

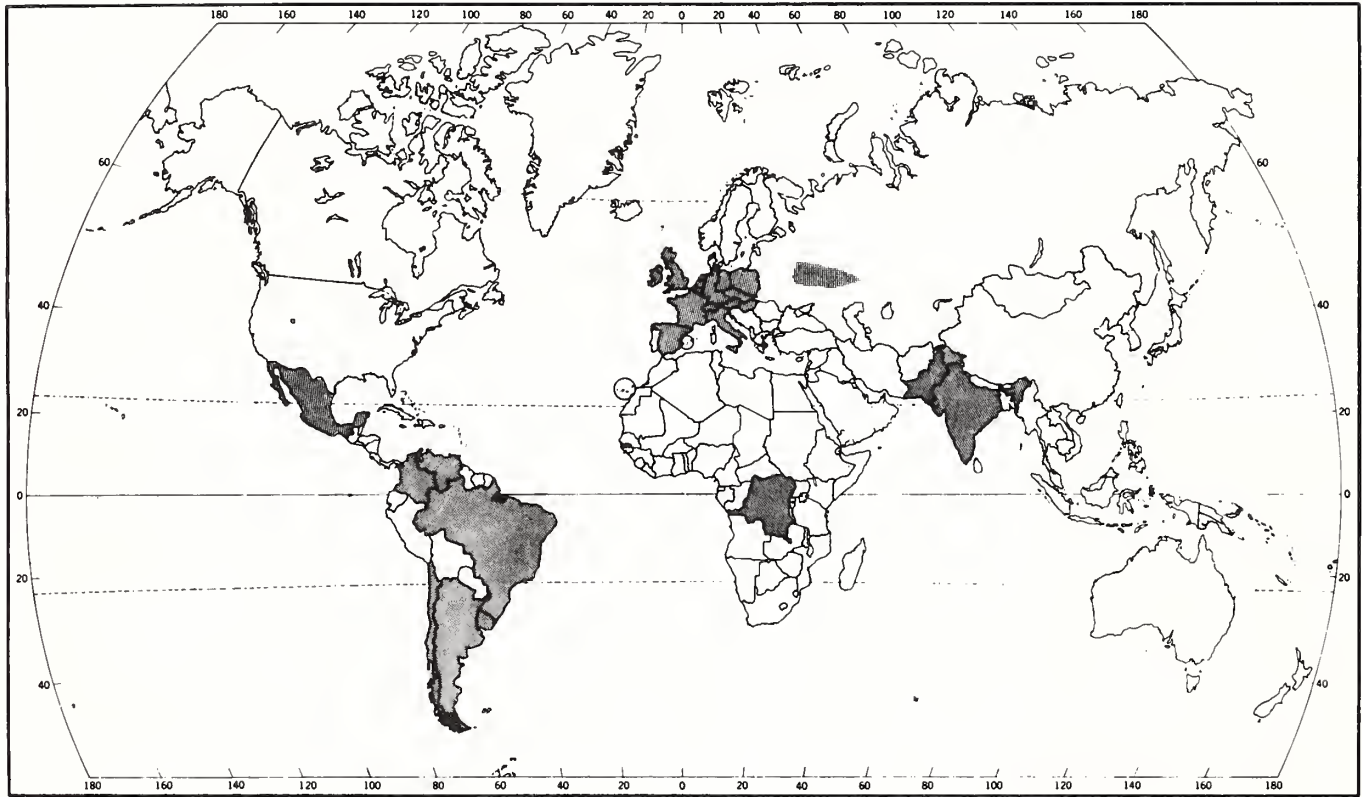
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PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR
OF LIMITED DISTRIBUTION, NO. 17: HONEY BEE MITE

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Order: Family	Acari: Tarsonemidae
Class: Subclass	Arachnida: Acari
Pest	HONEY BEE MITE <u>Acarapis woodi</u> (Rennie)
Economic Importance	<u>Acarapis woodi</u> causes acarine disease of the honey bee, <u>Apis mellifera</u> . The Honeybee Act of 1922 was enacted primarily to prevent importing live honey bees infested with acarine disease into the United States. This disease affects flight efficiency and causes a large number of crawling bees that are unable to fly. The inability of bees to fly contributes to losses of field bees and scarcity of food in the colony (Kaeser 1960). In such cases, the colony population could dwindle and ultimately result in the death of the colony. Acarine disease could persist in a colony for years causing little damage, but combined with other diseases, unfavorable conditions, scarcity of pollen, and/or a poor foraging season, the disease significantly increases the mortality of colonies in winter (Bailey 1958, 1961; Bailey and Lee 1959).
Hosts	<u>Apis mellifera</u> (honey bee) and <u>Apis cerana</u> (a honey bee) are the only known hosts of <u>Acarapis woodi</u> .
General Distribution	<u>Acarapis woodi</u> was first reported in 1921 on the Isle of Wight, England (Rennie 1921); it is now known in the USSR, and throughout most of Europe--Austria, Belgium, Czechoslovakia, France, Germany, Hungary, Ireland, Italy, Majorca, Netherlands, Poland, Scotland, Spain, Switzerland, and Wales (Jeffree 1959); Asia--India (Singh 1957, Kshirsagar 1966) and Pakistan (Ahmad 1981, personal communication); Africa--Canary Islands (Templer 1957) and Zaire (Benoit 1959); South America--Argentina, Chile, and Uruguay (Jeffree 1959), Venezuela (Vogelsang and Rodil 1957), Brazil (Nascimento et al. 1971), and Colombia (Menapace and Wilson 1980); and recently in Mexico (Zozaya 1981, personal communication).



Acarapis woodi map prepared by USDA, APHIS, PPQ,
Biological Assessment Support Staff

Characters

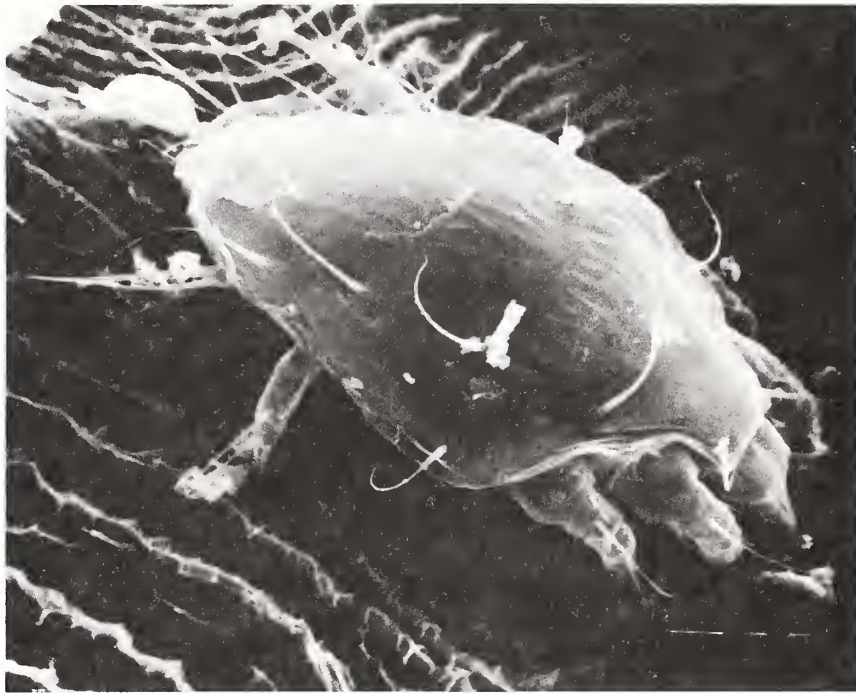
ADULT - The female of A. woodi infests the prothoracic tracheal system of the honey bee (fig. A). The mites are whitish in color and oblong. Female measures 143-174 μ in length and 77-97 μ in width (fig. B). The males are smaller, 125-136 μ in length and 60-77 μ in width. Both female and male lack sensillum or prodorsal prostigmatic organ. It has a beaklike gnathosoma with long, bladelike cheliceral stylets that are adapted for piercing and sucking and have a short and slender leg IV. The female leg IV has two long terminal setae and lacks claws; that of the male has one long terminal seta and one solenidion, and also lacks claws. The female of this mite is easily distinguished from other Acarapis species by having a shallow indentation on the posterior margin of the coxal plate (fig. C), and by the relatively short leg IV and anterior median apodeme. These morphological characters and the mites' presence in the bee trachea readily identify A. woodi, and should prevent confusion with the honey bee external Acarapis mites, externus and dorsalis (Michael 1962).

(Fig. A)



Acarapis woodi: A. Adults (SEM by W. E. Styer)

(Fig. B)



B. Female *Acarapis woodi*, dorsal view (SEM by W. E. Styer)

(Fig. C)



C. Female *Acarapis woodi*, ventral view (line drawing by E. W. Baker)

EGGS - The eggs are laid in the tracheae of the bee and are unusually large, about the size of a mature mite.

Characteristic
Damage

The life span of infected bees is significantly shortened. Because they are unable to fly, large numbers of bees can be seen crawling on the ground near the hive. Diseased bees will often drop to the ground from the alighting board or while flying and may also gather in small clusters near the hive.

The trachea of diseased bees is obstructed by mites in different stages of development, as well as by mite debris. Feeding by the mites damages the walls of the trachea. The trachea, which are normally white, turn black. Tracheae that are normally elastic and flexible become stiff and brittle. Discoloration and atrophy of the flight muscles may also occur.

Another symptom is the abnormal "dislocated" position of the wings of walking bees. Infested colonies do not develop normally and may exhibit symptoms of dysentery and have a high mortality rate in the winter months. These colonies may often show an excessive swarming tendency.

Detection
Notes

Because of the increased mortality of colonies in winter, it is important to detect the infestation before the winter clustering period. A positive diagnosis of the disease is made by examining the bee trachea for mites (fig. D). Suspect bees that appear unable to fly or have unhooked wings should be examined for mite infestation by removing the bee's head, front legs, and first skeletal ring.

The trachea can be examined for mites with a dissecting microscope. The specimen can be cleared with a 5 percent KOH solution or lactic acid or lactophenol. The suspect tracheae can be examined more closely under coverslip on a slide (Colin et al. 1979).

Biology

The biology of this species has not been worked out in detail. The life cycle apparently is completed in the bee trachea. The development time for female mites from the egg to the nymph and gravid female is about 14 days.

The eggs are laid in the trachea of the bee one at a time. Each female can lay from 5 to 7 eggs. The egg stage may last 3-6 days, from which a six-legged larva emerges. According to Bailey (1968) the larvae complete their development and emerge as mature adults from the first thoracic spiracle. The adults move from one bee to another until they encounter a young bee before entering the trachea. Bees less than 9 days old are the most susceptible (Lee 1963).

(Fig. D)



D. Acarapis woodi in trachea (photo by W. E. Styer)

Natural Enemies

Acarapis woodi has no known enemies.

Controls

Chemical controls are available in foreign countries for the control of this pest. One would have to check with the proper authorities to obtain proper registration and the latest recommendations for treatment.

Selected
References

Ahmad, R. [Letter to Dr. H. Shimanuki, with specimens of diseased honey bee adults from Islamabad, Pakistan]. 1981 March 15.

Bailey, L. The epidemiology of the infestation of the honey bee, Apis mellifera L. by the mite Acarapis woodi Rennie and the mortality of infested bee. Parasitology 48:493-506; 1958.

- Bailey, L. The natural incidence of Acarapis woodi (Rennie) and the winter mortality of honey bee colonies. Bee World 42(4):96-100; 1961.
- _____. Susceptibility of the honey bee, Apis mellifera Linnaeus, infested with Acarapis woodi (Rennie) to infection by airborne pathogens. J. Invertebr. Pathol. 7:141-143; 1965a.
- _____. The effect of Acarapis woodi on honey bees from North America. J. Apicu. Res. 4:105-108; 1965b.
- _____. Honey bee pathology. Annu. Rev. Entomol. 13:191-212; 1968.
- Bailey, L.; Lee, D. C. The effect of infestation with Acarapis woodi (Rennie) on the winter mortality of honey bees. J. Insect Pathol. 1:15-24; 1959.
- Benoit, P. L. G. The occurrence of the acarine mite Acarapis woodi in the honey bee in the Belgian Congo. Bee World 40:156; 1959.
- Colin, M. E.; Faucon, J. P.; Giauffret, A.; Sarrazin, C. A new technique for the diagnosis of acarine infestation in honeybees. J. Apicu. Res. 18(3):222-224; 1979.
- Eckert, J. E. Acarapis mites of the honey bee, Apis mellifera Linnaeus. J. Insect Pathol. 3:409-425; 1961.
- Jaycox, E. R. Acarine disease of honey bees. California Dep. Agric. Bull. 47(3):215-221; 1958.
- Jeffrey, E. P. The world distribution of acarine disease of honeybees and its probable dependence on meteorological factors. Bee World 40(1):4-15; 1959.
- Kaerer, W. The bee-mite. Budel, A.; Herold E. eds. Biene und bienenzucht; das gegenwartige Wissen von der Biene und ihrer Zucht in einer zusammenfassenden Darstellung. Munchen, Ehrenwirth, 1960: 360-368.
- Kshirsagar, K. K. A review of work on acarine disease of honeybees. I. History and distribution. Indian Bee J. 28(2):79-84; 1966.
- Lee, D. C. The susceptibility of honey bees of different ages to infestation by Acarapis woodi (Rennie). J. Insect Pathol. 5:11-15; 1963.

- Lehnert, T.; Michael, A. S.; Levin, M. D. Disease survey of South American africanized bees. *Am. Bee J.* 114(9): 338; 1974.
- Menapace, D. M.; Wilson, W. T. Acarapis woodi mites found in honey bees from Colombia. *Am. Bee J.* 120(11):761-762, 765; 1980.
- Michael, A. S. The Honeybee Act and the acarine problem. *Glean. Bee Cult.* 89(8):492-494, 509; 1961.
- _____. Morphological characters of the honey bee mites. *Bull. Apicole* 4:21-24; 1962.
- Milne, P. S. Acarine disease of bees. *J. Minist. Agric. Fish.* 54(10):473-477; 1948.
- Nascimento, C. B. La Acariosis en Brasil (Acarine disease in Brazil). *Ciencia y Abejas (Argentina)* 1(1):35-39; 1971.
- Nascimento, C. B.; de Mello, R. P.; dos Santos, M. W.; do Nascimento, R. V.; de Souza, D. J. Ocorrência de Acariose en Apis mellifera no Brazil (Occurrence of acarine disease in Apis mellifera in Brazil). *Pesquisa Agropecuaria Brasileira, Secao veter.* 6:57-60; 1971.
- Rennie, J. (4) Isle of Wight disease in hive bees--Acarine disease: The organism associated with the disease--Tarsonemus woodi, n. sp. In Isle of Wright disease in hive bees. *Trans. R. Soc. Edin.* 52, pt. 4 (No. 29):768-779; 1921.
- Singh, S. Acarine disease in the Indian honey bee (Apis indica F.). *Indian Bee J.* 19(3/4):27-28; 1957.
- Templer, C. R. Beekeeping in the Canary Islands. *Bee World* 38(7):184; 1957.
- Vogelsang, E. G.; Rodil, C. T. Acariosis de las abejas (Apis mellifera) por Acarapis woodi Rennie. *Rev. Med. Vet. Caracas* 16(1/4):79-80; 1957.
- Zozaya, A. [Letter to Dr. H. Shimanuki on acarine disease in Mexico]. 1981 April 10.