Technical consultation on the spread of *Anopheles stephensi*

Vector Control Advisory Group Meeting
Geneva, Switzerland
11 NOVEMBER 2019

Global **Malaria** Programme

World Health Organization

Anopheles stephensi

- three ecological variants; type, intermediate and mysorensis
- ‘type’ form is an efficient urban malaria vector in India due to its anthropophilic nature and adaptation to man-made breeding sites
- ‘type’ and ‘intermediate’ forms have also emerged as efficient vectors in rural areas of India as a result of changing agricultural and water storage practices
- quickly adapt to the local environment & withstands high temperatures
- an efficient urban malaria vector for both *Plasmodium falciparum* and *P. vivax*
- until 2011, the reported distribution was confined to certain countries in South-East Asia and large parts of the Arabian Peninsula

Why hold a technical consultation?

Acta Tropica 139 (2014) 39–43

Contents lists available at ScienceDirect

Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica

First record of the Asian malaria vector *Anopheles stephensi* and its possible role in the re

Michael K. Faulde[a,b,*], Leop

[a] Central Institute of the Bundeswehr Medical S
[b] Institute of Medical Microbiology, Immunolog
[c] Walter Reed Biosystematics Unit, Entomology
[d] Department of Infectious Diseases, Epidemiol

Gayan Dharmasiri *et al. Malar J (2017) 16:326*
DOI 10.1186/s12936-017-1977-7

Malaria Journal

CASE REPORT Open Access

First record of *Anopheles stephensi* in Sri Lanka: a pote of malaria rei

A. G. Gayan Dharmasiri[1], A. Yas
Kandasamy Aravindan[2], H. T. R.

Acta Tropica 188 (2018) 180–186

Contents lists available at ScienceDirect

Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica

First detection of *Anopheles stephensi* Liston, 1901 (Diptera: culicidae) in Ethiopia using molecular and morphological approaches

Tamar E. Carter[a,b,*,1], Solomon Yared[c,1], Araya Gebresilassie[c], Victoria Bonnell[a], Lambodhar Damodaran[a], Karen Lopez[a], Mohammed Ibrahim[d], Seid Mohammed[e], Daniel Janies[a]

[a] Department of Bioinformatics and Genomics, University of North Carolina at Charlotte, 9201 University City Blvd, Charlotte, NC, 28223, USA
[b] Department of Biology, Baylor University, Waco, TX, 76798, USA
[c] Department of Biology, Jigjiga University, Jigjiga, Ethiopia
[d] College of Veterinary Medicine, Jigjiga University, Ethiopia
[e] Department of Animal and Range Science, Jigjiga University, Jigjiga, Ethiopia

Conclusions

- *An. stephensi* has been spreading over the last decades
- Djibouti, Sri Lanka and Ethiopia were only the most recently affected countries

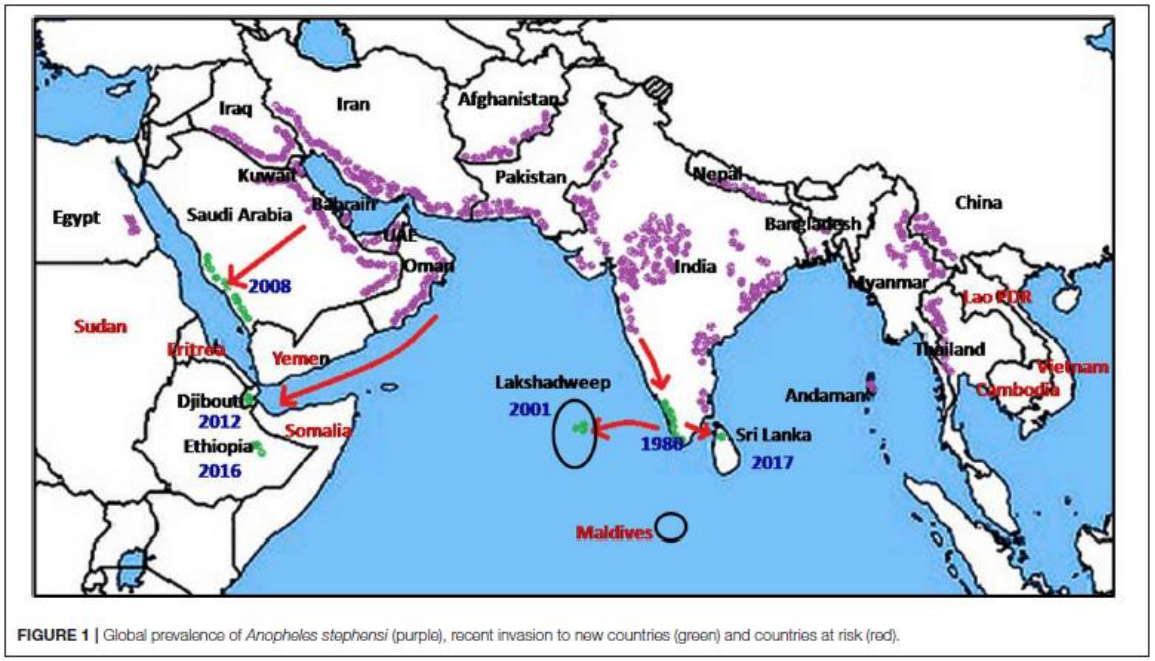


FIGURE 1 | Global prevalence of *Anopheles stephensi* (purple), recent invasion to new countries (green) and countries at risk (red).

- Sudan has since joined the list (Ayman Ahmed, per. Com.)
- Further spread must be anticipated (or has already occurred)

Figure from Surendran *et al. (*2019) Anthropogenic Factors Driving Recent Range Expansion of the Malaria Vector *Anopheles stephensi*. Front. Public Health 7:53.

Conclusions

- Evidence of actual or potential for transmission of both *P. falciparum* and *P. vivax* in Djibouti and Ethiopia
- Experiences of controlling *An. stephensi* in Africa is limited or absent. Surveillance and control approaches should thus be based on best-practices from India until context specific experience has been developed.
- *An. stephensi* mosquitoes that invaded new geographical areas generally have a genetic background that confers resistance to multiple insecticide classes, posing potential control challenges. However, no data on susceptibility to pyrroles or neonicotinoids were reviewed.
- New tools for surveillance and control need development and evaluation, including – once available – a self-limiting *An. stephensi* gene-drive construct that aims to produce non-biting male mosquitoes to suppress local wild populations
- Model-based assessments of mosquito threats need further development, incl. on key variables and how to collect/incorporate these

Recommendations to WHO

- Develop a ‘Vector Alert’ document and post it online to urge WHO Member States and their implementing partners in and around the Horn of Africa, Sudan and the surrounding geographical areas, and Sri Lanka to take immediate action

- Action in three areas:
  - Surveillance (including updates to mosquito identification keys)
  - Intervention
  - Monitoring & evaluation

- Develop data reporting sheet

- Update Malaria Threats Map to illustrate current and new reports of *An. stephensi* distribution / invasion (allowing potential expansion to report other invasive anopheline species)

What has happened since?

Global **Malaria** Programme

Vector alert: *Anopheles stephensi* invasion and spread

Horn of Africa, the Republic of the Sudan and surrounding geographical areas, and Sri Lanka

AUGUST 2019

INFORMATION NOTE

IDENTIFIED THREAT

Anopheles stephensi, a highly competent vector of *Plasmodium falciparum* and *P. vivax*, is considered an efficient vector of urban malaria. In parts of India, two biological forms of *An. stephensi* – "type" and "intermediate" – have also emerged as efficient vectors in rural areas, due to changing agricultural and water storage practices and urbanization. The third form – "mysorensis" – is considered to be a poor vector, although it has been involved in malaria transmission in certain rural areas in Afghanistan and Iran. Until 2011, the reported distribution of *An. stephensi* was confined to certain countries in South-East Asia and large parts of the Arabian Peninsula. Since then, the vector has been reported from Djibouti (2012), Ethiopia (2016), Sri Lanka (2017) and most recently from the Republic of the Sudan (2019). In the Horn of Africa, the vector seems to be spreading from its first site of detection (Djibouti) to neighbouring countries. *An. stephensi* typically breeds in containers or cisterns with clean water, and the vector appears to quickly adapt itself to the local environment (including cryptic habitats such as deep wells); it also survives extremely high temperatures during the dry season, when malaria transmission usually reaches a seasonal low. In addition, the genetic background of introduced *An. stephensi* seems to confer resistance to multiple insecticide classes, posing potential challenges to its control.

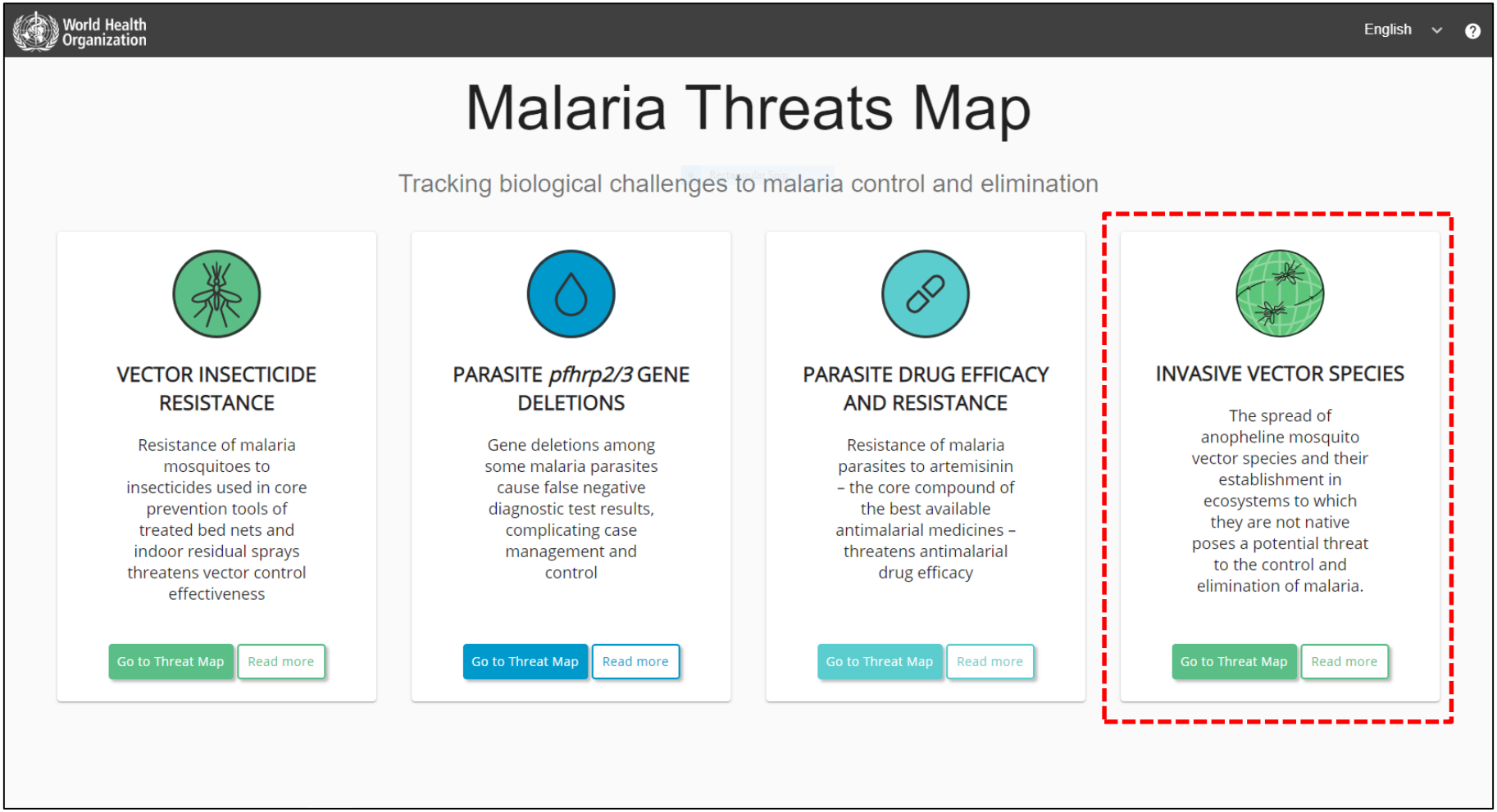
The World Health Organization (WHO) considers the spread of *An. stephensi* to be a major potential threat to malaria control and elimination in Africa and southern Asia. This vector alert has been developed to urge WHO Member States and their implementing partners – especially those in and around the Horn of Africa, the Republic of the Sudan and surrounding geographical areas, and in Sri Lanka – to take immediate action, as outlined below.

World Health Organization

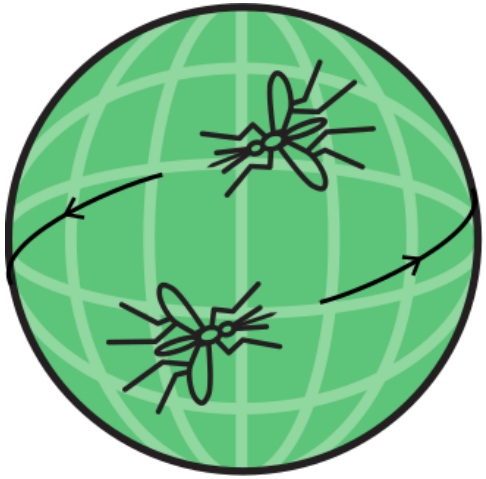
English & French versions online. Arabic undergoing layout.

Accompanied by data reporting form and new email account for data reporting

What has happened since?



Further Information



https://www.who.int/publications-detail/vector-alert-anopheles-stephensi-invasion-and-spread

https://www.who.int/fr/news-room/detail/26-08-2019-vector-alert-anopheles-stephensi-invasion-and-spread