

## **Public Agenda (Accra, Ghana)**

### **Ghana: Noguchi Pioneers the Use of DNA Barcodes to Rid the World of Elephantiasis**

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The Noguchi Memorial Institute for Medical Research at the University of Ghana, supported by the Philadelphia based JRS Biodiversity Foundation, is pioneering the use of DNA "barcodes" to map menacing mosquito species in West Africa that spread lymphatic filariasis (LF), commonly known as elephantiasis.

Using a short DNA sequence from a particular genome region, scientists can obtain a species' 'barcode' identity. Barcodes are needed because closely-related species, with different capabilities to transmit LF, are otherwise hard to distinguish.

"The scientific breakthrough of DNA barcoding, which grew explosively from a single Canadian research paper in 2003, is shedding new light on LF - a horrific and entirely preventable health scourge in developing countries," says principal investigator, Prof. Daniel Boakye, who is Head of the Parasitology Department at the Noguchi Memorial Institute for Medical Research, University of Ghana.

"Beyond the immediate battle against this disease in West Africa, the value to human health of these important new tools will grow as the range and habitats of specific mosquito species shift due to climate change", he says.

The ability to precisely identify mosquito species in this way is a promising advance in the battle against LF, an often disfiguring disease that today threatens 1 billion people across roughly 80 countries.

Over 120 million people have the parasitic infection and more than 40 million have been permanently disabled or disfigured.

The research is identifying species spreading the worm larvae that clog the human lymph system, often causing grotesque swelling. By revealing the menace species' habitat and range, it also aids understanding of environmental factors that influence their breeding and abundance.

LF is a leading cause of permanent and long-term disability worldwide and results from a microscopic, thread-like worm spread between humans through a mosquito bite, leaving larvae, called microfilariae. Symptoms often appear years after infection. The disease can permanently damage the lymph system and kidneys, which results in fluid collecting and swelling in the arms, breasts, legs, and for men, the genital area. The disease also makes it difficult for the body to fight germs and infections.

Poor sanitation and rapid growth in tropical and subtropical areas has created more places for mosquitoes to breed and thus to more LF infection.

World health authorities have earmarked the disease for eradication by 2020 through mass drug administration (MDA). Officials are identifying communities where LF is endemic and treating people at risk with annual doses of a combination drug therapy (albendazole/DEC or albendazole/ivermectin, freely donated by Merck and Co. and GSK respectively).

The drug reduces the density of worm larvae in humans. This LF elimination strategy relies on a belief that the region's main LF vector, the Anopheles mosquito, is incapable of transmitting low-density worm larvae.

But the Anopheles family is highly diverse and contains hundreds of species. And the new molecular studies reveal that not all anopheles species are created equal. Some can transmit the disease despite the drugs' thinning of the worm larvae.

The research is pointing out places infested with the menace species and therefore, where the drug strategy needs to be supplemented with insecticides to successfully eliminate LF.

Prof. Boakye also notes that blanket vector control using insecticides can have serious impact on non-target organisms, leading to biodiversity loss. The additional information and insight into specific mosquito species allows for those species and areas to be targeted reducing the level of spraying and its effect on other organisms.

The expertise to create databases is in short supply in Africa; the JRS Foundation is assisting science in very meaningful ways, he says.

The ground-breaking work of the Noguchi Memorial Institute for Medical Research at the University of Ghana is one of 17 JRS-supported projects operating in Africa, India and Latin and South America to be showcased at the e-Biosphere 09 Conference in London June 1-3, 2009. Media contact: Prof. Daniel a. Boakye, Head, Parasitology Department, Noguchi Memorial Institute for Medical Research University of Ghana.

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