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Malaria - old and new

T Blackwood

The number of Britons contacting malaria abroad is rising, according to the Health Protection Agency. The number of cases reported rose by nine per cent between 2008 and 2009. Malaria is very ancient disease defying a cure for centuries. It is caused by parasitic protozoa of the genus Plasmodium, transmitted by female mosquitoes and vectored by a number of species of the genus Anopheles. Parasites develop asexually in the human host, first in liver cells and then in erythrocytes, and sexually in mosquitoes. Seasonal or intermittent fevers, associated with convulsions, prostration and fatal out-comes were first described in medical and religious texts of ancient Sumerian, Babylonian, Chinese, Egyptian and Indian civilisations. The Hippocratic School detailed descriptions of the disease and different periodicity of the fevers and the swelling of the spleen in people inhabiting marshy zones. Roman doctors, particularly Celsus and Galen, recognised the marsh fevers that affected people living in areas around Rome. Etruscans and Romans con-structed hydraulic systems to facilitate the drainage of rain water and prevent surface stagnation.

In the late seventeenth century discoveries sug-gested marsh fevers could be cured with the bark of the cinchona tree-the active ingredient was quinine -isolated in 1820. During the nineteenth century thera-peutic and prophylactic expertise developed the use of quinine. The backbone of prevention and treatment for decades.

Malarial infection, remains a daunting challenge to human populations. The most effective genetic defences generally entail modifications of red blood cells, which constitute the life environment of plas-modia in the human body. Populations inhabiting malaria zones always aquire a partial immunity to the disease, but only after lengthy exposure to the infec-tion starting in adolescence.The price is high infant mortality.

The causative agent was identified in 1880 by the French army doctor Alphonse Laveran. Benign tertian fever and quartan fever were identified as due to two different, morphologically distinguishable species of plasmodia, P. vivax and P. malariae. P. falciparum. A colonial physician demonstrated that only mosquitoes of the genus Anopheles transmit malaria. Ronald Ross, a Scot, was a founding father of Malariology. He discovered the life cycle of the malaria parasite Plasmodium within the mosquito in 1897, and its transmission to man. Awarded the 1902 Nobel Prize in Medicine. Ross's discovery was published in the *British Medical Journal* on 18 December 1897. The causative agent was identified in 1880.

Antimalarials were developed to treat patients if they had contracted it and protect those at risk of con-tracting the disease, with the therapeutic and prophy-lactic use of quinine and mechanical protective meth-ods. Quinine treatment served to "clear" the infection, in such a way that the mosquitoes were unable to find parasites in the blood.

Gorgas in 1904 during the construction of the Panama Canal demonstrated the possibility of con-trolling the epidemics by means of measures targeting the mosquito vectors. The residual insecticidal action of DDT during the second world war emphasised the hygienic-sanitary approach, which achieved major success by interrupting the transmission of the disease The efficacy of DDT, seemed to justify attempts at the eradication of malaria. Its main effect however was to force mosquitoes out of people's homes, where low temperatures in temperate zones did not allow the parasite to accomplish its development cycle in the insect.

The use of DDT was ineffective in tropical zones, where transmission levels are much higher, mosquitoes do not remain in people's homes and out-side temperatures are sufficiently high to allow development of the parasite.

In 1969, the Word Health Organisation aimed to eradicate by improving sanitation in developing countries searching for new insecticides, and the identification of new antimalarial drugs and alternative control methods. Chloroquine became drug of choice for non P. falciparum resistant infection. Increasing resistance brought new preventative drugs, all with possible serious side effects. Attention is now being given to a different potential therapeutic approach, considering presumptive standby antimalarial treat-ment for people travelling to endemic countries. Treatment would only take place when symptoms occurred, instead of using traditional preventive treatments. Pharmacologists are exploring the use of vaccines and new anti-malarials including the therapeutic efficacy of Artemisia, a plant long used in Chinese medicine. The active ingredient, is artemisinin, and its efficacy in treatment of the parasites is being researched. This approach would depend upon a simple, cheap blood test to establish the diagnosis whenever possible symptoms of malaria appeared.

There is hope for development of an effective vac-cine but progress in this field is slow, although it promises to eradicate malaria morbidity in future.

Tom Blackwood has a special interest in the history of medicines.