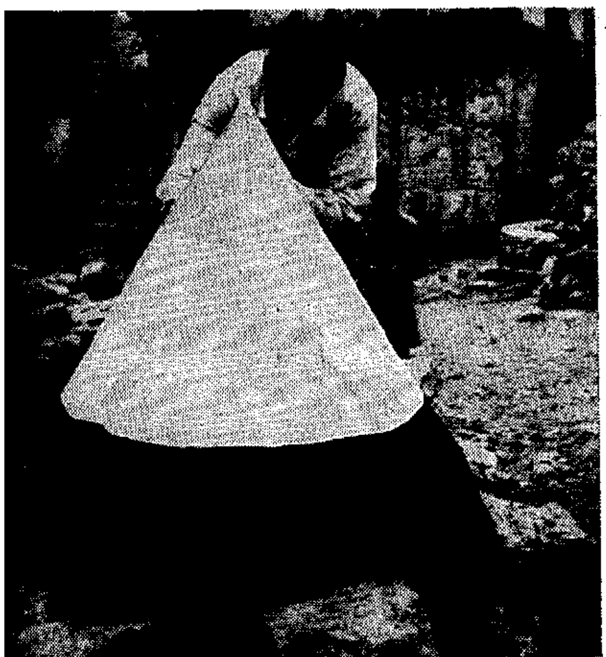
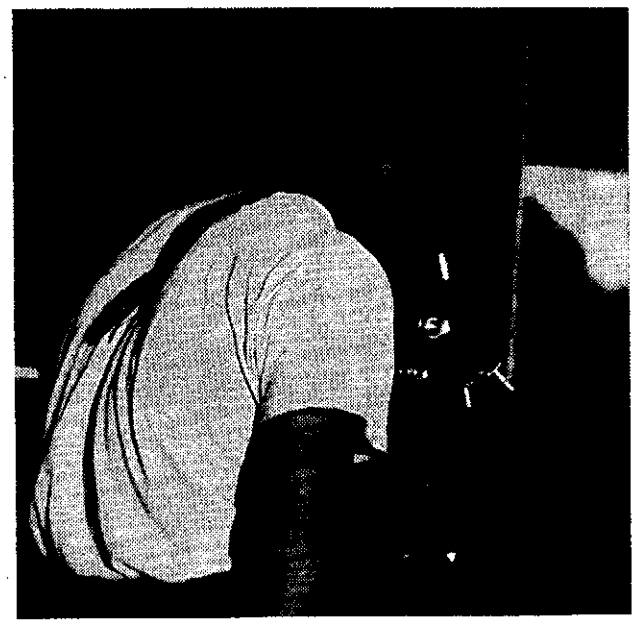


During the recent malaria control campaign conducted in Lebanon with the help of WHO, anopheles catching stations were installed at a number of points throughout the territory. This conical trap placed over a well captures the mosquito as it emerges from the nymph phase.

A quick survey of the methods of man in his fight against malaria from the days of Cleopatra to the era of DDT.

THEY SEEK IT HERE, THEY SEEK IT THERE...



In Sarawak, a national auxiliary worker, trained in modern laboratory techniques, examines blood samples taken from malaria suspects.

In the French Cameroons the assistant to the entomologist attached to the Yaoundé experimental malaria control centre identifies anopheles captured in the huts of neighbouring villages.

Our Weapons against Malaria

From the days of Cleopatra's mosquito net to DDT, malaria has managed to breach through men's defences. Now it has set him another problem—for which, however, the World Health Organisation proposes a new strategy of attack.

THREE hundred million cases and three million deaths was the yearly toll which malaria was estimated to take in the world before present control methods were used.

Most people now know that malaria is an infection transmitted by certain species of mosquito, known as anopheles. Today anyone living for some time in a territory where there is a risk of contracting malaria can probably escape it by taking an adequate weekly dose of one of the antimalarial drugs which have been in use since the last ~~war (amodiaquine, chloroquine, proguanil, pyrimethamine)~~.

If living quarters are screened so much the better; if not, it will be necessary to sleep under a mosquito net and to limit exposure to the bite of the insect as far as possible when outside the mosquito net. It would be unwise, for instance, to spend a considerable part of the night at the bridge table in a house where mosquitoes have free entry.

Action of this kind to protect ourselves against malaria is like boiling or filtering our personal water supply to make it safe. But, even if we do so, this does not relieve the public authorities of their responsibility for protecting water supplies.

In a similar way, governments today are undertaking the control of malaria over vast regions—a thing quite unheard of a dozen or so years ago.

WHAT has produced this miracle? The history of the battle against malaria is one of a long series of efforts, hopes and disappointments.

The ancient Romans already realized that there was some connection between marshes, mosquitoes and fevers. They made what we might perhaps call the first attempts at preventive medicine by introducing mosquito nets and drainage.

The mosquito net, already in use in ancient Egypt, was very probably invented less as a protection against fevers than against the troublesome insects which spoilt the beauty of women's faces. If, as Horace tells us, Cleopatra slept under a mosquito net, there is reason to believe that it was not just to protect herself against malaria.

The draining of marshes, however, may have been intended to serve sanitary and agricultural purposes. The engineer Vitruvius, contemporary of Augustus, who may be considered a forerunner of the modern sanitary engineer, maintained that "heavy and pestilential vapours" rose from undrained marshes.

Although he built canals for the drainage of swamps (and reduced the number of mosquitoes) he did not solve the problem of malaria, for the anopheles of the Roman campagna lay their eggs not only in stagnant water, but also in the slowly moving water of canals and ditches.

Vitruvius should have been born in the United States of America some centuries later, for the principal anopheles

This apparition, which seems to have come straight out of a work of science fiction, is taking part in testing a recently-developed insecticide (dieldrin) in the island of Luzon, in the Philippines. Some experts believe this insecticide to be more effective than DDT, and it is said that equivalent results can be obtained with smaller doses. Until its properties are better known, however, it is being used with every precaution.

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When antilarval measures are used it is obvious that t larger the population to be protected the less will be t cost per head. Such measures may be an econon proposition for a locality with 30,000 inhabitants, but th will be extremely expensive for a community of 100 perso In fact, it was found that large-scale larval control measu could not be economically applied in rural areas.

Recently, the myxomatosis virus appeared in Fran (and elsewhere) and it spread so quickly that almost rabbits were destroyed. Although this was not done human agency, it is an example of a biological method controlling a species. Similar methods have been employ by man in the campaigns against anopheles, by distributi large numbers of a small fish of American origin (*Gambusi* which is a ~~voracious eater of mosquito~~ larvae, ~~to the~~ breedi places of mosquitoes in Europe, Africa, Asia and the Phil pines.

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Therefore, by spraying the inside walls of houses with of the residual insecticides—not only DDT, but benz hexachloride (BHC), chlordane or dieldrin—a country be protected at a uniform *per capita* cost, whether the in bitants are many or few or whether they live in towns o very small communities. This cost is rather low. In So East Asia it is about 11 US cents per person per year the Western Pacific 17 cents, and in the Americas ab 45 cents. (In English currency about 10d, 1s 4d 3s 2d.)

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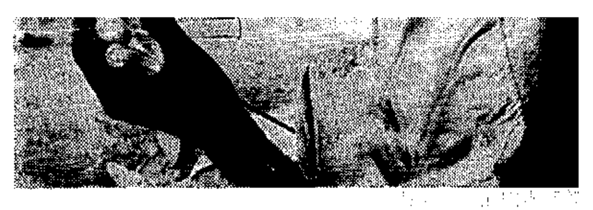

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Vitruvius should have been born in the United States of America some centuries later, for the principal anopheles of that country, *Anopheles quadrimaculatus*, does breed only in stagnant water. If, on the other hand, Vitruvius had been born in Manila, he would never have thought that drainage could protect against fever, for in the Philippines the vector lays its eggs only in running water.

AT the end of the last century, quinine began to be produced on a large scale and great hopes were raised by this drug, since it was known that a daily dose protected against fevers, even if it did not prevent infection.

Today, we have much more effective drugs—such as those mentioned earlier. By using these, malaria can undoubtedly be wiped out among small groups. But how could these products be administered weekly, or even once a fortnight, to millions and millions of people? It would be a task beyond the powers of most health administrations to enforce such a discipline.

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When it was proved in 1898 that malaria is transmitted only by anopheles, it seemed that a way had been found to control the disease. Even if it were not possible to suppress the anopheline breeding-places by drainage and filling (both very expensive measures) it should be feasible to spread larvicidal substances on their surfaces.

This was done between the two world wars—the period of oiling, or using "Paris green". Crude oil was poured on breeding places every 10 to 15 days, or they were treated with a mixture of road dust and 1 p.c. "Paris Green". In this way all anopheles larvae were killed, and, provided that the operation was efficiently carried out, malaria coul overcome.

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In many countries, where the disease had previousl unchecked, it was found that malaria control was mically feasible and infinitely worth while. In such as Italy, where until recently methods like dra larval control, distribution of quinine, screening of and land reclamation were used, this one single m was substituted and found to be more economica effective than all the others put together.

HOWEVER, a new problem has arisen involving threat: some of the malaria-carrying anophel developing resistance to the new insecticides.

It appears that such resistance takes some years to de but it also seems that, once it is established to any one four chemicals mentioned above, resistance to the may develop within a few months. This has a happened in Greece.

Fortunately, most people suffering from malaria of their infection, even without treatment, in a peri one to three years unless, of course, the attack is fa they become re-infected.

Therefore, as effective insecticide campaigns can p the occurrence of new cases, and provided the treated are large enough to obviate the importation of in from outside, a few years of spraying should be eno secure the total eradication of malaria.

This has already been achieved in several regions, a principal aim now is to attain this goal elsewher before resistance to insecticides can develop. Wh objective is reached, insecticide campaigns can be tinued and the cost of malaria control will cease t burden on national health budgets.

This is the strategy recommended by the World Organization, and it has already been adopted by countries throughout the world.

Dr. E. J. PAMPANA
Chief of the Malaria Section, WHO

A physician in the French Cameroons feels the spleen of a young patient. The spleen becomes much enlarged after repeated attacks of malaria and such examinations give guidance as to the incidence of the disease.