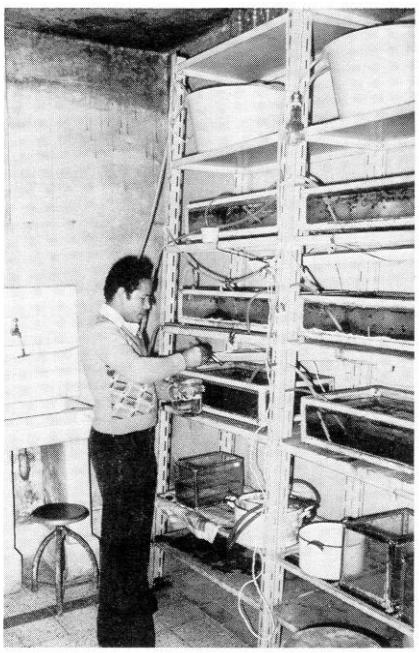

Damsissa is an herb with a difference. It produces a powerful natural pesticide that works against the snail carriers of bilharzia — a chronic, debilitating disease. The "simple powers of observation" led Egypt's Dr Mohamed El-Sawy (top) *to the discovery of damsissa's unique properties. Colleague Dr M.A.R. Shahata* (above) *developed a breeding tank system to enable the necessary laboratory trials.* At right, *dried damsissa is stored at the High Institute of Public Health laboratory in Alexandria.*

RESEARCH ON A SNAIL'S PACE

The snails transmitted disease. But something was killing the snails. What was it ?

BOB STANLEY

The year is 1955. The young Egyptian doctor at a health clinic in the Nile Delta sees many patients every day. Half of them suffer from bilharzia, a debilitating, often deadly disease caused by a tiny parasitic worm that makes its home in the liver or large intestine of a human host.

The worm finds its way into the body through contact with water, and during its larval stage in the water uses abundant aquatic snails as hosts. Destroy the snails and you break the cycle of disease. But how?

One day, the doctor hears from a man working in the government's snail eradication program that they sometimes encounter sections of canal where there are, inexplicably, no snails. Curious, he takes samples of mud and plants from one such area, and at home begins to test them.

"To my astonishment I found that when a certain herb was present the snails committed suicide by doing what I now call 'the dance of death'. The snail tries to come right out of its shell, and twists around so violently that blood oozes out. Soon they die."

He repeats the experiment many times. Each time the result is the same "dance of death". The plant he is using is a common wild herb called damsissa (scientific name *Ambrosia maritima*) found in much of Egypt, Sudan, and the Mediterranean countries.

Now very excited, the young doctor tries to interest someone in his discovery. He even writes to the President. His only response is a stern reprimand from the Ministry of Health reminding him that he is a doctor, not a researcher, and telling him to stop wasting his time with snails and get on with the business of doctoring.

More than 25 years have since passed, and Dr Mohamed El-Sawy is no longer a young man. But he is a researcher. In fact, he is Chairman of the Department of Tropical Public Health at the University of Alexandria.

Dr El-Sawy persisted. He became a researcher, studied both in Egypt and in the United States, and published his early findings on the damsissa plant. Today he says: "I thank God that after 25 years we have been able to introduce a method that is feasible, inexpensive, handy, and safe to combat the snails."

DETECTIVE WORK

A short, portly figure in a conservative suit, rimmed glasses, and walking with the aid of a sturdy cane, Dr El-Sawy today resembles nothing more than one of Agatha Christie's cerebral detectives. Which perhaps is as it should be, for a great deal of his research is based on detective work, or as the doctor prefers to say, "the simple powers of observation".

In this case, nowhere are the clues more prolific than in the folklore of Egypt itself. Dr El-Sawy gives a few examples: there is a saying in Egypt, even today, that the best workers, the strongest men, come from Upper Egypt. Why? Because until quite recently there was very little bilharzia among those people. And why was that? Because until the construction of the High Dam at Aswan there was no perennial irrigation. Water collected in basins during the spring flood, and once it was usd, the canals simply dried out. Snails cannot live under such conditions. But surely some snails must survive in the permanent waterways? True, in Upper Egypt the traditional houses were built of mud bricks, and it was always said that the best mud was to be found wherever the damsissa plant grew. The local name for the *Bulinus truncatus* snail (a carrier of bilharzia) literally translated means "destroyer of homes".

Dr El-Sawy believes that there is often a great deal more to folklore than meets the casual eye, and that modern medicine can learn a great deal by paying closer attention to some of the old tales and traditions. The house builders of Upper Egypt may not have fully understood the direct relationship between the snails and the damsissa plant, but they knew from generations of observation that where the plant grew there would be no snails.

BREAKING THE CYCLE

The doctor's early laboratory experiments with damsissa had yielded promising results. Infusions of 1:1000 proved lethal for the snails and their eggs, and remained potent in the water for up to 48 hours. As a bonus, the solution was also found to destroy 90 percent of the parasite schistosome eggs, which, if hatched, would produce the free-swimming larvae (known as *cercariae*) that can penetrate the skin of an unwary wader. Once established in a human host the *cercariae* grow to maturity, and multiply — the female adult schistosome worm has been described as "an egg-laying machine". Inevitably some of the eggs find their way back into the waterways thus perpetuating the cycle of infection. But now it seemed that Dr El-Sawy and his colleagues had found a way of breaking into that cycle without the use of expensive chemical molluscicides that pollute the waters and kill fish.

WHAT'S IN A NAME?

Theodor Maximilian Bilharz, a German physician and zoologist, went to Egypt at the age of 25. It was here, while working as professor of descriptive anatomy at the Cairo Medical School, that he first observed the disease. In a series of letters to his old zoology teacher between 1851 and 1853 he described the disease in detail and identified the previously unknown parasitic worm — complete with drawings of the worms and their eggs. The name bilharzia *was formally introduced into the scientific nomenclature in 1856, some years before* schistosomiasis *was also accepted.*

Oddly enough, Bilharz himself never considered his discovery to be as important as his research in zoology. Natural history remained his first love, and it was this that led him to accompany a fellow German explorer on an expedition to Ethiopia in 1862. There he contracted typhoid fever while treating a patient. Although he was rushed back to Cairo, he died a few days after his return, just 37 years old.

The herb kills the snail vectors of bilharzia, but appears to be harmless to fish, other plants, or humans.

The need is great. In spite of enormous efforts to eradicate it, the disease still affects an estimated 200 million people in the tropical countries of the developing world. The cost is incalculable, whether in terms of human suffering, or of direct economic values such as the cost of treatment and control programs and loss of productivity in the infected workforce. Worse, it reduces the benefits of costly large-scale irrigation schemes such as those resulting from the construction of Egypt's Aswan High Dam or Ghana's Volta Lake dam.

In Upper Egypt, says Dr El-Sawy, a 1937 survey showed the incidence of bilharzia among the population to be between 0.5 and 3.5 percent. Three years after the High Dam permitted perennial irrigation in the region, the level had risen to 75 percent. Because the dam prevents the annual flood waters "flushing out" the Nile, even the great river itself has become infested.

The only solution, Dr El-Sawy believes, is to reduce the snail population to the point where the infection cycle is broken. This must be combined, he says, with a cheap, effective treatment, and a public education program to prevent further contamination of the waterways. Only then will the disease cease to be endemic.

FIELD TESTING

The laboratories of the Department of Tropical Public Health are on the top level of the High Institute of Public Health in Alexandria, and have even overflowed on to the rooftop. Much of the equipment is old and dilapidated. The stairways and halls throng with people, most of whom seem to know the doctor, and greet him with respect and affection as he passes. Progress is slow as he is frequently stopped by colleagues or students seeking advice or assistance.

Even on the rooftop the interruptions continue as the doctor shows the visitors his domain. There is a simple gravity-fed system devised by one of his team, Dr Shahata, for breeding snails without the necessity for electric-powered aeration pumps. Further along the roof is the animal section, where literally thousands of experimental animals are bred and kept, so successfully that they are able to supply other university departments with the animals they need. And there is a room full of dried damsissa and sacks of seeds. Dr El-Sawy explains that last year he ran out of seed and was unable to supply the farmers who wanted to plant the herb alongside their irrigation canals.

In 1977, IDRC provided a grant to cover about 40 percent of the cost of a 2-year program of field-testing. Earlier tests in the field had demonstrated that the plant indeed killed all the snails in a short section of canal and did no harm to the fish, but they were carried out on a very limited scale using only dried damsissa. For this project the researchers selected a village of some 500 people on reclaimed coastal land near Alexandria. A similar village was selected as a control. After a thorough survey of both the human and the snail population of the region, the purpose of the project was explained to the people: to test the effectiveness of green damsissa as a natural molluscicide.

The response was enthusiastic. The villagers helped to seed the banks of every canal and drain in the vicinity. One farmer donated a small plot of land to be used to cultivate damsissa and collect the seeds. By happy coincidence, the summer flowering of the plant coincides with the natural peak of the snail population. It is also the time of the school break, so there was no shortage of young helpers to spread the flowers and leaves on the canals.

The research team visits both villages regularly, looking for symptoms of bilharzia, and recording the incidence of the disease. A count of the snail populations is taken every three months. In the project village monthly meetings are held, stressing improved sanitation and community involvement to prevent reinfection of the waters.

On one such visit, the project's microbus is surrounded the moment it reaches the village by people wanting to speak with Dr El-Sawy and his colleague, Dr Hassan Bassioumy, the team's physician. The people are pleased with the project, explains Dr El-Sawy, there are no snails now — a fact that is demonstrated when repeated sweeps with a net in several canals produce only empty shells.

Dr El-Sawy is now preparing a report of his findings for publication in the scientific literature. He has tentatively entitled it "Bilharzia: the problem and the solution", although he admits that may be just a little premature. Further large-scale testing of the damsissa plant will be needed to test its adaptability to different climatic zones. Agronomic studies are needed, because the plant usually grows wild and its cultivation has never been studied. The doctor speculates it might even be possible to develop an underwater variety that might eliminate the snails permanently. "There is still much work to be done," concedes Dr El-Sawy.

Back in his office, the desk is piled high with papers — a 6-volume thesis awaiting his attention, rolls of plans showing the project village and its waterways, and drawings of snails for his report. Against the walls are two grey metal tables, a broken chair propped carefully against one of them. The doctor rises to wash his hands at a small, stained sink. The tap coughs fitfully but declines to produce water. As he sits down and reaches for the first volume of the thesis, the lights go out momentarily, then flicker back to life. Dr El-Sawy allows himself a small smile. "What I would like," he says, "is to make a new laboratory for the young scientists." □

No live snails are netted in sweeps of a canal "treated" with damsissa grown along its banks.