

## AEDES ALBOPICTUS IN AFRICA? FIRST RECORDS OF LIVE SPECIMENS IN IMPORTED TIRES IN CAPE TOWN

A. J. CORNEL AND R. H. HUNT

*Medical Entomology, Department of Tropical Pathology, School of Pathology of the South African Institute for Medical Research and the University of the Witwatersrand, Johannesburg, South Africa*

**ABSTRACT.** Live larvae of *Aedes albopictus* have been found entering South Africa in used tire casings imported from Japan on 3 separate occasions. This is the first evidence that this mosquito is entering Africa and underlines the value of mosquito monitoring programs to detect the importations of this important vector. It is suggested that undetected populations of *Ae. albopictus* may have already become established in Africa.

*Aedes albopictus* (Skuse) is an Asian species of mosquito that has recently become established in North and South America (Sprenger and Wuithiranyagool 1986, Hawley 1988). The available evidence suggests that these mosquitoes entered the United States of America via used tires imported from several East Asian countries (Reiter and Sprenger 1987) and has since spread and established itself in 17 states (Francy et al. 1990). In response to the American experience, approximately 10% of the shipments of used tires entering South Africa have been inspected since 1987. Various arthropods and nematodes, both dead and alive, have been found (Cornel and Hartwig 1989).

In November 1989, a quantity of mosquito material was found in a shipment of tires originating from Tokyo, Japan. This consisted of 16 larval heads, 12 pupal pelts and 4 dead pupae. The dead pupae and 2 pupal exuviae were identified as *Ae. albopictus* using the keys in Huang (1972). The rest of the sample belonged to the subgenus *Stegomyia*, but the material could not be identified to species level.

In January 1990, a single live second stage larva was collected from a consignment of 20 tons of tires originating from Osaka, Japan. Information concerning the numbers of tires that were wet is not available. The larva was reared and the fourth stage larval and pupal exuviae were preserved and mounted. The resulting adult female and its immature stages all conformed to the description of *Ae. albopictus* given by Huang (1972).

In February 1990, a further 3 live first stage larvae were found in a shipment of tires from Japan. One mosquito larva survived, was reared to the adult stage and identified as *Ae. albopictus*. In this consignment, 6 tons of tires were imported from Kobe, Japan and 85% of the tires contained water. The consignment was in transit for 35 days before reaching Cape Town. Since these tires were loaded during the winter in Japan, the larvae might have hatched from

diapausing eggs when exposed to the long photoperiod of the southern hemisphere being experienced in Cape Town at that time. It is unlikely that the eggs would have hatched prior to arrival as the containers are usually sealed and dark inside. Simple agitation of water in the tires, resulting in the submergence of dry non-diapausing eggs while off loading might also have induced hatching.

In May a further 2 live second stage larvae were collected from a shipment of 20 tons of tires imported from Yokohama, Japan. Information on the percentage of wet tires is not available. Once again the larvae were reared to the adult stage and identified as *Ae. albopictus*. Both these specimens were males.

Large areas of Africa experience climatic conditions similar to those where *Ae. albopictus* is already established (Hawley 1988), and it is likely that this species could establish itself in these areas. South Africa imports approximately 10 million kg of used tires annually and most of these tires originate from Asian countries [S. Fullard (representative of S. A. Tyre Dealers Association), personal communication]. Once in South Africa these tires are distributed to tire companies throughout South Africa for retreading.

If a sufficiently large importation of *Ae. albopictus* occurred that contained an appropriate gene pool, this species could become established in Africa as it has in both North and South America. Since this has not happened yet, it is probably due to the difficulties that could be expected to confront small randomly selected and distributed samples of a species in a new environment. This supposition is supported by the repeated introduction of *Ae. albopictus* into North America, first from World War II combat zones in the Pacific since the war (Eads 1972), and since then via the international tire trade, but was only found to be established in 1985 (Sprenger and Wuithiranyagool 1986). Possibly in the absence of further monitoring procedures,

it may already be established somewhere in Africa. These results of the South African survey indicate that unless the international tire trade is effectively controlled, more importations of this and possibly other important vectors of human pathogens will occur in Africa and elsewhere.

Our identification of *Ae. albopictus* was confirmed by K. S. Rai from the University of Notre Dame who recently visited our laboratory. All the adults and corresponding larval and pupal exuviae are housed in the Department of Medical Entomology at the South African Institute for Medical Research. Three females and one male *Ae. albopictus* collected in Malaya were donated to us by Y.-M. Huang (from the Smithsonian Institution, Washington, DC), and we were thus able to confirm our identification by direct comparison with Asian material as well.

We thank E. K. Hartwig and J. H. Hanekom from the Department of National Health and Population Development for the collection of water samples and M. Coetzee and J. Segerman for their critical review of the manuscript.

#### REFERENCES CITED

- Cornel, A. J. and E. K. Hartwig. 1989. Importation of used tyre casings: a possible health hazard. *S. Afr. J. Sci.* 85:487-488.
- Eads, R. B. 1972. Recovery of *Aedes albopictus* from used tires shipped to United States ports. *Mosq. News* 32:113-114.
- Francy, D. B., C. G. Moore and D. A. Eliason. 1990. Past, present and future of *Aedes albopictus* in the United States. *J. Am. Mosq. Control Assoc.* 6:127-132.
- Hawley, W. A. 1988. The biology of *Aedes albopictus*. *J. Am. Mosq. Control Assoc.* 4(suppl. 1):1-40.
- Huang, Y.-M. 1972. Contributions to the mosquito fauna of Southeast Asia. XIV. The subgenus *Stegomyia* of *Aedes* in Southeast Asia. I. The scutellaris group of species. *Contrib. Am. Entomol. Inst. (Ann Arbor)* 15(6):1-79.
- Reiter, P. and D. Sprenger. 1987. The used tire trade: a mechanism for the worldwide dispersal of container breeding mosquitoes. *J. Am. Mosq. Control Assoc.* 3:494-501.
- Sprenger, D. and T. Wuithiranyagool. 1986. The discovery and distribution of *Aedes albopictus* in Harris County, Texas. *J. Am. Mosq. Control Assoc.* 2:217-219.