

Varroa Mite, *Varroa jacobsoni* Oudemans (Acari: Varroidae)¹

H.A. Denmark², H.L. Cromroy³, and L. Cutts⁴

INTRODUCTION: The varroa mite, an ectoparasite of honey bees, was described by Oudemans (1904) from Java on *Apis cerana*. In 1951, the varroa mite was found in Singapore. In 1962-63 varroa was found on *Apis m. mellifera* in Hong Kong and the Philippines (Delfinado, 1963) and spread rapidly from there. Adaption to a new host (*Apis m. mellifera*), the importation of queen bees from infested areas, and the movement of infested colonies of bees for pollination led to the rapid spread of this mite. Following the find of a single varroa mite in Maryland in 1979, the Division of Plant Industry and H.L. Cromroy, University of Florida, made an inspection of Florida bees in 1984. The varroa mite was not found at that time, but in 1987 the varroa mite was detected in Wisconsin and Florida. Several thousand colonies of migratory bees are moved in and out of Florida each year. It is not known where or when varroa mite was introduced into the continental U.S.A. In Florida, the varroa mite has been found on flower feeding insects (*Bombus pennsylvanicus* (Hymenoptera: Apidae) and *Palpada vinetorum* (Diptera: Syrphidae)). It has also been found on *Phanaeus vindex* (Coleoptera: Scarabaeidae) (Kevan et al., 1990). Although the varroa mite can not reproduce on other insects, it is a means of spreading the mite short distances.

DISTRIBUTION: Indonesia (Oudemans, 1904), Singapore (Gunther, 1951), and USSR (Breguetova, 1953); it was found on *Apis m. mellifera* in Hong Kong (Delfinado, 1963) and Philippines (Delfinado, 1963). It quickly spread to Peoples Republic of China (Ian Tzien-He, 1965), India (Phadke *et al.*, 1966), North Korea (Tian Zai Soun, 1967), Cambodia (Ehara, 1968), Japan (Ehara, 1968), South Vietnam (Stephen, 1968), Thailand (Laigo and Morse, 1969), Czechoslovakia (Samsinak and Haragsim, 1972), Bulgaria (Velitchkov and Nathev, 1973), South Korea (Delfinado and Baker, 1974), Paraguay (Orosi-Pal, 1975), Taiwan (Akranakul and Burgett, 1975), Argentina (Montiel and Piola, 1976), Poland (Koivulehto, 1976) Romania (Orosi-Pal, 1975), Uruguay (Grobov, 1976), West Germany (Ruttner, 1977), Bangladesh (Marin, 1978), Brazil (Alves *et al.*, 1975), Burma (Marin, 1978), Hungary (Buza, 1978), Tunisia (Hicheri, 1978), Greece (Santas, 1979), Iran (Crane, 1979), Libya (Crane, 1979), Turkey (Crane, 1979), Yugoslavia (Santas, 1979), Lebanon (Popa, 1980), and in the USA in 1987. It is known to occur in the USA in the following states: Alabama, Arizona, California, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington State, West Virginia, and Wisconsin.

HOSTS: *Apis cerana*, *Apis koschevnikovi*, *Apis mellifera mellifera*, *Apis mellifera capensis*, *Apis mellifera carnica*, *Apis mellifera iberica*, *Apis mellifera intermissa*, *Apis mellifera ligustica*, *Apis mellifera macedonica*, *Apis mellifera meda*, *Apis mellifera scutellata*, and *Apis mellifera syriaca*.

ECONOMIC IMPORTANCE: The varroa mite is the most serious pest known of honey bee brood. The mite feeds on the haemolymph of the developing honey bee larva, pupa, and the adult bee. Heavily infested colonies usually have large numbers of unsealed brood cells. Dead or dying newly emerged bees with malformed wings, legs, abdomens, and thoraxes may be present at the entrance of affected colonies. If left unchecked, mites can cause loss of honey production, fewer bees for pollination, and the complete destruction of a queen rearing industry due to regulatory restrictions. It is reported in Europe that weak colonies are subject to being robbed by stronger colonies or may die within 3 - 4 years from the lack of worker bees to manage the brood and gather nectar. In Florida,

¹Contribution No. 769, Bureau of Entomology

²Chief of Entomology, FDACS, Div. Plant Industry, P.O. Box 147100, Gainesville, Florida 32614-7100

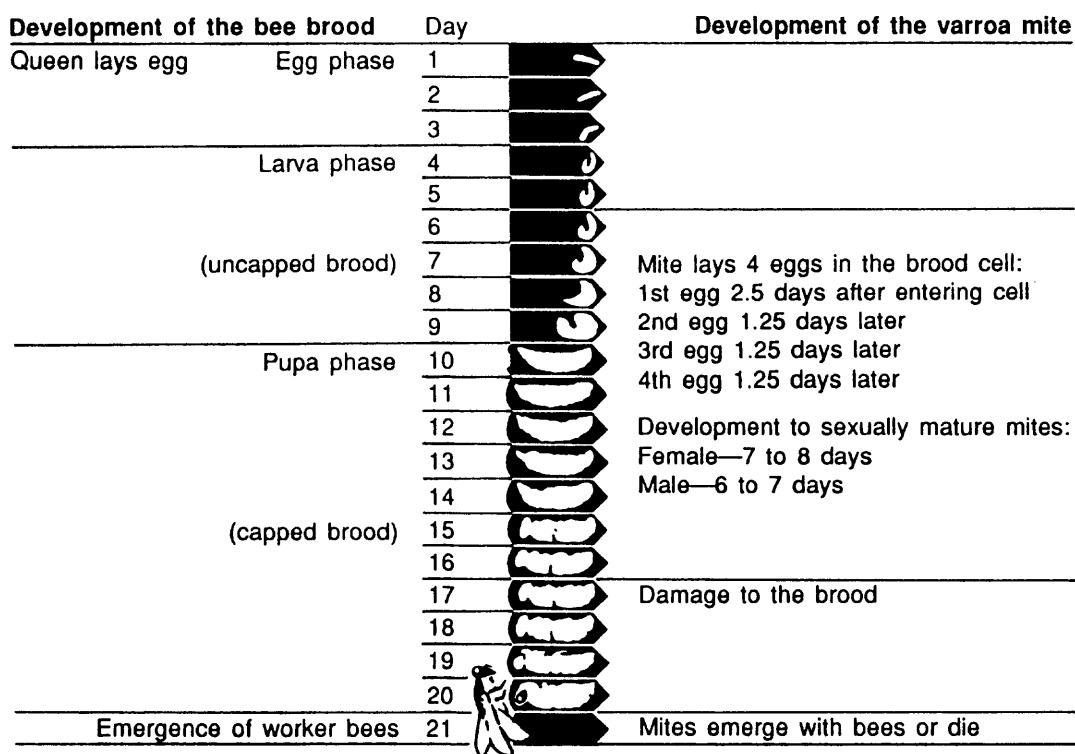
³Professor Dept. of Entomology and Nematology, University of Florida, Gainesville, Florida 32611

⁴Chief of Apiary, FDACS, Div. Plant Industry, P.O. Box 147100, Gainesville, Florida 32614-7100

infested colonies have died within 7 months, probably due to the ideal weather conditions for mite development. Since varroa mites may cause the death of a colony of *Apis m. mellifera*, it has been suggested that the development of this particular host/parasite relationship is still incomplete. There appears to be less damage to *Apis cerana*. *Apis m. scutellata* seems to have some resistance to varroa mite (Ritter, 1981).

DESCRIPTION: Adult females (Fig. 1) are brown to dark brown, shaped like a crab, measuring 1.00 - 1.77mm long and 1.50 - 1.99mm wide. The curved body fits into abdominal folds of the adult bee and is held there by the shape and arrangement of ventral setae (Fig. 2). It is also protected in the body fold from the bee's normal cleaning habits. The adult male is yellowish with lightly tanned legs and spherical body shape measuring 0.75 - 0.98mm long and 0.70 - 0.88 wide. The male chelicerae are modified for transferring sperm. The protonymph and deutonymph stages were described by Delfinado-Baker (1984).

LIFE CYCLE:



SURVEY AND DETECTION: **ETHER ROLL:** The most widely used technique involves shaking 300 to 500 bees (1/4 to 1/3 pint) from the center frame of the brood nest into a pint jar. Spray automotive ether starting fluid for about two seconds onto bees. Close jar and shake vigorously for 10 to 15 seconds, then roll slowly. Mites can be seen stuck to the jar's interior. **STICKY PAPER:** Place a sheet of white paper coated with cooking oil on the hive bottom and cover with 8 mesh screen. Check daily for mites and replace when debris becomes excessive. To accelerate mite drop, place two Apistan[®] strips in the brood nest and monitor paper 1 to 7 days. Dewill Varroa Mite Detector[®] sticky boards and screens are commercially available for this purpose. **SHAKE AND WASH:** Shake 1/4 to 1/2 pint of bees from the brood nest into a jar. Cover with 75% isopropyl alcohol and place on shaker for 15 to 30 minutes. Pour contents into a coarse sieve and vertically agitate in alcohol for 60 seconds. Strain alcohol wash through fine mesh cloth to recover mites. Replace bees in pint jar and preserve with alcohol. Count bees in white enamel pan and recover additional mites not recovered by first wash (ca. 1 - 3%).

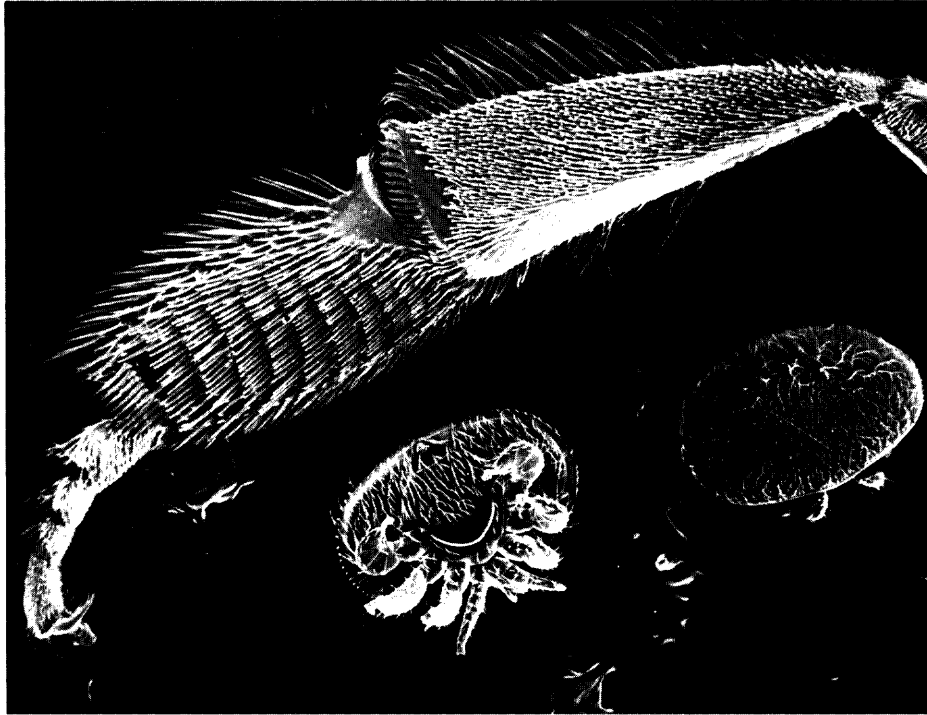


Fig. 1: Adult female, ventral and dorsal views



Fig. 2: Adult female, showing curvature of body

CONTROLS: The Environmental Protection Agency has approved Apistan^R strips. These are plastic strips impregnated with fluvalinate. If used properly this treatment is 99.8% effective, and if the colony is not exposed to heavy reinfestation, treatment should be effective for 12 months. FOLLOW LABEL DIRECTIONS.

LITERATURE CITED:

- Akratanakul, P. and M. Burgett. 1975. *Varroa jacobsoni*: A prospective pest of honeybees in many parts of the world. *Bee World*. 56: 119-121.
- Alves, S. B., C. H. Flechtmann, and A. E. Rosa. 1975. *Varroa jacobsoni* Oudemans, 1904 (Acari: Mesostigmata, Varroidae) also in Brazil. *Ecosistema* 3(3): 78-79.
- Breguetova, N. G. 1953. [The mite fauna of the Far East.] *Parazitologicheskii Zbornik ZIN AN SSR*. 15: 302-338. (In Russian).
- Buza, L. 1978. Control of varroa disease in Hungary. *Apiacta*. 13: 176-177.
- Crane, E. 1979. Fresh news on the varroa mite. *Bee World*. 60:8.
- Cromroy, H. L. 1984. The Asian honeybee mite, a new threat to American beekeepers. *Florida Ext. Ser. Ent.* 48, 4p.
- Delfinado, M. D. 1963. Mites of the honey bee in South-east Asia. *J. Apic. Res.* 2: 113-114.
- Delfinado, M. D., and E. W. Baker. 1974. Varroidae, a new family of mites on honeybees (Mesostigmata: Acarina). *J. Washington Acad. Sci.* 64: 4-10.
- Delfinado-Baker, M. 1984. The nymphal stages and male of *Varroa jacobsoni* Oudemans, a parasite of honey bees. *Internat. J. Acarol.* 10(2): 75-80.
- Ehara, S. 1968. On two mites of economic importance in Japan (Arachnida: Acarina). *Appl. Entomol. and Zool.* 3: 124-129.
- Grobov, O. F. 1976. Varroasis in bees. In: Varroasis, a honey bee disease. Apimondia Publ. House, Bucharest. 46-70.
- Gunther, C. E. M. 1951. A mite from a beehive on Singapore Island (Acarina: Laelapidae). *Proc. Linnean Soc. New South Wales.* 76: 155.
- Hicheri, K. 1978. *Varroa jacobsoni* in Africa. *Apiacta*. 13: 178.
- Kevan, P. G., T. M. Laverty, and H. A. Denmark. 1990. Association of *Varroa jacobsoni* with organisms other than honey bees and implications for its dispersal. *Bee World*. 7(3): 119-121.
- Koivulehto, K. 1976. *Varroa jacobsoni*, a new mite infesting honeybees in Europe. *Br. Bee J.* 104: 16-17.
- Laigo, F. M., and R. A. Morse. 1969. Control of the bee mites, *Varroa jacobsoni* Oudemans and *Tropilaelaps clareae* Delfinado and Baker with chlorobenzilate. *Philippine Entomol.* 1: 144-148.
- Marin, M. 1978. World spread of varroa disease. *Apiacta*. 13: 163-166.
- Montiel, J. C., and G. A. Piola. 1976. A new enemy of bees. *Campo Moderno and Chacra*, October, 1976: 36-37. English translation In: Varroasis, a honey bee disease. Apimondia Publ. House, Bucharest. 36-38.
- Orosi-Pal, Z. 1975. [Varroa in America.] *Mehezset.* 23: 123. (In Hungarian).
- Oudemans, A. C. 1904. On a new genus and species of parasitic acari. *Notes. Leyden Mus.* 24: 216-222.
- Phadke, K. G., D. S. Bisht, and R. B. P. Sinha. 1966. Occurrence of the mite *Varroa jacobsoni* Oudemans in the brood cells of the honey bee, *Apis indica* F. *Indian J. Entomol.* 28: 411-412.
- Popa, A. 1980. Agriculture in Lebanon. *American Bee J.* 120: 336-367.
- Ritter, W. 1981. Varroa disease of the honeybee, *Varroa mellifera*. *Bee World*. (62): 141-153.
- Ruttner, F. 1977. [Interim report on the cause of varroa infection.] *Die Biene*. 113(9): 353-354. (In German).
- Samsinak, K. and O. Haragsim 1972. [The mite *Varroa jacobsoni* imported into Europe.] *Vcelarstvi.* 25: 268-269.
- Santas, L. A. 1979. Problems of honey bee colonies in Greece. *Apiacta*. 14(4): 127-313.
- Stephen, W. A. 1968. A beekeeping problem in Vietnam and India. *Bee World*. 49: 119-120.
- Tian, Zai Soun 1967. [The disease of bees caused by the mite *Varroa jacobsoni*.] *Monop Kvahaiboi Karpo.* 4: 30-31. (In Korean).
- Tzien-He, Ian. 1965. The biological peculiarities of the acarine mite *Varroa jacobsoni* Oudemans. *Kounchong Zhishi.* 9(1): 40-41. (In Chinese).
- Velitchkov, V., and P. Natchev. 1973. Investigation about the *Varroa jacobsoni* disease - Oud. in Bulgaria. In: Proceedings of the XXIV In. Apic. Congr. Buenos Aires, Argentina. 375-377.