

## Old foes return

### Dr Basil Brooke

A small camp on the outskirts of Ndumu village in Northern Kwazulu/Natal is an unlikely setting for the initiation of a chain of events that would see one of the world's purportedly great environmental foes resuscitated, at least for the time being.

We had spent the day engaged in a rather peculiar enterprise, collecting mosquitoes from a set of window traps attached to the windows of a number of houses in the Ndumu district. Amongst our collections were a mere handful of particularly dangerous mosquitoes called *Anopheles funestus*. These are tiny, black insects that feed almost exclusively on humans. They have the habit of resting in cool, dark places inside human dwellings and are one of the most, if not the most, efficient transmitters of malaria on the continent. This particular collection, and a few previous similar collections, had invoked mixed reactions of consternation and academic interest simply because we had all thought that they had been eradicated from South Africa. Instead, buzzing around in a polystyrene cup in the shade of an acacia were our tormentors, collected from houses that had been suitably sprayed with an insecticide belonging to the pyrethroid group of insecticides as part of the Kwazulu/Natal malaria control programmes' activities.

Our brief from that point was simple; we would let them rest awhile in their new polystyrene container and then expose them to a particular dose of pyrethroid insecticide. The dose was carefully chosen using guidelines from the World Health Organisation so that only mosquitoes who had inherited some form insecticide resistance could survive. Of the 5 we tested, 2 did.

Keith and I were bemused. Keith Hargreaves is an entomologist employed by the Kwazulu/Natal Health Department. It was he who first predicted the return of the dreaded *Anopheles funestus* as an explanation for the dramatic increase in malaria cases recorded in 1999. It was also Keith and his team who subsequently found them resting in houses that had been sprayed with insecticide. As Keith and I looked on, Professor Richard Hunt took the initiative and searched for a spot where he had a clear cell phone signal. He contacted his wife, Professor Maureen Coetzee, head of the Department of Medical Entomology, South African Institute for Medical Research (now National Institute for Communicable Diseases). Maureen, Richard, Keith and I all knew the implications of those two survivors: *Anopheles funestus* was back in South Africa and was resistant to insecticides – the perfect ingredients for a serious malaria epidemic.

By 2000 the number of malaria cases recorded in South Africa had reached an alarming 64622, the highest number recorded since the initiation of malaria control activities in the

1950's. This dramatic occurrence had begun in 1996, coincident with a change in policy that saw DDT phased out as the insecticide of choice for malaria control in favour of a newer group of insecticides called pyrethroids. These are generally considered to be more environmentally friendly than DDT, largely because their chemical composition tends to convert to more favourable non-toxic compounds fairly quickly, especially compared to the remarkable chemical stability of DDT. No one could have foreseen the re-invasion of pyrethroid resistant *Anopheles funestus* that would follow, nor the dramatic rise in malaria incidence, particularly along the border regions with Mozambique. Further research using other groups of insecticides which are also registered for use in public health produced unexpected results, leaving us with clear evidence that only DDT was truly effective against our new population of *Anopheles funestus*, by then positively identified using sophisticated molecular tools developed by Dr. Lizette Koekemoer of the same Department of Medical Entomology. Given the general global antipathy toward the use of DDT, our recommendation that DDT be re-introduced for malaria control was not easily received. However, on this occasion good, hard evidence spoke for itself, and after much deliberation DDT was temporarily removed from the list of persistent organic pollutants (POPs) that were scheduled for an outright ban. Instead it was given the status of being registered for public health use under licence. DDT has subsequently been used for malaria control in Kwazulu/Natal for the past 4 years. South Africa's malaria incidence has subsequently decreased 5 fold to 13290 in 2004.