



# MALARIA

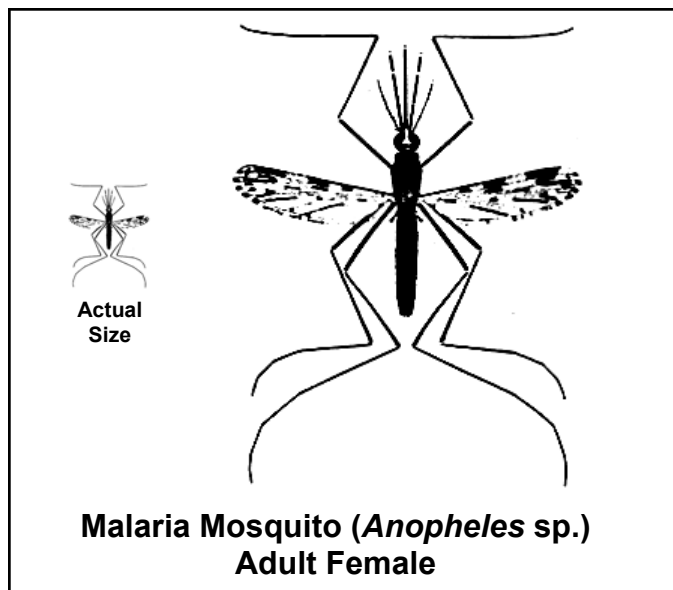
## History

Malaria is a mosquito-borne disease caused by protozoan parasites of human blood. Malaria has probably been, on a worldwide basis, the most serious disease affecting humans throughout history. Some areas, particularly tropical regions, have at times been rendered nearly uninhabitable by Malaria. In modern times, Malaria is usually restricted to the tropics and subtropics. However, it is occasionally reintroduced to temperate regions (including California) by people infected with the disease traveling from tropical or other Malaria-infested regions. Thousands of cases of Malaria are reported in the United States every year due to infections acquired in other countries. **Every California county has reported imported Malaria cases.** This can result in Malaria transmission by local mosquitoes. Malaria was epidemic in California during the 1800s and continued to be present into the early 20th century. It was a major reason for forming mosquito control districts in California. As recently as 1986, an outbreak occurred in San Diego County.

Until the 19th century, Malaria was thought to be caused by “bad air” emanating from swampy lowland areas, hence the name *mal'aria*. Other common names for Malaria include ague, chills and fever, jungle fever, paludism, marsh fever, remittent fever, intermittent fever, etc. During the 1890s it was established that the true cause of Malaria is protozoa of the genus *Plasmodium*. There are 4 types of Human Malaria; benign tertian fever (*Plasmodium vivax*), aestivoautumnal fever (*P. falciparum*), ovale tertian fever (*P. ovale*), quartan fever (*P. malariae*). *P. vivax* is the most widespread form. *P. falciparum* is the most dangerous. Other types of *Plasmodium* affect apes, monkeys, other mammals, birds, and reptiles.

## Biology

Anopheline or Malaria Mosquitoes (*Anopheles* sp.) are the only vectors of Malaria. Of the 5 *Anopheles*



species that occur in California, 3 species are known to be capable of transmitting Malaria. They are the Western Malaria Mosquito (*Anopheles freeborni*), the Coastal Malaria Mosquito (*Anopheles hermsi*), and the Woodland Malaria Mosquito (*Anopheles punctipennis*). The transmission cycle for Human Malaria involves only mosquitoes and humans. A female mosquito (only female mosquitoes feed on blood) becomes infected by feeding on a human that is infected with Malaria. Within a few days, the infected mosquito can transmit the disease to another human. Malaria affects the mosquito's health as seriously as it does the human's health.

In humans, the *Plasmodium* parasites attack and destroy red blood cells. People of both sexes, all age groups, and every ethnic group are susceptible. Symptoms of infection may appear 9 to 30 days following the bite from an infected mosquito, depending on the type of Malaria. The first symptoms of Malaria are flu-like; headache, back pain, nausea, and a general ill feeling. For the first 2 to 4 days, the fever rises and falls irregularly.

## Symptoms and Treatment

The disease soon becomes characterized by **regular recurring attacks called paroxysms**. Each paroxysm usually lasts 8 to 12 hours and has **three distinct stages**. First is the **cold stage** (the chill) in

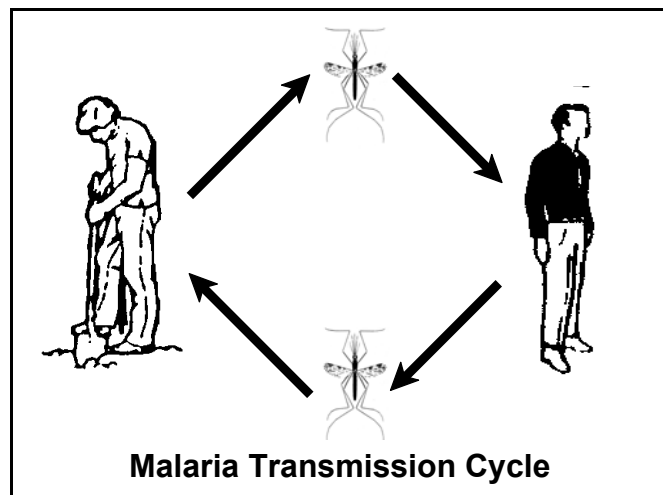
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which the skin becomes pale and covered with “goose bumps.” The victim’s teeth may chatter and he/she may shiver violently. Next is the **hot stage** where the victim’s temperature rises and the skin becomes hot and flushed. The third stage is a **sweating stage** where the victim perspires heavily, the fever falls, and the temperature approaches normal. In some cases the stages may not be fully distinct. The time interval in which the paroxysm recurs varies according to the type of Malaria the victim is infected with. The effects of Human Malaria can include enlargement of the liver and spleen, kidney failure, suppression of the immune system, and death.

Physicians can confirm a case of Malaria only through specific laboratory tests, such as examination of a blood sample for the presence of the parasite. It is important for physicians to report cases of Malaria in order to alert public health and mosquito control agencies to take action to prevent the further spread of the disease. Quinine, an extract from the South American Cinchona Tree, was the first anti-malarial drug used to treat victims during the 1800s. Since the 1930s, more effective anti-malarial drugs have become available. However, in some parts of the world, *Plasmodium* has become resistant to many of these drugs.

### Prevention and Control

The most effective and widespread preventative measure has been to control the mosquito vectors of Malaria. Because immature mosquitoes can develop only in water, draining wetland breeding sources of Anopheline Mosquitoes was the original control method. However in recent years, wetlands have been recognized as vital economic and environmental resources. Insecticides have been and still are widely used to control mosquitoes. Following the introduction of DDT in the 1940s, levels of infection with Malaria dropped dramatically. But after a few years, mosquitoes began to develop resistance to DDT and other



insecticides. Additionally, DDT and some other pesticides were implicated to be the cause of environmental problems. During the 1960s and 1970s, numbers of Malaria cases began to increase in some parts of the world. The introduction of biological control agents such as Mosquito Fish (*Gambusia affinis*) is usually ineffective against Anopheline Mosquitoes. Unlike other mosquito species, Anopheline Mosquito larvae live on the surface of the water on top of mats of floating water plants and algae, where they are inaccessible to fish and many other predators. New pesticides that do little if any harm to the environment are widely used in developed countries, but are often too expensive for third world countries where Malaria is most prevalent.

The best way for individuals to avoid Malaria or any other mosquito-borne disease is to avoid mosquito bites. This means reducing outdoor activity during the first few hours after sunset (when mosquitoes are most active), wearing long sleeves and long pants, applying insect repellent, checking window and door screens for holes large enough for mosquitoes to enter, and eliminating “backyard” mosquito breeding sources. If mosquitoes become a problem in your neighborhood, call the Mosquito and Vector Management District or your local mosquito control or public health agency.

## MOSQUITO and VECTOR MANAGEMENT DISTRICT

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