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FIRST COUNTY RECORDS FOR *ACARAPIS WOODI*
(ACARI: TARSONEMIDAE) IN MICHIGANMurray Hanna¹ and Sharon Pratt Anzaldua²

ABSTRACT

Acarapis woodi is an internal parasite of *Apis mellifera*. Surveys conducted by the Michigan Department of Agriculture in years 1986-1990 produced first county records for *A. woodi* in 63 of the 83 counties of Michigan.

Acarapis woodi (Rennie), the honey bee tracheal mite, is an exotic, internal, obligate parasite of the honey bee, *Apis mellifera* Linn. (Calderone and Shimanuki, 1993). The distribution of *A. woodi*, therefore, is that of its host. The host, *A. mellifera*, is an exotic, domesticated, social insect of particular value to agriculture in Michigan. Cook (1876) observed that cross-fertilization of flowers, which can only be accomplished early in the season by the honey bee, is often necessary to a full yield of fruit and vegetables.

Cowan (1903) published a treatise on the culture of the honey bee for British beekeepers which stated that dysentery and foulbrood were the two most important diseases of the honey bee. Rennie et al. (1921) investigated the cause of Isle of Wight disease of the honey bee which derived its popular name from the island from which it was first recognized in 1904. The disease assumed epidemic proportions in honey bee colonies on Isle of Wight in 1905, and was reported from mainland England in 1909. Diagnosis of Isle of Wight disease from symptoms had been an unsatisfactory procedure. The most usual features of Isle of Wight disease recognizable by the beekeeper were inability of honey bees to fly and continuous mortality of adult honey bees. During the course of investigation it was discovered that a mite in all stages of development occurred in prothoracic tracheae of honey bees exhibiting symptoms of Isle of Wight disease. Cumulative evidence indicated an invariable and clear association of the mite with diseased honey bees, and that there was a definite pathology in relation to infection in the individual honey bee. Rennie (1921) in a companion publication described tracheal mite, *A. woodi*. Bailey (1958) discussed the epidemiology of the infection of the honey bee by *A. woodi* and concluded that mortality of infected honey bees is only slightly greater than that of non-infected honey bees. He produced evidence to suggest that Isle of Wight disease was due to factors other than, or supplementary to, infection with *A. woodi*.

Jaycox (1958) cited the need for a plan to protect the apiary industry in the event *A. woodi* were to be discovered in the United States. He proposed a method of survey which employed dissection of adult honey bees to determine presence or absence of *A. woodi*.

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The first occurrence of *Acarapis woodi* in the United States was reported from specimens of *A. woodi* identified from adult honey bees collected in Texas (Delfinado-Baker [1984]). Delfinado-Baker stated that because of frequent movement of honey bee colonies throughout much of the United States, it could be expected that *A. woodi* would spread inexorably. Calderone and Shimanuki (1993) state that *A. woodi* has caused a significant reduction in both number and quality of honey bee colonies in the United States.

The Michigan Apiary Law (Act No. 412, Public Acts of 1976, as amended 1985) enabled authorized representatives of the Michigan Department of Agriculture to conduct surveys on the premises of any property, private or public, to ascertain the existence of serious honey bee disease. In the years 1985-1989 *A. mellifera* specimens were collected at Michigan apiaries by Michigan Department of Agriculture apiary inspectors for dissection at the Michigan Department of Agriculture, Entomology Laboratory, to determine presence or absence of *A. woodi* (Figure 1). No survey was undertaken in either Keweenaw or Schoolcraft counties. In 1990 arrangement was made for Michigan beekeepers voluntarily to collect *A. mellifera* specimens for dissection to determine presence or absence of *A. woodi* by Michigan State University, Department of Entomology, under contract to the Michigan Department of Agriculture.

Results obtained by dissection of 16,700 honey bees collected in 54 counties in 1985 indicate, but provide no assurance, that *A. woodi* did not then occur in Michigan. The first record of the occurrence of *A. woodi* in Michigan was obtained by dissection of *A. mellifera* specimens collected on 19 May 1986 in Van Buren County by apiary inspector Jane Winkler. Results obtained by dissection of *A. mellifera* specimens collected in 81 of the 83 counties of Michigan in years 1985-1990 indicate, but provide no assurance, that within a span of 5 years *A. woodi* had become distributed to 63 counties of Michigan (Table 1, Fig. 2).

With the *A. woodi* population now apparently so widespread throughout the state, future surveys for the presence of *A. woodi* should focus on the role that the mites have played on the apparent decline in healthy feral honey bee populations, as well as the domesticated colonies. The lack of such numerous and effective pollinators would bring about significant economic and ecological repercussions in the agriculture industry.

Table 1. Chronology of first county records for *Acarapis woodi* in Michigan.

| YEAR | COUNTIES |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1986 | Chippewa, Hillsdale, Jackson, Lenawee, Menominee, Oakland, Van Buren |
| 1987 | Alcona, Berrien, Branch, Genesee, Gratiot, Isabella, Kalkaska, Livingston, Mecosta, Monroe, Montcalm, Newaygo, Ogemaw, Ottawa, Tuscola |
| 1988 | Allegan, Cass, Huron, Lapeer, Muskegon, Saginaw, Shiawassee, Washtenaw |
| 1989 | Alpena, Antrim, Barry, Bay, Benzie, Calhoun, Charlevoix, Clare, Clinton, Eaton, Ingham, Iosco, Iron, Kalamazoo, Kent, Leelanau, Macomb, Mason, Midland, Oceana, Osceola, St. Joseph, Sanilac, Wexford |
| 1990 | Cheboygan, Emmet, Gladwin, Ionia, Lake, Mackinac, Manistee, Otsego, St. Clair |

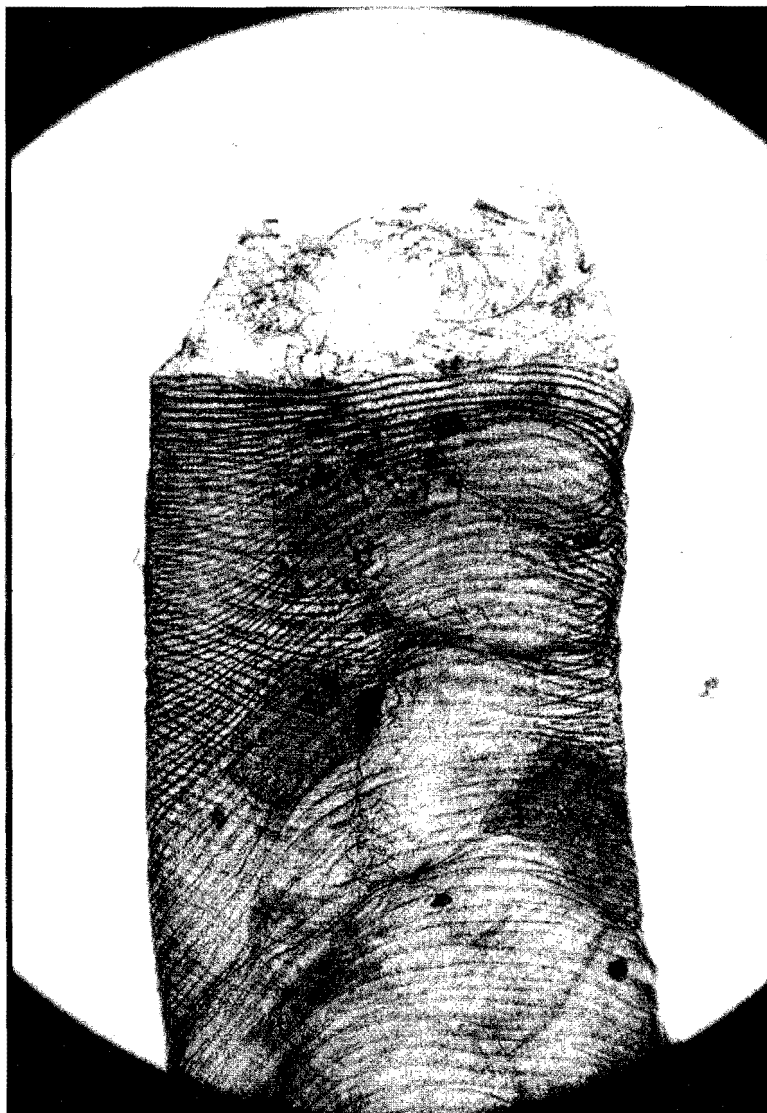


Figure 1. Photomicrograph of prothoracic trachea dissected from *A. mellifera* infected with *A. woodi*. Positive image produced by Michigan State University, Instructional Media Center.

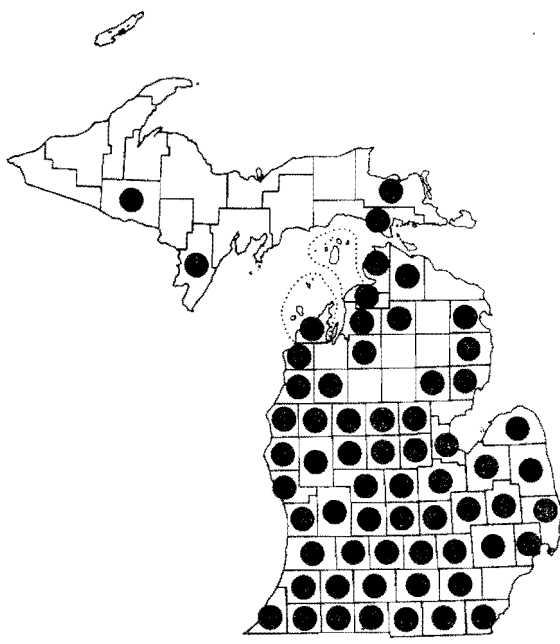


Figure 2. Map indicating distribution of first county records for *A. woodi* in Michigan.

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