DDT resistance and the *kdr* mutation in *Anopheles arabiensis*

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DDT resistance was first detected in South African *Anopheles arabiensis* in northern Kwazulu/Natal in 2003 (Hargreaves *et al.* 2003. *Anopheles arabiensis* and *An. quadriannulatus* resistance to DDT in South Africa. *Med Vet Entomol* 17, 417-422). Specimens were collected from window traps set up in DDT sprayed houses and showed 63% 24-hr-mortality after 1 hour exposure on 4% DDT treated papers. Samples from baited net traps and F-1 progeny of wild females showed 81% and 86.5% mortality respectively. A laboratory colony (MBN) was established at the NICD and selected on increasing doses of DDT until, at the 45th generation, adults could survive exposure to 4% DDT for a full 1 hour.

A laboratory colony (SENN) of *An. arabiensis* from Sudan was obtained from the Sennar region south of Khartoum. This colony is resistant to organophosphates, but after going through a genetic bottleneck also exhibited signs of resistance to DDT. Within 13 generations this colony was fully resistant to DDT and will withstand exposure to 4% DDT for more than 2 hours.

Bioassay data of the two colonies, MBN and SENN, were compared and marked differences in mortality with age of mosquitoes noted. Both were subjected to biochemical analysis and assayed for possible *kdr* mutations.

The West African Leu-Phe mutation was detected in 8 individuals in the SENN colony but did not assort with survival to exposure, indicating that this mutation does not play a role in conferring DDT resistance in *An. arabiensis* from Sudan. The MBN colony did not have the mutation. Biochemical analysis showed increased levels of GST in both colonies.

In SENN, the resistance was not age dependent and survivors were found in cohorts of mosquitoes that were 14 days old. In MBN, however, there was a marked increase in mortality with age, most mosquitoes dying at 3-4 days old. This latter phenomenon may explain why no malaria epidemic occurred in Kwazulu/Natal since the house spraying campaign continued to kill of mosquitoes before they were old enough to transmit malaria.