Tarsus I in female Michigan specimens has four tactile setae proximal to duplex setae and tibia I has seven tactile setae. The aedeagus is bent ventrally at a right angle to the shaft.

*Collection record* — Ingham County: Michigan State University campus, East Lansing, September 9, 1967, from *Thuja occidentalis* (67-55).

#### 10. *Panonychus ulmi* (Koch)

*Tetranychus ulmi* Koch, 1836: 11.

*Panonychus ulmi*, Tuttle and Baker, 1958: 84.

This is a well-known pest of deciduous fruit trees. It is easily recognized from other species in that the outer sacral setae on the hysterosoma are about two-thirds as long as the inner sacral; the genital flap in females possesses longitudinal striae on the anterior portion. All the dorsal body setae are set on strong tubercles.

*Collection records* — Macomb County: Melrose Court, July 16, 1967, from *Ulmus* sp. (67-21); Oakland County: Pontiac Lake Recreation Area, June 24, 1967, from *Symplocarpus foetidus* (67-6); St. Clair County: Algonac State Park, June 1, 1968, from *Prunus* sp. (68-15); Wayne County: Greenfield Village, August 17, 1967, from *Rosa* sp. and *Ulmus* sp. (67-39,40).

#### 11. *Petrobia harti* (Ewing)

*Neophyllobius harti* Ewing, 1909: 405.

*Petrobia harti*, Pritchard and Baker, 1955: 45.

*P. harti* is recorded from various parts of the world and is known to feed primarily on *Oxalis*. The first pair of legs in females are very long, about twice as long as the body, and the clunal setae on the hysterosoma are shorter than other dorsal hysterosomal setae. All the dorsal body setae are set on strong tubercles.

*Collection record* – Washtenaw County: University of Michigan campus, Ann Arbor, September 10, 1967, from *Viola* sp. (67-72).

#### 12. *Petrobia latens* (Muller)

*Acarus latens* Muller, 1776: 187.

*Petrobia latens*, Oudemans, 1915: 44.

*P. latens* has world-wide distribution. It feeds mainly on monocotyledonous plants and is known to invade houses. The dorsal body setae in females are shorter than distances between their bases and are not set on tubercles. All the dorsal hysterosomal setae are approximately equal in length. Males are unknown.

*Collection records* – St. Clair County: Algonac State Park, June 1, 1968, from *Prunus* sp., *Geranium* sp., *Ambrosia* sp., and *Asclepias* sp. (68-10, 12, 13).

#### 13. *Schizotetranychus garmani* Pritchard and Baker

*Schizotetranychus garmani* Pritchard and Baker, 1955: 233.

Dorsal hysterosomal setae in female are longer than interval between their bases and tibia I has nine tactile setae. Aedeagus is very long, pointed, and wavy.

*Collection record* – Wayne County: Dearborn, August 27, 1967, from *Acer* sp. (67-66).

#### 14. *Schizotetranychus schizopus* (Zacher)

*Tetranychus schizopus* Zacher, 1913: 40.

*Schizotetranychus schizopus*, Tragardh, 1915: 277.

The dorsal body setae in females are lanceolate and reach to the base of next setae. Tibia I in the female has eight tactile setae and tarsus I has three sensory setae. Aedeagus is bent dorsally and has a knob distally. It is known to infest willow.

*Collection records* – Wayne County: Dearborn, August 27, 1967, from fern and *Pieris* sp. (67-64, 65).

#### 15. *Schizotetranychus spireafolia* Garman

*Schizotetranychus spireafolia* Garman, 1940: 74.

This species is known only from *Spirea*. The female is distinctive in having lanceolate dorsal setae which are shorter than the longitudinal intervals between their bases. Tibia I in male and female has eight tactile setae. The aedeagus is bent upward.

*Collection record* – Washtenaw County: The Nichols Arboretum, Ann Arbor, September 10, 1967, from *Spirea* sp. (67-73).

#### 16. *Tetranychus atlanticus* McGregor

*Tetranychus atlanticus* McGregor, 1941a: 26.

This species is known to feed mainly on low-growing plants. The earliest Michigan collection record is from Bay City on red raspberry (Tuttle and Baker, 1964). The females have longitudinal striae between the third pair of dorsocentral setae on the hysterosoma and tibia I has nine tactile setae. The aedeagus has an enlarged knob which is about one-fourth as long as the dorsal margin of shaft.

*Collection records* --Oakland County: Northwestern Highway and Telegraph Road, Stream Wood, August 11, 1967, from *Asarum canadense*, and *Sanguinaria canadensis* (67-37, 38); Oakwood, August 27, 1967, from *Aralia* sp. (67-42); Gildow Street, University of Michigan, Dearborn Center, August 27, 1967, from *Viola* sp. (67-48); Washtenaw County: University of Michigan campus, Ann Arbor, September 10, 1967, from *Viola* sp. (67-71).

#### 17. *Tetranychus canadensis* (McGregor)

*Septanychus canadensis* McGregor, 1950: 319.

*Tetranychus canadensis*, Pritchard and Baker, 1952: 267.

This species is known from several parts of the country. The females have transverse striae between the third pair of dorsocentral setae and longitudinal striae between the inner sacra on the hysterosoma. Tibiae I have nine tactile setae in the female, eight in the male. The knob of the male aedeagus is about one-fourth as long as dorsal margin of the shaft.

*Collection records* -- Wayne County: Wayne State University campus, Detroit, July 13, 1967, from *Ulmus* sp. (67-19); West Canfield and Prentis streets, Detroit, July 29, 1967, from *Aesculus hippocastanum* (67-23); West Canfield street, Detroit, from *Ulmus* sp. (67-26).

#### 18. *Tetranychus mcdanieli* McGregor

*Tetranychus mcdanieli* McGregor, 1931: 193.

*T. mcdanieli* was first collected and described from Bridgman and Byron Creek (Berrien County), Michigan, on cultivated raspberry. The females have transverse striae between the third and inner sacral setae on the hysterosoma. Tibia I in the female has seven tactile setae.

*Collection records* -- St. Clair County: Algonac State Park, June 1, 1968, from raspberry (68-16).

#### 19. *Tetranychus schoenei* McGregor

*Tetranychus schoenei* McGregor, 1941b: 223.

*T. schoenei* may be confused with *T. canadensis*. The females of *T. schoenei* and *T. canadensis* have transverse striae between the third pair and longitudinal striae between the inner sacral setae on the hysterosoma. However, the aedeagus in males of *T. schoenei* has a strongly enlarged knob. This knob in *T. schoenei* is about one-half and in *T. canadensis* is about one-fourth as long as the dorsal margin of the shaft.

*Collection records* -- Oakland County: Pontiac Lake Recreation Area, July 9, 1967, from *Symplocarpus foetidus* (67-15); Washtenaw County: Nichols Arboretum, Ann Arbor, September 10, 1967, from *Spirea* sp. (67-73); Wayne County: Gildow street, University of Michigan, Dearborn Center, August 27, 1967, from *Tilia* sp. (67-47).

#### 20. *Tetranychus urticae* Koch

*Tetranychus urticae* Koch, 1836: 10.

*Tetranychus urticae*, Tuttle and Baker, 1968: 129.

This species is widely distributed in temperate regions and is known from numerous hosts. The females have longitudinal striae between the third pair of dorsocentral setae on the hysterosoma and have nine tactile setae on tibia I. The aedeagus knob is very small, less than one-sixth as long as the dorsal margin of the shaft. The green form, earlier known as *Tetranychus telarius*, is included here in *T. urticae* (Tuttle and Baker, 1968).

*Collection records*-- Bay County: Two miles south of Freeland, July 26, 1968, from *Melilotus alba* (68-21); Chippewa County: Half-mile south of St. Mary River, Sugar Island, July 27, 1968, from *Aegopodium* sp. (68-50); Sheridan Park, July 29, 1968, from fern and *Cornus canadensis* (68-51, 52); Ingham County: Michigan State University campus, East Lansing, September 9, 1967, from *Viola* sp., *Arctium* sp., and grape (67-56, 59, 62); Macomb County: Melrose Court, July 16, 1967, from *Salvia* sp. (67-22); Oakland County: Summit Drive, Novi, October 26, 1966, from indoor balsam plant (D. R. Cook) (66-1); Pontiac Lake Recreation Area, June 24, 1967, from *Symplocarpus foetidus* (67-6); Highland Recreation Area, August 11, 1967, from *Smilacina racemosa* (67-30); Washtenaw County: The Nichols Arboretum, Ann Arbor, September 10, 1967, from lily (67-75); Wayne County: Third and West Hancock, Detroit, June 24, 1967, from hollyhock (67-5); Wayne State University campus, Detroit, July 6, 1967, from *Ambrosia* sp. (67-14); Wayne State University campus, Detroit, July 13, 1967, from *Viola* sp., and *Deutzia* sp. (67-18, 20); West Canfield and Lysander, Detroit, July 29, 1967, from *Arctium minus* (67-24); Third and West Hancock, Detroit, July 29, 1967, from *Linocera* sp. (67-25); Prentis and Lysander, Detroit, July 30, 1967, from *Lactuca* sp. (67-27); Greenfield Village, Dearborn, August 17, 1967, from *Canna* sp. (67-41); Henry Ford Museum, Dearborn, August 27, 1967, from *Forsythia* sp. (67-53).

#### TENUIPALPIDAE

##### 21. *Brevipalpus bicolpus* Pritchard and Baker

*Brevipalpus bicolpus* Pritchard and Baker, 1958: 217.

This species is very close to *Brevipalpus garmani* Baker and differs from it in that the females have two sensory rods on tarsus II. It was previously known only from Maryland on pawpaw.

*Collection record*- Oakland County: Highland Recreation Area, August 11, 1967, from *Smilacina racemosa* (67-31).

##### 22. *Brevipalpus garmani* Baker

*Brevipalpus garmani* Baker, 1949: 363.

Females of *B. garmani* have only one sensory rod on tarsus II, and the propodosoma has a few longitudinal striae mediodorsally.

*Collection record* - Ingham County: Michigan State University campus, East Lansing, September 9, 1967, from *Elymus* sp. (67-60).

##### 23. *Pentamerismus erythreus* (Ewing)

*Tenuipalpus erythreus* Ewing, 1917a: 152.

*Pentamerismus erythreus*, McGregor, 1949: 25.

This species is known from conifers in several states. The females have two pairs of dorsosublateral and seven pairs of minute dorsolateral setae on the hysterosoma.

*Collection record*-- Ingham County: Michigan State University campus, East Lansing, September 9, 1967, from *Thuja* sp. (67-55).

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## REVIEWS OF RECENT LITERATURE

THE FLIES OF WESTERN NORTH AMERICA. F. R. Cole, with the collaboration of Evert I. Schlinger. Berkeley and Los Angeles: University of California Press, 1969. xi, 693 pp. \$25.00.

Knowing of the excellence of the author's work especially as an artist of Diptera, entomologists have been waiting for this much-needed volume since the completion of the first manuscript in 1932. The work deals with two-winged flies (Diptera) of North America west of the 104th meridian, south of the 70th parallel and north of Mexico, but including Baja California. There are 38 double-columned pages of introductory matter, keys to families and genera, notes on species and the localities from which they are known, a glossary, selected bibliography, and index to species. There are some 180 of the author's beautiful drawings of flies as well as many illustrations from other sources.

Great caution will be needed in using this work. There are unfortunately many errors in spelling of names, beginning with "philicornis" for *pilicornis* on the frontispiece. The keys in several instances are adaptations of keys which have been superseded. The bibliography includes nothing later than one reference dated 1963. It is recommended that names be checked in Stone et al., 1965 ( *A Catalog of the Diptera of America North of Mexico*, U.S. Dept. of Agr., Agr. Handbook no. 276) before using them. The *Catalog* is referred to in the text many times, but no citation of it appears.

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THEORIES ON THE NATURE OF LIFE. Giovanni Blandino, New York: Philosophical Library, 1969. xiv, 374 pp. \$6.00.

In a short span, this encyclopedic work summarizes the historical problems of the nature of life. Blandino conducts his narrative in a condensed and highly-packed form that assumes the nature of an outline. His own ideas are explained in the second part of the book. In the author's words, his conception is that vegetative biological phenomena (1) are material deterministic phenomena and therefore, in order to produce them, fixed laws inherent in matter are both necessary and sufficient; (2) are regular, specific phenomena and therefore must be produced by specific preferential laws which do not exist in an average chance universe. Blandino is both a Jesuit and the recipient of a doctorate in biological sciences from the University of Rome, so that this work in theoretical biology will claim more attention than if it were the work of a theologian. His concise summary of historical thought is useful.

R. S. W.