

AEDES ALBOPICTUS AND OTHER MOSQUITOES IMPORTED IN TIRES INTO DURBAN, SOUTH AFRICA

PETER G. JUPP AND ALAN KEMP

Arbovirus Unit, National Institute for Virology, Department of Virology, University of the Witwatersrand, Private Bag X4, Sandringham, 2131, South Africa

ABSTRACT. The results of surveillance for immature stages of mosquitoes in samples of wet tires in 5 consignments imported into Durban from Japan is reported. Three of these consignments contained tires with immatures of *Aedes aegypti*, *Ae. albopictus* and *Uranotaenia n. novobscura*. The proportions of all the wet tires calculated to contain mosquitoes were 189/1,488 (13%), 20/813 (2.5%) and 13/1,032 (1.3%) which emphasizes the need for effective mosquito control measures to prevent *Ae. albopictus* escaping from such tires and establishing itself in Durban.

Figures for 1978–86 revealed that South Africa was the fifth largest importer of used tires from Japan with 1,065,211 tires, i.e., 118,356 per annum (Reiter and Sprenger 1987). According to A. S. Fullard of the South African Tyre Dealers Association (personal communication), the number has now increased with about 154,553 tires being the 1992 import quota. Immature stages of the Asian mosquito *Aedes albopictus* (Skuse) have been collected on 4 occasions in tires landed in Cape Town from Japan. These were dead pupae and pupal exuviae in November 1989, and live larvae on 3 occasions in 1990 (Cornel and Hunt 1991). Some populations of *Ae. albopictus* might survive the cold winter in Cape Town's Mediterranean climate, since populations of the mosquito in northern Asia can apparently survive severe winter conditions (Reiter and Darsie 1984, Hawley et al. 1989). However, in South Africa it is considered much more likely that this predominantly tropical species (Hawley 1988) would establish itself in Durban with its subtropical climate should it be introduced into this city. For this reason we are undertaking surveillance for *Ae. albopictus* and other exotic mosquitoes in Durban at the premises of companies which import second-hand tires from the Far East. Durban is situated on the east coast of South Africa in the Province of Natal and is our busiest port.

The first aspect of this surveillance began in late November 1991, when we initiated the sampling of each consignment of wet tires landed. Two inspectors from the Port Health Office search for mosquito larvae and pupae in a consignment with wet tires for at least 1 hour. Any live immatures are brought to the laboratory, where they are reared to adults, while larval and pupal pelts are stored in alcohol to facilitate identification. Identifications have been made using the keys for mosquitoes of Japan and Korea by Tanaka et al. (1979). So far 5 consignments of wet motor car tires, landed in containers between November 21, 1991 and January

16, 1992, have been sampled and live immature mosquitoes were collected in 3 of them.

Table 1 gives details of the 5 shipments, all from Japan. Seventeen 2nd or 3rd instar larvae and 2 pupae were collected. All were reared to adults except 7 specimens in collection No. 2; these were one *Aedes aegypti* (Linn.) which died on reaching the 4th instar and six 2nd instar larvae which died before they became identifiable. The other species were *Uranotaenia n. novobscura* Barraud and *Ae. albopictus*. During the time the health inspectors could spend sampling wet tires, only a relatively small proportion (4–13%) of all the wet tires in a consignment could be examined. However, the proportions of all the wet tires estimated to contain larvae or pupae were calculated from the proportion of tires found to contain immature stages in the samples examined. The figures shown in Table 1 indicate that a considerable number of larvae-bearing tires must have escaped detection, e.g., 182 (189 minus 7) in collection No. 2.

In view of the above, it seems possible that some *Ae. albopictus* could have established founder populations in the vicinity of the tire importers' premises. The second aspect of our surveillance is aimed at the detection of such *Ae. albopictus* populations. This project is in progress and involves the exposure of bamboo pots as ovipositional sites within the grounds of the 2 largest importers of second-hand tires from the Far East in Durban. *Uranotaenia n. novobscura* is not medically important but exotic *Ae. aegypti*, and more particularly *Ae. albopictus*, are potential dengue vectors. The latter and possibly the former, would be expected to have a higher vector potential for dengue viruses than the indigenous mosquito species along the Natal coast. It is therefore important that control measures are effected to prevent the escape of exotic mosquitoes from the imported tires lest such mosquitoes become established in Durban. A similar system of surveillance is planned for the other main centers in South Africa where

Table 1. Second-hand tire casings landed in Durban, South Africa, from Japan: results of sampling for immature mosquitoes.

Collection no.	Place of origin	Date sampled*	No. tires in consignment	Estimated no. tires wet (%)	Proportion of tires examined found with mosquitoes (%)	No. of all wet tires estimated to contain mosquitoes	Mosquito identity
1	Osaka	Nov. 21, 1991	1,551	310 (20)	0/40	—	—
2	Yokohama	Nov. 21, 1991	1,860	1,488 (80)	7/55 (12.7)	189	1 <i>Ae. aegypti</i> 8 <i>Ur. novobscura</i> 6 unidentifiable
3	Tokyo	Dec. 20, 1991	1,626	813 (50)	1/40 (2.5)	20	1 <i>Ur. novobscura</i>
4	Tokyo	Jan. 6, 1992	1,291	1,032 (80)	1/80 (1.3)	13	1 <i>Ae. albopictus</i>
5	Yokohama	Jan. 16, 1992	1,172	703 (60)	0/45	—	—

* This was also the date the container arrived at the tire company and was opened.

containers with imported tires are opened up. These are Cape Town, Johannesburg and Pretoria.

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REFERENCES CITED

- Cornel, A. J. and R. H. Hunt. 1991. *Aedes albopictus* in Africa? First records of live specimens in imported tires in Cape Town. *J. Am. Mosq. Control Assoc.* 7:107-108.
- Hawley, W. A. 1988. The biology of *Aedes albopictus*. *J. Am. Mosq. Control Assoc.* (Suppl.) 4:1-39.
- Hawley, W. A., C. B. Pumpuni, R. H. Brady and G. B. Craig Jr. 1989. Overwintering survival of *Aedes albopictus* (Diptera: Culicidae) eggs in Indiana. *J. Med. Entomol.* 26:122-129.
- Reiter, P. and R. F. Darsie, Jr. 1984. *Aedes albopictus* in Memphis, Tennessee (USA): an achievement of modern transportation. *Mosq. News* 44:396-399.
- 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.
- Tanaka, K., K. Mizusawa and E. S. Saugstad. 1979. A revision of the adult and larval mosquitoes of Japan (including the Ryukyu Archipelago and the Ogasawara Islands) and Korea (Diptera: Culicidae). *Contrib. Am. Entomol. Inst. (Ann Arbor)*. 16.