



# TDR / AT Photofeature No.9

## Ivermectin: one of Nature's healthiest gifts

In Japan, a dapper, distinguished chemistry professor squats on a patch of ground next to a golf course. In Nigeria, a bright-eyed boy sits on the lap of his elderly, blind grandfather. What links these two images together? A drug, ivermectin, which is recognised by some as being one of the greatest health interventions of the last century. And one that in the new millennium is continuing to make a huge impact around the world.

Some 30 years ago when Satoshi Omura initiated a collaborative research programme with the US-based pharmaceutical giant Merck, Sharp and Dohme (MSD), he could not have foreseen the outcome and the astonishing impact it would have, particularly in improving the health and livelihoods of millions of the world's poorest people.

By the early 1970s, the Kitasato Institute in Tokyo was already a world leader in searching for natural soil-dwelling microorganisms that produce bioactive compounds. The arrangement

with MSD meant that hundreds of promising cultures from Japan were sent to the US for testing, particularly in a novel mouse model infected with the nematode *Nematospiroides dubius*. The goal was to find a new anthelmintic compound to replace the currently existing ones, which were performing relatively poorly, particularly in the animal health field.

In 1975, MSD researchers discovered intense activity in a culture of an organism isolated from soil collected from the fringes of the Japanese golf

course. They quickly isolated a new class of potent anthelmintic compounds, the avermectins, which showed biocidal activity against a wide variety of nematodes, insects and arachnids.

MSD scientists manipulated avermectin molecules (the producing microorganism *Streptomyces avermectinius* makes eight avermectins) and chemical reduction of two, B1a and B1b formed a potent and robust complex which MSD commercially developed under the name ivermectin. This drug possessed no antibacterial or antifungal properties or activity against flatworms or protozoa, but proved to be extremely efficacious against mite, tick and botfly ectoparasites, all of which inflict massive economic damage in the livestock industry.

More significantly, the drug was remarkably effective in killing endo- and ecto-parasites in horses, cattle, sheep and pigs, as well as in killing larval worms in dogs. Subsequently, MSD launched ivermectin as a commercial animal health product in 1981. It rapidly proved to be the most effective, broad-spectrum antiparasitic drug ever developed.

Within two years it had become the world's leading animal health drug, maintaining that position ever since, raking in annual sales of around \$1 billion. Soon after its introduction, millions of livestock around the world were being regularly dosed and virtually every horse and pet dog in the United



Prof Satoshi Omura revisiting the site near Kawana Golf Course, in Japan, from where a soil sample yielded *Streptomyces avermectinius* the organism which produces the avermectins.

Credit: Andy Crump

**We apologise for omitting a page of text in the last issue. We are, therefore, reprinting the whole feature.**