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Editorial

Changing the malaria environment

On Friday, 21st November 2008, a wonderful international symposium entitled "Malaria in the 21st Century" was held at the Beckman Center of the National Academies of Science, on the beautiful campus of the University of California, Irvine. The participants included top-notch scientists working on various strategies for mosquito vector control, vaccine development, ecology, and bioinformatics. Further, there were presentations from the funding agency Bill and Melinda Gates Foundation, and a panel consisting of representatives from the Millennium Foundation, and malariologists from Kenya, The Philippines, and Thailand. It is particularly noteworthy to point out the contributions of Dr. John Githuri, Head of the Human Health Division at the world renowned International Centre of Insect Physiology and Ecology (ICIPE) Nairobi, Kenya. Similarly, Dr. Andrew Githeko Head of the Climate and Human Health Research Unit at the Center for Global Health Research, Kenya energized the panel and the audience with his treatise on the pursuit of "fashionable" topics in malaria research.

About four out of ten people in the world live in areas were malaria is a major risk of illness and death. Most of those who succumb to malaria are children under the age of 5 years who live in Africa (Figure 1). Everyone seems to "know" that malaria exerts a great burden in Africa, but even the World Health Organization (WHO) acknowledges the difficulty of counting malaria-induced deaths and morbidity on the continent[1]. Nevertheless, a child dies from malaria every 30 seconds, and more than one million deaths occur annually from this disease. In the regions of the world where malaria no longer represents a serious threat to health, environmental management has been the critical tool against mosquito vectors (Figure 2). This sometimes involves the saturation of the environment with chemical pesticides such as carbamates, DDT, organophosphates, and pyrethroids. But resistance is growing among mosquito populations and the use of chemical pesticides carry risks of toxicity to people and the ecosystem.

Biological control, for example the use of predatory fish against mosquito larvae and the use of other predatory insects and frogs against adult mosquitoes are also a time-tested technique that has been used primarily in Asia. Although selectivity and resistance also limits the deployment of biological control mechanisms, they represent local technologies that can complement other malaria control strategies. Moreover, relatively simple land-use planning strategies such as well developed draining systems and vegetation control around domiciles are probably among the most effective strategies that can be deployed in Africa. These are environmental technologies that are not patented, and extremely cost-effective. But it takes a unified vision across political, socio-cultural, and academic dimensions.

The emerging vision of funding agencies is that malaria can be eradicated within one or two human generations from the present time. Opinions differ on how such eradication can be accomplished and within what time frame. However, everyone agrees that we have sufficient knowledge to make a big dent in the burden of malaria within the currently available tools and weapons in the arsenal. Yes, we must support research into vaccine development, and genetic engineering approaches against the mosquito vector, but the immediate vision of malaria control is within reach – on all continents, especially in Africa.

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[1] Karen Iley. 2006. Malaria Deaths are the Hardest to Count. Bulletin of the World Health Organization. 84: 3, 161. http://www.who.int/bulletin/volumes/84/3/news10306/en/index.html

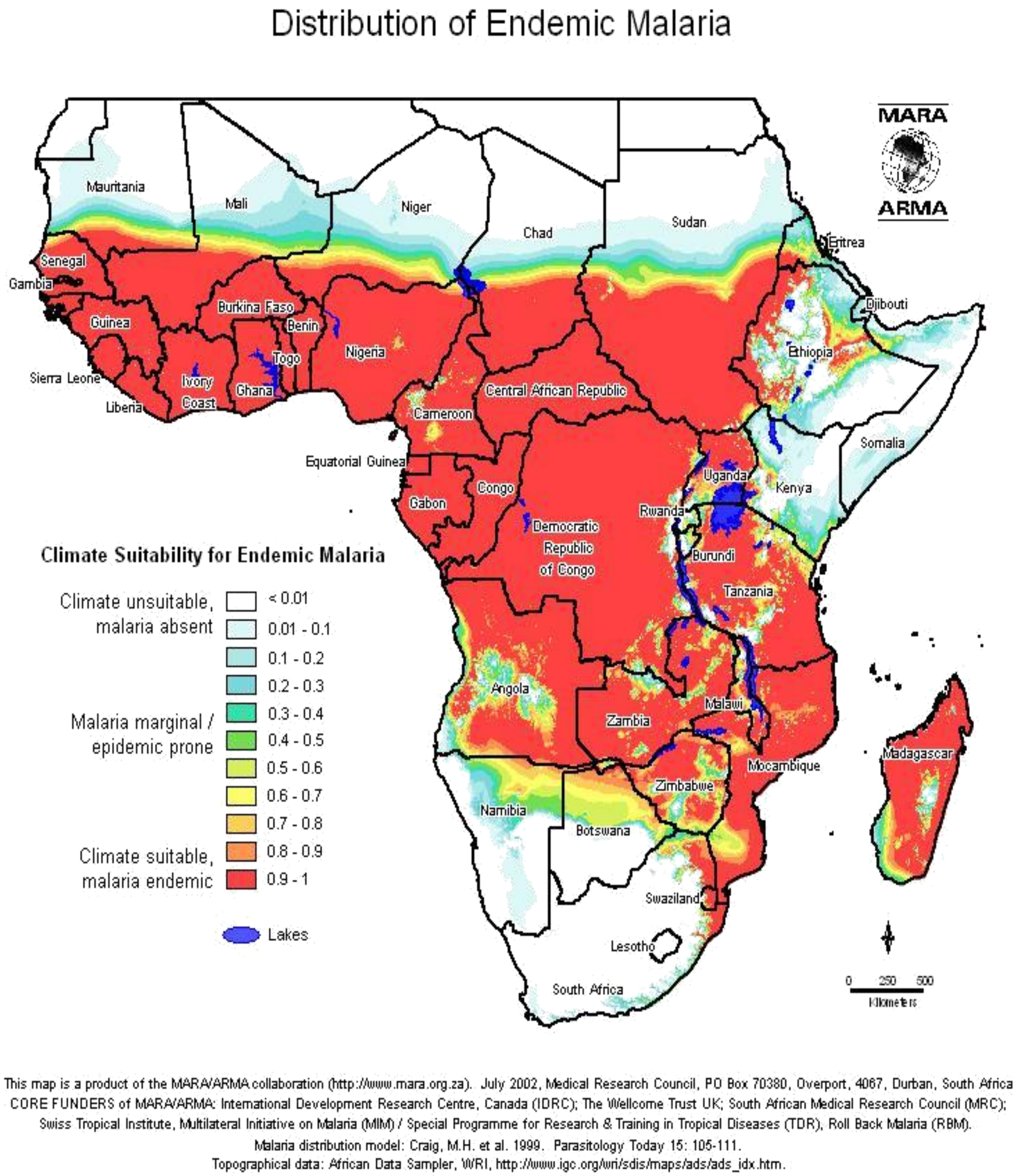

Figure 1. Malaria endemicity in Africa. Map is from the MARA/ARMA project based in South Africa (http://www.mara.org.za/).

Figure 2. Hematophagy – the evolutionary brilliance of female mosquitoes to feed on the rich nutrient source of human blood is a critical link in the chain of events leading to the scourge of malaria. No link within the complex change of events has proven to be sufficiently weak to prevent infection – besides killing the mosquito by means of potentially dangerous chemical pesticides. Image from the United States Center for Disease Control and Prevention.

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