Malaria parasite goes bananas before sex: new study

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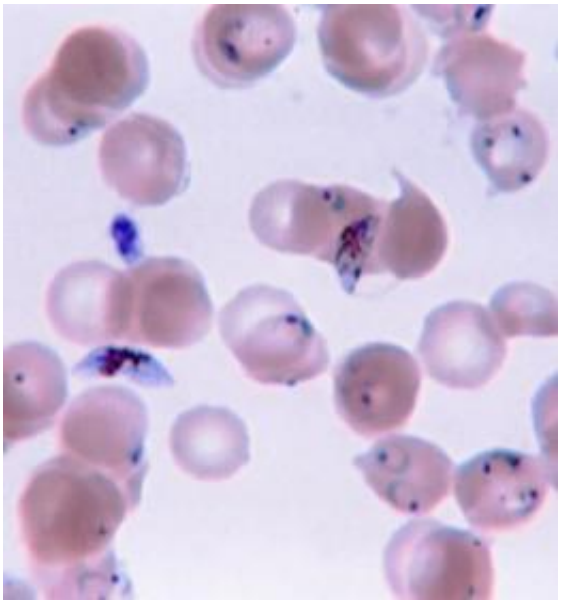

A thin-film Giemsa stained micrograph of ring-forms, and gametocytes of Plasmodium falciparum. Image: CDC

(PhysOrg.com) -- New research from the University of Melbourne shows how the malaria parasite (*Plasmodium falciparum*) changes into a banana shape before sexual reproduction, a finding that could provide targets for vaccine or drug development and may explain how the parasite evades the human immune system.

The work was conducted by an Australian research team led by Dr Matthew Dixon and PhD student Megan Dearnley from the Department

of Biochemistry and Molecular Biology, Bio21 Institute at the University of Melbourne, and is published in the Journal of Cell Science today.

Dr Dixon said the new study solves a 130-year old mystery, revealing how the most deadly of human malaria parasites, Plasmodium falciparum performs its shape-shifting.

“In 1880 the banana or crescent shape of the malaria parasite was first seen in the blood of a patient. Using a 3D microscope technique, we reveal that malaria uses a scaffold of special proteins to form a banana shape before sexual reproduction,” said Dr Dixon.

“As the malaria parasite can only reproduce in its ‘banana form’, if we can target these scaffold proteins in a vaccine or drug, we may be able to stop it reproducing and prevent malaria transmission entirely.”

When in its banana shape, the malaria parasite is passed from a human host to a mosquito where it reproduces in the mosquito gut. The study found that specific proteins form scaffolds, called microtubules, which lie underneath the parasite surface and elongate it into the sexual stage banana shape.

The work suggests that when the parasites are ready for sexual reproduction, they adopt the banana shape so that they can fit through the tiny sinusoidal slits in the spleen. This enables them to avoid the host's mechanical filtering and immune surveillance mechanisms and to survive in the circulation long enough to be picked up by a mosquito and transmitted to the next victim.

The banana shape was revealed in greater detail than ever before by using high-end imaging techniques - 3D Structured Illumination Microscopy and Cryo Electron Microscopy – conducted with the ARC Centre of Excellence for Coherent X-Ray Science.

One child dies from malaria every minute in Africa. Around the world, the malaria parasite kills more than 600,000 people each year, most of them children and pregnant women, while another 225 million people suffer illness as a result of malaria infections.

Provided by University of Melbourne