



## Updated list of *Anopheles* species (Diptera: Culicidae) by country in the Afrotropical Region and associated islands

SETH R. IRISH<sup>1,5</sup>, DAVID KYALO<sup>2</sup>, ROBERT W. SNOW<sup>2,3</sup> & MAUREEN COETZEE<sup>4</sup>

<sup>1</sup>U.S. President's Malaria Initiative and Entomology Branch, Division of Parasitic Diseases and Malaria, Center for Global Health, Centers for Disease Control and Prevention, 1600 Clifton Road NE, Atlanta, GA 30329, USA. E-mail: [sirish@cdc.gov](mailto:sirish@cdc.gov)

<sup>2</sup>Population Health Unit, Kenya Medical Research Institute—Wellcome Trust Research Programme, P.O. Box 43640-00100, Nairobi, Kenya. E-mail: [dkyalo@kemri-wellcome.org](mailto:dkyalo@kemri-wellcome.org)

<sup>3</sup>Centre for Tropical Medicine and Global Health, Nuffield Department of Clinical Medicine, University of Oxford, Oxford, UK. E-mail: [rsnow@kemri-wellcome.org](mailto:rsnow@kemri-wellcome.org)

<sup>4</sup>Wits Research Institute for Malaria, School of Pathology, Faculty of Health Sciences, University of the Witwatersrand and Centre for Emerging Zoonotic & Parasitic Diseases, National Institute for Communicable Diseases, Johannesburg, South Africa.

E-mail: [maureen.coetzee@wits.ac.za](mailto:maureen.coetzee@wits.ac.za)

<sup>5</sup>Corresponding author. E-mail: [sirish@cdc.gov](mailto:sirish@cdc.gov)

### Abstract

The distributions of the Afrotropical *Anopheles* mosquitoes were first summarized in 1938. In 2017, an extensive geo-coded inventory was published for 48 sub-Saharan African countries, including information such as sampling methods, collection dates, geographic co-ordinates and the literature consulted to produce the database. Using the information from the 2017 inventory, earlier distribution lists, museum collections and publications since 2016, this paper presents an updated, simplified list of *Anopheles* species by mainland countries and associated Afrotropical islands, with comments where applicable. It is intended as a supplement to the 2017 geo-coded inventory.

**Key words:** Africa, *Anopheles*, mosquitoes, inventory

### Introduction

At the end of the 19th century, the *Anopheles* mosquitoes of the world became the focus of intense research after they were implicated in the transmission of malaria parasites (Ross 1910). Since then, lists of species recorded for sub-Saharan African countries were published by Evans (1938), Edwards (1941) and de Meillon (1947), with the country lists in Gillies & de Meillon (1968) being the most comprehensive at that time. A supplement to Gillies & de Meillon was subsequently published by Gillies & Coetzee (1987), which provided updated country occurrence records for some species, including newly described species. An interactive list and identification key for *Anopheles* of the Afrotropical Region was produced in 1998 (Hervy *et al.* 1998).

Although maps of dominant vector species were produced more recently (Sinka *et al.* 2010, 2012), these were limited to species involved in malaria transmission. It has taken almost 50 years for complete country lists to be updated. In 2017, Kyalo and co-workers produced a geo-coded inventory of *Anopheles* species recorded for 48 countries in sub-Saharan Africa, covering almost 120 years of work on this important group of insects (Kyalo *et al.* 2017). They also produced a freely accessible database of species by country that includes collection information, collection dates, geographic co-ordinates and reference sources that provide historic information on mosquito surveys conducted in Afrotropical countries over the years.

This present paper provides an update of the lists given in Table 3 of Kyalo *et al.* (2017), with some deletions and some additions of species to countries and notes on the rationale behind the amendments.

## Methods

The list of all the species present in each country, from Table 3 in Kyalo *et al.* (2017), was compared with the Kyalo *et al.* online database, the VectorMap lists provided by the Walter Reed Biosystematics Unit (WRBU) based in the Smithsonian Institution (<http://vectormap.si.edu>), records from Gillies & de Meillon (1968) and Gillies & Coetzee (1987) and the database of the Institut de Recherche pour le Développement (IRD) at Montpellier (<https://arim.ird.fr/#recherches/index/specimens/routage:home>). Species listed in the IRD database but not in the published literature, that are clearly way out of their normal distributions, have not been included in the country lists and require confirmation.

In addition to records from the collections of the National Institute for Communicable Diseases, Johannesburg, South Africa, noted by one of the authors (MC), a visit was made to the Natural History Museum in London, UK by another of the authors (SRI) in January 2019, and records noted during the visit are also included here.

One of the possible uses of these lists is the development of country-specific identification keys. For this reason, both malaria vectors and non-vectors have been included.

## Results

Each country list (Appendix) is followed by relevant comments regarding species additions, deletions or points of interest, and references to these are provided.

The *Anopheles* fauna of mainland Tanzania and Zanzibar are presented separately. In addition to the countries in Kyalo *et al.* (2017), *Anopheles* records for Mauritius, La Réunion and Lesotho are presented. No records were found for St. Helena, and despite an early report of *Anopheles gambiae s.l.* in the Seychelles, it appears that no *Anopheles* are present there (Robert *et al.* 2011; Le Goff *et al.* 2012).

Table 1 provides a list of all the currently recognised species by subgenus, series and authorship. An Excel file providing a single record for each species present in each country can be found at <https://doi.org/10.7910/DVN/PHGADL>.

## Discussion

The species listed per country in Gillies & de Meillon (1968) are not always accompanied by references to published records. This is because M. T. Gillies personally studied the collections in the British, French, Belgian and South African museums to record species deposited in those collections that had never been documented in the published literature. Thus, for example, the inclusion of *Anopheles cydippis* de Meillon, *An. walravensi* Edwards and *An. ziemanni* Grünberg in the Botswana list would all have been based on observations from the collections in the South African Institute for Medical Research in Johannesburg (now the National Institute for Communicable Diseases), and reference to their presence would therefore be Gillies & de Meillon (1968). Further information on the museum specimens examined by Gillies (date of collection, location, collector, etc.) would necessitate a visit to the relevant museums as these details are not provided in Gillies & de Meillon (1968).

Species name changes, border changes and splitting one species into multiple species make maintaining these lists challenging. The use of chromosomal and molecular methods is increasingly being used to understand mosquito taxonomy. The adverb “*sensu lato*”, or the abbreviation “*s.l.*”, has been used for *Anopheles gambiae* Giles and *An. funestus* Giles where genetic/molecular species identification was not carried out. In particular, the listing of *An. gambiae s.l.* denotes that no differentiation was made in the past 30 years between *An. gambiae sensu stricto* (*s.s.*) and *An. coluzzii* Coetzee & Wilkerson (previously S and M molecular forms and Savanna and Mopti chromosomal forms, respectively) (Coetzee *et al.* 2013). Subspecies names are not included in the current list, only the nominal species is given.

**TABLE 1.** *Anopheles* species of the Afrotropical Region and associated islands.

Subgenus	Species and authorship	Series
<i>Anopheles</i>	<i>caliginosus</i> de Meillon, 1943	Myzorhynchus
<i>Anopheles</i>	<i>concolor</i> Edwards, 1938	Anopheles
<i>Anopheles</i>	<i>coustani</i> Laveran, 1900	Myzorhynchus
<i>Anopheles</i>	<i>crypticus</i> Coetzee, 1995	Myzorhynchus
<i>Anopheles</i>	<i>fuscicolor</i> van Someren, 1947	Myzorhynchus
<i>Anopheles</i>	<i>namibiensis</i> Coetzee, 1984	Myzorhynchus
<i>Anopheles</i>	<i>obscurus</i> (Grünberg, 1905)	Myzorhynchus
<i>Anopheles</i>	<i>paludis</i> Theobald, 1900	Myzorhynchus
<i>Anopheles</i>	<i>symesi</i> Edwards, 1928	Myzorhynchus
<i>Anopheles</i>	<i>tenebrosus</i> Dönitz, 1902	Myzorhynchus
<i>Anopheles</i>	<i>ziemanni</i> Grünberg, 1902	Myzorhynchus
<i>Cellia</i>	<i>amharicus</i> Hunt, Wilkerson & Coetzee, 2013	Pyretophorus
<i>Cellia</i>	<i>arabiensis</i> Patton, 1905	Pyretophorus
<i>Cellia</i>	<i>ardensis</i> (Theobald, 1905)	Neomyzomyia
<i>Cellia</i>	<i>argenteolobatus</i> (Gough, 1910)	Cellia
<i>Cellia</i>	<i>aruni</i> Sobti, 1968	Myzomyia
<i>Cellia</i>	<i>austeni</i> (Theobald, 1905)	Myzomyia
<i>Cellia</i>	<i>azaniae</i> Bailly-Choumara, 1960	Myzomyia
<i>Cellia</i>	<i>azevedoi</i> Ribeiro, 1969	Paramyzomyia
<i>Cellia</i>	<i>barberellus</i> Evans, 1932	Myzomyia
<i>Cellia</i>	<i>berghei</i> Vincke & Leleup, 1949	Myzomyia
<i>Cellia</i>	<i>bervoetsi</i> D'Haenens, 1961	Myzomyia
<i>Cellia</i>	<i>brohieri</i> Edwards, 1929	Myzomyia
<i>Cellia</i>	<i>brucei</i> Service, 1960	Myzomyia
<i>Cellia</i>	<i>brumpti</i> Hamon & Rickenbach, 1955	Cellia
<i>Cellia</i>	<i>brunnipes</i> (Theobald, 1910)	Myzomyia
<i>Cellia</i>	<i>buxtoni</i> Service, 1958	Neomyzomyia
<i>Cellia</i>	<i>bwambae</i> White, 1985	Pyretophorus
<i>Cellia</i>	<i>cameroni</i> de Meillon & Evans, 1935	Neomyzomyia
<i>Cellia</i>	<i>carnevalei</i> Brunhes, Le Goff & Geoffroy, 1999	Neomyzomyia
<i>Cellia</i>	<i>caroni</i> Adam, 1961	Neomyzomyia
<i>Cellia</i>	<i>carteri</i> Evans & de Meillon, 1933	Myzomyia
<i>Cellia</i>	<i>christyi</i> (Newstead & Carter, 1911)	Pyretophorus
<i>Cellia</i>	<i>cinctus</i> (Newstead & Carter, 1910)	Neomyzomyia
<i>Cellia</i>	<i>cinereus</i> Theobald, 1901	Paramyzomyia
<i>Cellia</i>	<i>coluzzii</i> Coetzee & Wilkerson, 2013	Pyretophorus
<i>Cellia</i>	<i>comorensis</i> Brunhes, Le Goff & Geoffroy, 1997	Pyretophorus
<i>Cellia</i>	<i>confusus</i> Evans & Leeson, 1935	Myzomyia
<i>Cellia</i>	<i>crispipalpis</i> Service, 1977	Cellia
<i>Cellia</i>	<i>culicifacies</i> Giles, 1901	Myzomyia
<i>Cellia</i>	<i>cydippis</i> de Meillon, 1931	Cellia
<i>Cellia</i>	<i>dancalicus</i> Corradetti, 1939	Neocellia
<i>Cellia</i>	<i>daudi</i> Coluzzi, 1958	Pyretophorus
<i>Cellia</i>	<i>deemingi</i> Service, 1970	Neomyzomyia

.....continued on the next page

**TABLE 1. (Continued)**

Subgenus	Species and authorship	Series
<i>Cellia</i>	<i>demeilloni</i> Evans, 1933	Myzomyia
<i>Cellia</i>	<i>distinctus</i> (Newstead & Carter, 1911)	Myzomyia
<i>Cellia</i>	<i>domicolus</i> Edwards, 1916	Myzomyia
<i>Cellia</i>	<i>dthali</i> Patton, 1905	Myzomyia
<i>Cellia</i>	<i>dualaensis</i> Brunhes, Le Goff & Geoffroy, 1999	Neomyzomyia
<i>Cellia</i>	<i>dureni</i> Edwards, 1938	Neomyzomyia
<i>Cellia</i>	<i>eouzani</i> Brunhes, Le Goff & Boussès, 2003	Neomyzomyia
<i>Cellia</i>	<i>erepens</i> Gillies, 1958	Myzomyia
<i>Cellia</i>	<i>erythraeus</i> Corradetti, 1939	Myzomyia
<i>Cellia</i>	<i>ethiopicus</i> Gillies & Coetzee, 1987	Myzomyia
<i>Cellia</i>	<i>faini</i> Leleup, 1952	Neomyzomyia
<i>Cellia</i>	<i>flavicosta</i> Edwards, 1911	Myzomyia
<i>Cellia</i>	<i>fontenillei</i> Barrón, Paupy, Rahola, Akone-Ella, Ngangue, Wilson-Bahun, Pombi, Kengne, Costantini, Simard, González & Ayala, 2019	Pyretophorus
<i>Cellia</i>	<i>fontinalis</i> Gillies & de Meillon, 1968	Myzomyia
<i>Cellia</i>	<i>freetownensis</i> Evans, 1925	Myzomyia
<i>Cellia</i>	<i>funestus</i> Giles, 1900	Myzomyia
<i>Cellia</i>	<i>funestus</i> -like species (see Spillings <i>et al.</i> , 2009)	Myzomyia
<i>Cellia</i>	<i>fuscivenosus</i> Leeson, 1930	Myzomyia
<i>Cellia</i>	<i>gabonensis</i> Rahola, Makanga & Paupy, 2014	Myzomyia
<i>Cellia</i>	<i>gambiae</i> Giles, 1902	Pyretophorus
<i>Cellia</i>	<i>garnhami</i> Edwards, 1930	Myzomyia
<i>Cellia</i>	<i>gibbinsi</i> Evans, 1935	Myzomyia
<i>Cellia</i>	<i>grassei</i> Grjebine, 1953	Neomyzomyia
<i>Cellia</i>	<i>grenieri</i> Grjebine, 1964	Neomyzomyia
<i>Cellia</i>	<i>griveaudi</i> Grjebine, 1960	Neomyzomyia
<i>Cellia</i>	<i>hamoni</i> Adam, 1962	Neomyzomyia
<i>Cellia</i>	<i>hancocki</i> Edwards, 1929	Myzomyia
<i>Cellia</i>	<i>hargreavesi</i> Evans, 1927	Myzomyia
<i>Cellia</i>	<i>harperi</i> Evans, 1936	Myzomyia
<i>Cellia</i>	<i>hervyi</i> Brunhes, Le Goff & Geoffroy, 1999	Neocellia
<i>Cellia</i>	<i>hughi</i> Lambert & Coetzee, 1982	Myzomyia
<i>Cellia</i>	<i>jebudensis</i> Froud, 1944	Neomyzomyia
<i>Cellia</i>	<i>keniensis</i> Evans, 1931	Myzomyia
<i>Cellia</i>	<i>kingi</i> Christophers, 1923	Neomyzomyia
<i>Cellia</i>	<i>kosiensis</i> Coetzee, Segerman & Hunt, 1987	Myzomyia
<i>Cellia</i>	<i>lacani</i> Grjebine, 1953	Neomyzomyia
<i>Cellia</i>	<i>leesoni</i> Evans, 1931	Myzomyia
<i>Cellia</i>	<i>letabensis</i> Lambert & Coetzee, 1982	Myzomyia
<i>Cellia</i>	<i>listeri</i> de Meillon, 1931	Paramyzomyia
<i>Cellia</i>	<i>lloreti</i> Gil Collado, 1935	Myzomyia
<i>Cellia</i>	<i>longipalpis</i> (Theobald, 1903)	Myzomyia
<i>Cellia</i>	<i>lounibosi</i> Gillies & Coetzee, 1987	Neomyzomyia

.....continued on the next page

**TABLE 1. (Continued)**

Subgenus	Species and authorship	Series
<i>Cellia</i>	<i>lovettae</i> Evans, 1934	Neomyzomyia
<i>Cellia</i>	<i>machardy</i> Edwards, 1930	Neomyzomyia
<i>Cellia</i>	<i>maculipalpis</i> Giles, 1902	Neocellia
<i>Cellia</i>	<i>maliensis</i> Bailly-Choumara & Adam, 1959	Neomyzomyia
<i>Cellia</i>	<i>marshallii</i> (Theobald, 1903)	Myzomyia
<i>Cellia</i>	<i>mascarensis</i> de Meillon, 1947	Neomyzomyia
<i>Cellia</i>	<i>melas</i> (Theobald, 1903)	Pyretophorus
<i>Cellia</i>	<i>merus</i> Dönitz, 1902	Pyretophorus
<i>Cellia</i>	<i>millecampsi</i> Lips, 1960	Neomyzomyia
<i>Cellia</i>	<i>milloti</i> Grjebine & Lacan, 1953	Neomyzomyia
<i>Cellia</i>	<i>mortiauxi</i> Edwards, 1938	Myzomyia
<i>Cellia</i>	<i>moucheti</i> Evans, 1925	Myzomyia
<i>Cellia</i>	<i>mousinhoi</i> de Meillon & de Carvalho Pereira, 1940	Myzomyia
<i>Cellia</i>	<i>multicolor</i> Cambouliu, 1902	Paramyzomyia
<i>Cellia</i>	<i>multicinctus</i> Edwards, 1930	Neomyzomyia
<i>Cellia</i>	<i>murphyi</i> Gillies & de Meillon, 1968	Cellia
<i>Cellia</i>	<i>natalensis</i> (Hill & Haydon, 1907)	Neomyzomyia
<i>Cellia</i>	<i>nili</i> (Theobald, 1904)	Neomyzomyia
<i>Cellia</i>	<i>njombiensis</i> Peters, 1955	Myzomyia
<i>Cellia</i>	<i>notleyi</i> van Someren, 1949	Neomyzomyia
<i>Cellia</i>	<i>ovengensis</i> Awono-Ambene, Kengne, Simard, Antonio-Nkondjio & Fontenille, 2004	Neomyzomyia
<i>Cellia</i>	<i>parensis</i> Gillies, 1962	Myzomyia
<i>Cellia</i>	<i>pauliani</i> Grjebine, 1953	Neomyzomyia
<i>Cellia</i>	<i>pharoensis</i> Theobald, 1901	Cellia
<i>Cellia</i>	<i>pretoriensis</i> (Theobald, 1903)	Neocellia
<i>Cellia</i>	<i>quadriannulatus</i> (Theobald, 1911)	Pyretophorus
<i>Cellia</i>	<i>radama</i> de Meillon, 1943	Neomyzomyia
<i>Cellia</i>	<i>rageaui</i> Mattingly & Adam, 1954	Neomyzomyia
<i>Cellia</i>	<i>ranci</i> Grjebine, 1953	Neomyzomyia
<i>Cellia</i>	<i>rhodesiensis</i> Theobald, 1901	Neomyzomyia
<i>Cellia</i>	<i>rivulorum</i> Leeson, 1935	Myzomyia
<i>Cellia</i>	<i>rivulorum</i> -like species (see Cohuet <i>et al.</i> 2003)	Myzomyia
<i>Cellia</i>	<i>rodhaini</i> Leleup & Lips, 1950	Neomyzomyia
<i>Cellia</i>	<i>roubaudi</i> Grjebine, 1953	Neomyzomyia
<i>Cellia</i>	<i>ruarinus</i> Edwards, 1940	Neomyzomyia
<i>Cellia</i>	<i>rufipes</i> (Gough, 1910)	Neocellia
<i>Cellia</i>	<i>salbairi</i> Maffi & Coluzzi, 1958	Neocellia
<i>Cellia</i>	<i>schwetzi</i> Evans, 1934	Myzomyia
<i>Cellia</i>	<i>seretsei</i> Abdulla-Khan, Coetzee & Hunt, 1998	Paramyzomyia
<i>Cellia</i>	<i>sergentii</i> (Theobald, 1907)	Myzomyia
<i>Cellia</i>	<i>seydeli</i> Edwards, 1929	Myzomyia
<i>Cellia</i>	<i>smithii</i> Theobald, 1905	Neomyzomyia

.....continued on the next page

**TABLE 1. (Continued)**

Subgenus	Species and authorship	Series
<i>Cellia</i>	<i>somalicus</i> Rivola & Holstein, 1957	Neomyzomyia
<i>Cellia</i>	<i>squamosus</i> Theobald, 1901	Cellia
<i>Cellia</i>	<i>stephensi</i> Liston, 1901	Neocellia
<i>Cellia</i>	<i>swahilicus</i> Gillies, 1964	Cellia
<i>Cellia</i>	<i>tchekedii</i> de Meillon & Leeson, 1940	Myzomyia
<i>Cellia</i>	<i>theileri</i> Edwards, 1912	Myzomyia
<i>Cellia</i>	<i>turkhudi</i> Liston, 1901	Paramyzomyia
<i>Cellia</i>	<i>vaneedeni</i> Gillies & Coetzee, 1987	Myzomyia
<i>Cellia</i>	<i>vanhoofi</i> Wanson & Lebied, 1945	Neomyzomyia
<i>Cellia</i>	<i>vernus</i> Gillies & de Meillon, 1968	Neomyzomyia
<i>Cellia</i>	<i>vinckei</i> de Meillon, 1942	Neomyzomyia
<i>Cellia</i>	<i>walravensi</i> Edwards, 1930	Myzomyia
<i>Cellia</i>	<i>wellcomei</i> Theobald, 1904	Myzomyia
<i>Cellia</i>	<i>wilsoni</i> Evans, 1934	Neomyzomyia
<i>Christya</i> *	<i>implexus</i> (Theobald, 1903)	–
<i>Christya</i>	<i>okuensis</i> Brunhes, Le Goff & Geoffroy, 1997	–

\*Elevated to subgeneric level by Harbach & Kitching (2016).

## Acknowledgements

SRI is funded by the U.S. President’s Malaria Initiative. MC is funded by a South African National Research Foundation grant #113300. RWS is funded by a Wellcome Trust Principal Fellowship (number 103602) that provides support to DK. RWS is grateful to the UK’s Department for International Development for their support to the project “Strengthening the Use of Data for Malaria Decision Making in Africa” (DFID Programme Code 203155) and acknowledges the support of the Wellcome Trust to the Kenya Major Overseas Programme (number 203077). Erica McAlister is thanked for facilitating the visit to the Natural History Museum in London. Philippe Bousès and an anonymous reviewer are thanked for their constructive review of the manuscript. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

## References

- Abonnenc, E. (1954) Sur un anophèle cavernicole de la Guinée: *Anopheles cavernicolus* n. sp. (Diptera—Culicidae) *Bulletins et Mémoires de l’École Préparatoire de Médecine et de Pharmacie de Dakar, Parasitologie*, 2, 288–290.
- Adam, J.P. (1964) Répartition géographique des anophèles en République du Congo (Brazzaville). *Cahiers ORSTOM Série Entomologie médicale et Parasitologie*, 2, 73–82, 1 map.
- Adam, J.P. (1965) Les *Culicidae* [sic] cavernicoles du Congo et de l’Afrique intertropicale. *Annales de Spéléologie*, 20, 409–423.
- Adam, J.P. & Hamon, J. (1958) I. Présence, en Côte d’Ivoire des *Anopheles paludis* Theo 1900 et *A. obscurus* var. *nowlini* Evans 1932. II. Comparaison des terminalia des espèces éburnéennes du sous-genre *Anopheles*. *Annales de Parasitologie Humaine et Comparée*, 33, 509–512.
- Adam, J.P. & Mouchet, J. (1957) *Répartition géographique des anophèles au Cameroun Français*. IRCAM, Yaoundé, 1–10.
- Adja, A.M., N’Goran, K.E., Kengne, P., Koudou, G.B., Toure, M., Koffi, A.A., Tia, E., Fontenille, D. & Chandre, F. (2006) Transmission vectorielle du paludisme en savane arborée à Gansé Côte d’Ivoire. *Médecine Tropicale*, 66, 449–455.
- Africa Indoor Residual Spraying (AIRS) Project (2014) *Semi-annual Report: April–September 2014*. AIRS, Abt Associates Inc, Bethesda, Maryland, 38 pp.
- Animut, A., Gebre-Michael, T., Balkew, M. & Lindtjørn, B. (2012) Abundance and dynamics of anopheline larvae in a highland malarious area of south-central Ethiopia. *Parasites & Vectors*, 5, 117. <https://doi.org/10.1186/1756-3305-5-117>



- Antonio-Nkondjio, C., Ndo, C., Kengne, P., Mukwaya, L., Awono-Ambene, P., Fontenille, D. & Simard, F. (2008) Population structure of the malaria vector *Anopheles moucheti* in the equatorial forest region of Africa. *Malaria Journal*, 7, 120. <https://doi.org/10.1186/1475-2875-7-120>
- Asma, M.H. (2012) *Investigation of mosquitoes of Anopheles gambiae species complex (Diptera: Culicidae) using integrated cytological, molecular and morphological techniques*. PhD thesis, Faculty of Science, University of Khartoum, Khartoum, 247 pp.
- Awono-Ambene, H.P., Kengne, P., Simard, F., Antonio-Nkondjio, C., Fontenille, D. (2004) Description and bionomics of *Anopheles (Cellia) ovengensis* (Diptera: Culicidae), a new malaria vector species of the *Anopheles nili* group from south Cameroon. *Journal of Medical Entomology*, 41, 561–568. <https://doi.org/10.1603/0022-2585-41.4.561>
- Ayanda, O.I. (2009) Relative abundance of adult female anopheline mosquitoes in Ugah, Nasarawa State, Nigeria. *Journal of Parasitology & Vector Biology*, 1, 5–8.
- Barrón, M.G., Paupy, C., Rahola, N., Akone-Ella, O., Ngangue, M.F., Wilson-Bahun, T.A., Pombi, M., Kengne P., Costantini, C., Simard, F., González, J., Ayala, D. (2019) A new species in the major malaria vector complex sheds light on reticulated species evolution. *Scientific Reports*, 9, 14753. <https://doi.org/10.1038/s41598-019-49065-5>
- Bødker, R., Akida, J., Shayo, D., Kisinza, W., Msangeni, H.A., Pedersen, E.M. & Lindsay, S.W. (2003) Relationship between altitude and intensity of malaria transmission in the Usambara Mountains, Tanzania. *Journal of Medical Entomology*, 40, 706–717. <https://doi.org/10.1603/0022-2585-40.5.706>
- Brady, J. (1965) The occurrence of *Anopheles smithii* var. *rageaui* Mattingly and Adam in Ghana, with a note on its possible implication as a vector of non-human malaria. *Annals of Tropical Medicine and Parasitology*, 59, 99–105. <https://doi.org/10.1080/00034983.1965.11686288>
- Brunhes, J. (1977) Les moustiques de l'archipel des Comores: I. Inventaire, répartition et description de quatre espèces ou sous-espèces nouvelles. *Cahiers ORSTOM Série Entomologie médicale et Parasitologie*, 15, 131–152.
- Brunhes, J., Le Goff, G. & Boussès, P. (2003) Anophèles afrotropicaux.—V. Description du mâle et des stades pré-imaginaux d'*An. deemingi* Service, 1970 et description d'*An. eouzani* n. sp. (Diptera: Culicidae). *Annales de al Société Entomologique de France*, 39, 179–185. <https://doi.org/10.1080/00379271.2003.10697372>
- Brunhes, J., Le Goff, G. & Geoffroy, B. (1997) Anophèles Afro-tropicaux. I.—Descriptions d'espèces nouvelles et changements de statuts taxonomiques (Diptera: Culicidae). *Annales de al Société Entomologique de France*, 33, 173–183.
- Brunhes, J., Le Goff, G. & Geoffroy, B. (1999) Afro-tropical anopheline mosquitoes. III. Description of three new species: *Anopheles carnevalei* sp. nov., *An. hervyi* sp. nov., and *An. dualaensis* sp. nov., and resurrection of *An. rageaui* Mattingly and Adam. *Journal of the American Mosquito Control Association*, 15, 552–558.
- Brunhes, J., Le Goff, G., Manga, L. & Geoffroy, B. (1998) Anophèles afrotropicaux.—IV. Mise au point sur le complexe *Anopheles moucheti*, réhabilitation d'*An. multicoloratus* et d'*An. garnhami basilewskyi* (Diptera: Culicidae). *Annales des Société Entomologie de France*, 34, 397–405.
- Bryan, J.H. & Gebert, F. (1976) Identifications of members of the *Anopheles gambiae* complex from Mauritius. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 70, 339. [https://doi.org/10.1016/0035-9203\(76\)90094-8](https://doi.org/10.1016/0035-9203(76)90094-8)
- Buck, A.A., Andersen, R.I., Sasaki, T.T., Kawata, K. & Hitchcock, J.C. (1968) *Diseases and infections in the Republic of Chad: a study of the ecology of disease*. Geographic Epidemiology Unit, Johns Hopkins University, Baltimore, Maryland, 425 pp.
- Cambournac, F.J.C., Petrarca, V. & Coluzzi, M. (1982) *Anopheles arabiensis* in the Cape Verde Archipelago. *Parassitologia*, 24, 265–267.
- Carter, T.E., Yared, S., Gebresilassie, A., Bonnell, V., Damodaran, L., Lopez, K., Ibrahim, M., Mohammed, S. & Janies, D. (2018) First detection of *Anopheles stephensi* Liston, 1901 (Diptera: culicidae [sic]) in Ethiopia using molecular and morphological approaches. *Acta Tropica*, 188, 180–186. <https://doi.org/10.1016/j.actatropica.2018.09.001>
- Carteron, B., Morvan, D. & Rodhain, F. (1978) Le problème de l'endémie palustre dans la République de Djibouti. *Médecine Tropicale*, 38, 299–304.
- Chauvet, G. (1962) Variabilité géographique chez les femelles d'*Anopheles mascarensis* de Meillon, 1947. Absence d'*A. marshalli* Theobald, 1929 à Madagascar. *Bulletin de la Société de Pathologie exotique*, 55, 1145–1156.
- Chayabajara, S., Sobti, S.K., Payne, D. & Braga, F. (1975) *Malaria situation in Botswana. Report on a visit. December 1973–October 1974. WHO Report AFR/MAL/144*. WHO, Brazzaville, 28 pp.
- Chinery, W.A. (1995) Impact of rapid urbanization on mosquitoes and their disease transmission potential in Accra and Tema, Ghana. *African Journal of Medicine and Medical Sciences*, 24, 179–188.
- Choumara, R., Hamon, J., Ricosse, J., Bailly, H. & Adam, D. (1959) Le paludisme dans la zone pilote antipaludique de Bobo Dioulasso (Haute Volta, AOF). *Cahiers de l'O.R.S.T.O.M.*, No. 1, 1–125.
- Coetzee, M., Hunt, R.H., Wilkerson, R., della Torre, A., Coulibaly, M.B. & Besansky, N.J. (2013) *Anopheles coluzzii* and *Anopheles amharicus*, new members of the *Anopheles gambiae* complex. *Zootaxa*, 3619 (3), 246–274.

<https://doi.org/10.11646/zootaxa.3619.3.2>

- Coetzee, M., Segerman, J. & Hunt, R.H. (1987) Description of a new species *Anopheles (Cellia) kosiensis* (Diptera: Culicidae) from Zululand, South Africa. *Systematic Entomology*, 12, 23–28.  
<https://doi.org/10.1111/j.1365-3113.1987.tb00543.x>
- Cohuet, A., Simard, F., Toto, J.C., Kengne, P., Coetzee, M. & Fontenille, D. (2003) Species identification within the *Anopheles funestus* group of malaria vectors in Cameroon and evidence for a new species. *American Journal of Tropical Medicine and Hygiene*, 69, 200–205.  
<https://doi.org/10.4269/ajtmh.2003.69.200>
- Coluzzi, M. (1958) Descrizione di una nuova specie rinvenuta in Somalia. *Rivista di Malariologia*, 37, 69–71.
- Cooke, M.K., Kahindi, S.C., Oriango, R.M., Owaga, C., Ayoma, E., Mabuka, D., Nyangau, D., Abel, L., Atieno, E., Awuor, S., Drakeley, C., Cox, J. & Stevenson, J. (2015) 'A bite before bed': exposure to malaria vectors outside the times of net use in the highlands of western Kenya. *Malaria Journal*, 14, 259.  
<https://doi.org/10.1186/s12936-015-0766-4>
- Cornel, A.J., Lee, Y., Almeida, A.P.G., Johnson, T., Mouatcho, J., Venter, M., de Jager, C. & Braack, L. (2018) Mosquito community composition in South Africa and some neighboring countries. *Parasites & Vectors*, 11, 331.  
<https://doi.org/10.1186/s13071-018-2824-6>
- Dahl, C. & White, G. B. (1978) Culicidae. In: Illies, J. (Ed.), *Limnofauna Europaea. A checklist of the animals inhabiting European inland waters, with accounts of their distribution and ecology (except protozoa). 2<sup>nd</sup> Edition*. Gustav Fischer Verlag, Stuttgart and New York, pp. 390–395.
- Davidson, G. (1966) *Distribution records of member species of the Anopheles gambiae complex (identifications up to May 1966)*. WHO/Mal/66.570. World Health Organization, Geneva, 16 pp., 2 Appendices.  
<https://doi.org/10.1080/04345546709415218>
- Das, S., Muleba, M., Stevenson, J.C. & Norris, D.E. (2016) Habitat partitioning of malaria vectors in Nchelenge District, Zambia. *American Journal of Tropical Medicine and Hygiene*, 94, 1234–1244.  
<https://doi.org/10.4269/ajtmh.15-0735>
- de Almeida Franco, L.T., Roche, S.M., Ariaratnam, V., Joia, H.S. & Chinien, V. (1984) *Malaria situation in Swaziland. Report on a evaluation mission. WHO Consultant Team. November-December 1984*. World Health Organization, Geneva, 112 pp.
- de Barros Machado, A., da Cunha Ramos, H. & Ribeiro, H. (1981) Research on the mosquitoes of Angola (*Insecta, Diptera, Culicidae* [sic]): XI—twenty-one new records from Lunda and Moxico. *Boletim da Sociedade Portuguesa de Entomologia*, 11, 1–16.
- della Torre, A., Fanello, C., Akogbeto, M., Dossou-yovo, J., Favia, G., Petrarca, V. & Coluzzi, M. (2001) Molecular evidence of incipient speciation within *Anopheles gambiae* s.s. in West Africa. *Insect Molecular Biology*, 10, 9–18.  
<https://doi.org/10.1046/j.1365-2583.2001.00235.x>
- de Meillon, B. (1947) *The Anophelini of the Ethiopian geographical region. Publications of the South African Institute for Medical Research*, 10 (49), 1–272.
- de Meillon, B. (1951) Malaria survey of South-West Africa. *Bulletin of the World Health Organization*, 4, 333–417.
- de Meillon, B. & de Carvalho Pereira, M. (1940) Notes on some anophelines (Dipt. Culicidae) from Portuguese East Africa. *Moçambique Documentário Trimestral*, 23, 69–83, 1 photo, 7 pls, 1 map.
- de Meillon, B. & van Eeden, G. (1976) *Anopheles (Cellia) deaconi* n. sp., from South Africa (Diptera: Culicidae). *Mosquito Systematics*, 8, 335–342.
- Diallo, M., Amran, J., Ali, S.D., Yasin, A.H. & Mio, J.D. (2014) *Study of Malaria vectors behaviour in Somalia. February–31 March 2014*. WHO-EMRO, Cairo, 40 pp.
- Diallo, M., Nabeth, P., Ba, K., Sall, A.A., Ba, Y., Mondo, M., Girault, L., Abdalahi, M.O. & Mathiot, C. (2005) Mosquito vectors of the 1998–1999 outbreak of Rift Valley Fever and other arboviruses (Bagaza, Sanar, Wesselsbron and West Nile) in Mauritania and Senegal. *Medical and Veterinary Entomology*, 19, 119–126.  
<https://doi.org/10.1111/j.0269-283X.2005.00564.x>
- Doucet, J., Adam, J.-P. & Binson, G. (1960) Les *Culicidae* [sic] de la Cote [sic] d'Ivoire. *Annales de Parasitologie Humaine et Comparée*, 35, 391–408.  
<https://doi.org/10.1051/parasite/1960353391>
- Dowling, M.A.C. (1953) Control of malaria in Mauritius. Eradication of *Anopheles funestus* and *Aedes aegypti*. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 47, 177–198.  
[https://doi.org/10.1016/0035-9203\(53\)90002-9](https://doi.org/10.1016/0035-9203(53)90002-9)
- Edwards, F.W. (1941) *Mosquitoes of the Ethiopian Region. III.—Culicine adults and pupae*. British Museum (Natural History), London, viii + 499 pp.
- Elissa, N., Karch, S., Bureau, Ph., Ollomo, B., Lawoko, M., Yangari, P., Ebang, B. & Georges, A.J. (1999) Malaria transmission in a region of savanna–forest mosaic, Haut-Ogooué, Gabon. *Journal of the American Mosquito Control Association*, 15, 15–23.
- Evans, A.M. (1931) Observations made by Dr. M. A. Barber on a melanic, coastal race of *Anopheles costalis* Giles (*gambiae*) in Southern Nigeria. *Annals of Tropical Medicine and Parasitology*, 25, 443–453.  
<https://doi.org/10.1080/00034983.1931.11684694>



- Evans, A.M. (1938) *Mosquitoes of the Ethiopian Region. II.—Anophelini adults and early stages*. British Museum (Natural History), London, x + 404 pp.
- Faulde, M.K., Rueda, L.M. & Khairah, B.A. (2014) First record of the Asian malaria vector *Anopheles stephensi* and its possible role in the resurgence of malaria in Djibouti, Horn of Africa. *Acta Tropica*, 139, 39–43.  
<https://doi.org/10.1016/j.actatropica.2014.06.016>
- Ferreira, F.S., Pinto, A.R. & de Almeida, C.L. (1948) Alguns dados sobre a biologia do *Anopheles gambiae* da cidade de Bissau e arredores (Guiné Portuguesa), em relação com transmissão da malária e filariase linfática. *Anais do Instituto de Medicina Tropical*, 5, 223–250.
- Fornadel, C. & Norris, L. (2015) *PMI insecticide susceptibility summaries. President's Malaria Initiative Country Insecticide Susceptibility Summaries*. United States Agency for International Development (USAID), Washington, D.C., 60 pp.
- Gandara, A.F. (1956) Subsidio para o estudo dos 'Culicidae' (Diptera) de Angola. *Anais do Instituto de Medicina Tropical*, 13, 387–418.
- Gelfand, H.M. (1954) The Anopheline mosquitoes of Liberia. *West African Medical Journal*, 3 (2), 80–88.
- Geoffroy, B. (1982) *Culicidés et arbovirus de Centrafrique. Etude bioécologique des moustiques adultes des stations de la Gomoka et de Bozo, et de leur rôle dans l'épidémiologie des arbovirus*. PhD thesis, Université de Paris Sud Centre d'Orsay, O.R.S.T.O.M, Paris, 326 pp.
- Giaquinto-Mira, M. (1950) Notes on the geographical distribution and biology of "Anophelinae,, and "Culicinae,, in Ethiopia. *Rivista di Malariologia*, 29, 281–313.
- Gibbins, E.G. (1936) On a melanic inland race of *Anopheles costalis* Giles (*gambiae*) in Uganda. *Annals of Tropical Medicine and Parasitology*, 30, 275–282.  
<https://doi.org/10.1080/00034983.1936.11684934>
- Gillies, M.T. (1958) Notes on the biology of a new subspecies of *Anopheles wellcomei* (Diptera: Culicidae) from East Africa, and on the distribution of related forms. *Proceedings of the Royal Entomological Society of London. Series A, General Entomology*, 33, 9–14.  
<https://doi.org/10.1111/j.1365-3032.1958.tb00386.x>
- Gillies, M.T. & Coetzee, M. (1987) A Supplement to the Anophelinae of Africa South of the Sahara (Afrotropical Region). *Publications of the South African Institute for Medical Research*, 55, 1–143.
- Gillies, M.T. & de Meillon, B. (1968) The Anophelinae of Africa south of the Sahara (Ethiopian Zoogeographical Region). *Publications of the South African Institute for Medical Research*, 54, 1–343.
- Gnanguenon, V., Govoetchan, R., Agossa, F.R., Ossè, R., Oke-Agbo, F., Azondekon, R., Sovi, A., Attolou, R., Badirou, K., Tokponnon, F.T., Padonou, G.G. & Akogbeto, M.C. (2014) Transmission patterns of *Plasmodium falciparum* by *Anopheles gambiae* in Benin. *Malaria Journal*, 13, 444.  
<https://doi.org/10.1186/1475-2875-13-444>
- Gopaul, R. (1995) Surveillance entomologique à Maurice. *Santé*, 5, 401–405.
- Grjebine, A. (1966) *Faune de Madagascar XXII. Insectes Dipteres Culicidae Anophelinae*. Centre National de la Recherche Scientifique, Office de la Recherche Scientifique et Technique Outre-Mer, Paris, 487 pp.
- Hamon, J. & Rickenbach, A. (1955) Contribution a l'étude des culicidés d'Afrique occidentale. Description d'*Anopheles brumpti* sp. n. *Bulletin de la Société de Pathologie exotique*, 48, 342–344.
- Hamon, J., Adam, J.P. & Grjebine, A. (1956) Observations sur la répartition et le comportement des anophèles de l'Afrique-Équatoriale française, du Cameroun et de l'Afrique Occidentale. *Bulletin of the World Health Organization*, 15, 549–591.
- Hamon, J., Coz, J., Adam, J.P., Holstein, M., Rickenbach, A., Brengues, J., Subra, R., Sales, S. & Eyraud, M. (1966) Contribution a l'étude de la répartition des anophèles en Afrique occidentale. *Cahiers ORSTOM Série Entomologie Médicale et Parasitologie*, 4, 13–70.
- Hamon, J., Dedewanou, B. & Eyraud, M. (1962) Études entomologiques sur la transmission du paludisme humain dans une zone forestière africaine, la région de Man, République de Côte d'Ivoire. *Bulletin de l'Institut français d'Afrique noire, Série A, Sciences naturelles*, 24, 854–879.
- Hamon, J., Eyraud, M., Diallo, B., Dyemkouma, A., Bailly-Choumara, H. & Ouanou, S. (1961) Les moustiques de la République du Mali [Dipt. Culicidae]. *Annales de la Société Entomologique de France*, 130, 95–129.
- Harbach, R.E. & Kitching, I.J. (2016) The phylogeny of Anophelinae revisited: inferences about the origin and classifications of *Anopheles* (Diptera: Culicidae). *Zoologica Scripta*, 45, 34–47.  
<https://doi.org/10.1111/zsc.12137>
- Hervy, J.-P., Le Goff, G., Geoffroy, B., Hervé, J.-P., Manga, L. & Brunhes, J. (1998) *Les anophèles de la région afro-tropicale*. ORSTOM, Montpellier. [CD-ROM]
- Hunt, R.H. & Coetzee, M. (1992) Ovarian polytene chromosome map, notes on the status, morphology, biology and a new distribution record of *Anopheles (Cellia) mousinhoi* (Diptera: Culicidae). *Systematic Entomology*, 17, 59–64.  
<https://doi.org/10.1111/j.1365-3113.1992.tb00321.x>
- Jannone, G., Mara, L. & Ferro-Luzzi, G. (1946) Risultati di una spedizione tecnico-scientifica nella Dancalia settentrionale esterna; studio agrario, entomologico, malariologico e di fisiologia alimentare. *Bollettino della Società Italiana di Medicina e Igiene Tropicale, Sezione Eritrea*, 2, 110–126.
- Julvez, J., Mouchet, J., Suzzoni, J., Larrouy, G., Fouta, A. & Fontenille, D. (1998) Les anophèles du Niger. *Bulletin de la Société de Pathologie exotique*, 91, 321–326.

- Khromov, A. (1969) *Programme de pre-éradication du paludisme. Organisation Mondiale de la Sante, AFR/MAL/99, 10 Janvier 1969, Mauritanie* 9. World Health Organization Archives, Geneva, 59 pp.
- Kobylinski, K. (2011) *Ivermectin mass drug administration to humans for malaria parasite transmission control*. PhD thesis, Colorado State University, Fort Collins, Colorado, 216 pp.
- Koekemoer, L.L., Lochouart, L., Hunt, R.H. & Coetzee, M. (1999) Single-strand conformation polymorphism analysis for identification of four members of the *Anopheles funestus* (Diptera: Culicidae) group. *Journal of Medical Entomology*, 36, 125–130.  
<https://doi.org/10.1093/jmedent/36.2.125>
- Kyalo, D., Amratia, P., Mundia, C.W., Mbogo, C.M., Coetzee, M. & Snow, R.W. (2017) A geo-coded inventory of anophelines in the Afrotropical Region south of the Sahara: 1898–2016. *Wellcome Open Research*, 2, 57.  
<https://doi.org/10.12688/wellcomeopenres.12187.1>
- Labbo, R., Czeher, C., Djibrila, A., Arzika, I., Jeanne, I. & Duchemin, J.B. (2010) *Anopheles herveyi* in Niger: no evidence for a role in *Plasmodium falciparum* transmission. *Medical and Veterinary Entomology*, 24, 62–65.  
<https://doi.org/10.1111/j.1365-2915.2009.00824.x>
- Lacan, A. (1958) Les *Anophèles* de l’Afrique Equatoriale Française et leur répartition. *Annales de Parasitologie Humaine et Comparée*, 33, 150–170.
- Le Goff, G., Boussès, P., Julienne, S., Brengues, C., Rahola, N., Rocamora, G. & Robert, V. (2012) The mosquitoes (Diptera: Culicidae) of Seychelles: taxonomy, ecology, vectorial importance, and identification keys. *Parasites & Vectors*, 5, 207.  
<https://doi.org/10.1186/1756-3305-5-207>
- Lewis, D.J. (1944) Observations on *Anopheles gambiae* and other mosquitoes at Wadi Halfa. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 38, 215–229.  
[https://doi.org/10.1016/S0035-9203\(44\)80005-0](https://doi.org/10.1016/S0035-9203(44)80005-0)
- Lewis, D.J. (1956) The anopheline mosquitos [sic] of the Sudan. *Bulletin of Entomological Research*, 47, 475–494.  
<https://doi.org/10.1017/S0007485300046800>
- MacGregor, M.E. (1924) *Report on the Anophelinae of Mauritius, and on certain aspects of malaria in the Colony, with recommendations for a new anti-malaria campaign*. Waterlow, London, 48 pp.
- Marshall, J.C., Pinto, J., Charlwood, J.D., Gentile, G., Santolamazza, F., Simard, F., della Torre, A., Donnelly, M.J. & Caccone, A. (2008) Exploring the origin and degree of genetic isolation of *Anopheles gambiae* from the islands of São Tomé and Príncipe, potential sites for testing transgenic-based vector control. *Evolutionary Applications*, 1, 631–644.  
<https://doi.org/10.1111/j.1752-4571.2008.00048.x>
- Masendu, H.T., Hunt, R.H., Govere, J., Brooke, B.D., Awolola, T.S. & Coetzee, M. (2004) The sympatric occurrence of two molecular forms of the malaria vector *Anopheles gambiae* Giles *sensu stricto* in Kanyemba, in the Zambezi Valley, Zimbabwe. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 98, 393–396.  
<https://doi.org/10.1016/j.trstmh.2003.10.006>
- Massebo, F. & Lindtjorn, B. (2013) The effect of screening doors and windows on indoor density of *Anopheles arabiensis* in south-west Ethiopia: a randomized trial. *Malaria Journal*, 12, 319.  
<https://doi.org/10.1186/1475-2875-12-319>
- McCullough, F. & Friis-Hansen, B. (1961) A parasitological survey in Luapula Province, northern Rhodesia. *Bulletin of the World Health Organization*, 24, 213–219.
- Miles, S.J. (1978) Enzyme variation in the *Anopheles gambiae* Giles group of species (Diptera: Culicidae). *Bulletin of Entomological Research*, 68, 85–96.  
<https://doi.org/10.1017/S0007485300007173>
- Mnzava, A.E.P. & Kilama, W.L. (1986) Observations on the distribution of the *Anopheles gambiae* complex in Tanzania. *Acta Tropica*, 43, 277–282.
- Mouatcho, J., Cornel, A.J., Dahan-Moss, Y., Koekemoer, L.L., Coetzee, M. & Braack, L. (2018) Detection of *Anopheles rivulorum*-like, a member of the *Anopheles funestus* group, in South Africa. *Malaria Journal*, 17, 195.  
<https://doi.org/10.1186/s12936-018-2353-y>
- Mouchet, J., Gariou, J. & Hamon, J. (1960) Note faunistique sur les moustiques des montagnes de l’Ouest-Cameroun, présence de neuf formes de *Culicidae* [sic] nouvelles pour le Cameroun. *Bulletin de l’Institut français d’Afrique noire, Série A, Sciences naturelles*, 22, 207–216.
- Mutebi, J.-P., Crabtree, M.B., Kading, R.C., Powers, A.M., Ledermann, J.P., Mossel, E.C., Zeidner, N., Lutwama, J.J. & Miller, B.R. (2018) Mosquitoes of northwestern Uganda. *Journal of Medical Entomology*, 55, 587–599.  
<https://doi.org/10.1093/jme/tjx220>
- Mzilahowa, T., Ball, A.J., Bass, C., Morgan, J.C., Nyoni, B., Steen, K., Donnelly, M.J. & Wilding, C.S. (2008) Reduced susceptibility to DDT in field populations of *Anopheles quadriannulatus* and *Anopheles arabiensis* in Malawi: evidence for larval selection. *Medical and Veterinary Entomology*, 22, 258–263.  
<https://doi.org/10.1111/j.1365-2915.2008.00736.x>
- Ntomwa, B.N., Usuku, P., Govere, J.N., Manga, L., Koekemoer, L.L., Hunt, R.H. & Coetzee, M. (2006) Distribution of members of the *Anopheles gambiae* Giles *s.l.* complex in Namibia and susceptibility to insecticides used for malaria control. *African Entomology*, 14, 404–406.
- Nyanjom, S.R.G., Chen, H., Gebre-Michael, T., Bekele, E., Shililu, J., Githure, J., Beier, J.C. & Yan, G. (2003) Population ge-

- netic structure of *Anopheles arabiensis* mosquitoes in Ethiopia and Eritrea. *Journal of Heredity*, 94, 457–463.  
<https://doi.org/10.1093/jhered/esg100>
- O'Connor, C.T. (1967) The distribution of anopheline mosquitoes in Ethiopia. *Mosquito News*, 27, 42–54.
- Pappa, V., Reddy, M., Overgaard, H.J., Abaga, S. & Caccone, A. (2011) Estimation of the human blood index in malaria mosquito vectors in Equatorial Guinea after indoor antivevector interventions. *American Journal of Tropical Medicine and Hygiene*, 84, 298–301.  
<https://doi.org/10.4269/ajtmh.2011.10-0463>
- Paupy, C., Makanga, B., Ollomo, B., Rahola, N., Durand, P., Magnus, J., Willaume, E., Renaud, F., Fontenille, D. & Prugnolle, F. (2013) *Anopheles moucheti* and *Anopheles vinckei* are candidate vectors of ape *Plasmodium* parasites, including *Plasmodium praefalciparum* in Gabon. *PLoS ONE*, 8, e57294.  
<https://doi.org/10.1371/journal.pone.0057294>
- Peters, W. (1953) Records of mosquitoes Dipt. Culicidae in the southern highlands of Tanganyika. II. *Entomologist's Monthly Magazine*, 89, 65–67.
- Petrarca, V., Nugud, A.D., Ahmed, M.A.E., Haridi, A.M., Di Deco, M.A. & Coluzzi, M. (2000) Cytogenetics of the *Anopheles gambiae* complex in Sudan, with special reference to *An. arabiensis*: relationships with East and West African populations. *Medical and Veterinary Entomology*, 14, 149–164.  
<https://doi.org/10.1046/j.1365-2915.2000.00231.x>
- Raffaele, G. (1942) *Ispezione eseguita ai centri di studi del l'istituto di malariologica E. Marchifava in Africa Orientale Italiana*. Istituto di Malariologia "E. Marchiafava", Rome, 55–76.
- Rahm, U. & Vermeylen, M. (1966) Répertoire et répartition des Anophèles de la République Démocratique du Congo. *Estratto dalla Rivista di Malariologia*, 45, 1–3.
- Reid, E.T. & Woods, R.W. (1957) Anopheline mosquitoes of southern Rhodesia: a general survey. *Proceedings and Transactions of the Rhodesia Scientific Association*, 45, 47–72.
- Ribeiro, H., da Cunha Ramos, H., Pires, C.A. & Capela, R.A. (1979) Description and biometric study of *Anopheles (Cellia) quadriannulatus davidsoni* ssp.n., a seventh member of the *Anopheles gambiae* Giles complex (Diptera Culicidae) [sic] endemic to the Cape Verde archipelago. *Garcia de Orta, Série de Zoologia*, 8, 75–88.
- Rickenbach, A. (1969) Quelques données nouvelles sur les *Culicidae* [Diptera, Nematocera] [sic] de la République centrafricaine. *Bulletin de l'Institut français d'Afrique noire. Série A, Sciences naturelles*, 31, 614–628.
- Ridl, F.C., Bass, C., Torrez, M., Govender, D., Ramdeen, V., Yellot, L., Edu, A.E., Schwabe, C., Mohloai, P., Maharaj, R. & Kleinschmidt, I. (2008) A pre-intervention study of malaria vector abundance in Rio Muni, Equatorial Guinea: Their role in malaria transmission and the incidence of insecticide resistance alleles. *Malaria Journal*, 7, 194.  
<https://doi.org/10.1186/1475-2875-7-194>
- Rioux, J.-A. (1961 [for 1960]) Contribution a l'étude des culicides (Diptera-Culicidae) [sic] du Nord-Tchad. In: Rioux, J.A. (Ed.), *Mission Épidémiologique au Nord-Tchad*. Arts et Métiers Graphiques, Paris, pp. 53–92, foldout map.
- Robert, V. (1989) *La transmission du paludisme humain: la zone des savanes d'Afrique de l'Ouest*. PhD thesis, Université Paris, Paris, 325 pp.
- Robert, V., Rocamora, G., Julienne, S. & Goodman, S.M. (2011) Why are anopheline mosquitoes not present in the Seychelles? *Malaria Journal*, 10, 31.  
<https://doi.org/10.1186/1475-2875-10-31>
- Ross, R. (1910) *The prevention of malaria*. John Murray, London, 669 pp.
- Salgueiro, P., Moreno, M., Simard, F., O'Brochta, D. & Pinto, J. (2013) New insights into the population structure of *Anopheles gambiae* s.s. in the Gulf of Guinea Islands revealed by *Herves* transposable elements. *PLoS ONE*, 8, e62964.  
<https://doi.org/10.1371/journal.pone.0062964>
- Seyfarth, M., Khaireh, B.A., Abdi, A.A., Bouh, S.M. & Faulde, M.K. (2019) Five years following first detection of *Anopheles stephensi* (Diptera: Culicidae) in Djibouti, Horn of Africa: populations established—malaria emerging. *Parasitology Research*, 118, 725–732.  
<https://doi.org/10.1007/s00436-019-06213-0>
- Shililu, J., Ghebremeskel, T., Mengistu, S., Fekadu, H., Zerom, M., Mbogo, C., Githure, J., Gu, W., Novak, R. & Beier, J.C. (2003) Distribution of anopheline mosquitoes in Eritrea. *American Journal of Tropical Medicine and Hygiene*, 69, 295–302.  
<https://doi.org/10.4269/ajtmh.2003.69.295>
- Sinka, M.E., Bangs, M.J., Manguin, S., Coetzee, M., Mbogo, C.M., Hemingway, J., Patil, A.P., Temperley, W.H., Gething, P.W., Kabaria, C.W., Okara, R.M., Van Boeckel, T., Godfray, H.C.J., Harbach, R.E. & Hay, S.I. (2010) The dominant *Anopheles* vectors of human malaria in Africa, Europe and the Middle East: occurrence data, distribution maps and bionomic précis. *Parasites & Vectors*, 3, 117.  
<https://doi.org/10.1186/1756-3305-3-117>
- Sinka, M.E., Bangs, M.J., Manguin, S., Rubio-Palis, Y., Chareonviriyaphap, T., Coetzee, M., Mbogo, C.M., Hemingway, J., Patil, A.P., Temperley, W.H., Gething, P.W., Kabaria, C.W., Burkot, T.R., Harbach, R.E. & Hay, S.I. (2012) A global map of dominant malaria vectors. *Parasites & Vectors*, 5, 69.  
<https://doi.org/10.1186/1756-3305-5-69>
- Smith, A., Hansford, C.F. & Thomson, J.F. (1977) Malaria along the southern most fringe of its distribution in Africa: epidemiology and control. *Bulletin of the World Health Organization*, 55, 95–103.

- Snow, R.W. (2017) A geo-coded inventory of anophelines in the Afrotropical Region south of the Sahara: 1898-2016. *Harvard Dataverse*, V1.  
<https://doi.org/10.7910/DVN/NQ6CUN>
- Soromenho, L. (1923) Epidemiology of malaria and blackwater fever in Portuguese East Africa between 1901-1920. *Medical Journal of South Africa*, 18, 201–206.
- Spillings, B.L., Brooke, B.D., Koekemoer, L.L., Chiphwanya, J., Coetzee, M. & Hunt, R.H. (2009) A new species concealed by *Anopheles funestus* Giles, a major malaria vector in Africa. *American Journal of Tropical Medicine and Hygiene*, 81, 510–515.  
<https://doi.org/10.4269/ajtmh.2009.81.510>
- Symes, C.B. (1931) *Descriptions of fourth stage larvae of certain anophelines of East Africa, with brief notes on breeding, distribution and economic importance in Kenya. Records of the Medical Research Laboratory. No. 2.* Medical Department, Colony & Protectorate of Kenya, Wellcome-NPHL Archive, Nairobi, 78 pp.
- Van der Linde, T.C. de K., Hewitt, P.H., Van Pletzen, R., Kok, D.J., Fourie, S., Mostert, D.J. & Nel, A. (1982) Species richness and relative abundance of female mosquitoes at a site in the western Orange Free State, Culicidae, taxonomy, vector potential. *Journal of the Entomological Society of Southern Africa*, 45, 57–67.
- Vermeylen, M. (1967) Répartition du genre *Anopheles* en République du Rwanda et au Royaume du Burundi. *Rivista di Malariaologia*, 46, 13–22.
- Verrone, G.A. (1962a) Outline for the determination of malarial mosquitoes in Ethiopia. Part I—Adult female anophelines. *Mosquito News*, 22, 37–49.
- Verrone, G.A. (1962b) Outline for the determination of malarial mosquitoes in Ethiopia. Part II—Anopheline larvae. *Mosquito News*, 22, 394–401.
- Vincke, I.H. (1946) Note sur la biologie des anophèles d’Elisabethville et environs. *Annales de la Société Belge de Médecine Tropicale*, 26, 385–481.
- Vincke, I.H. & Jadin, J.B. (1946) Contribution à l’étude de l’anophélisme en pays d’altitude. *Annales de la Société Belge de Médecine Tropicale*, 26, 483–500.
- Vincke, I.H. & Laarman, J.J. (1956) Sciences biologiques, station de Forêt d’Irangi. *Folia scientifica Africae centralis*, 2 (2), 14.
- Wilson, D.B. (1936) *Report of the Malaria Unit, Tanga 1933-1934. Report to the Colonial Development Fund (Malaria Research Scheme).* Dar es Salaam, Tanganyika and NPHL-Wellcome Archive, Nairobi, 71 pp.
- Wilson, D.B. (1947) Malaria in Madagascar. *East African Medical Journal*, 24, 171–178.
- World Health Organization (1963) *Report of WHO advisory team on malaria eradication No. 2. Bechuana Protectorate: July 1961–August 1962.* WHO, Geneva, 52 pp.
- World Health Organization (1990) *Malaria Border Meeting: Djibouti, 29 October–1 November 1990. WHO-EM/MAL/218-E.* WHO, Alexandria, 18 pp.
- World Health Organization (2014) *World Malaria Report 2013.* WHO, Geneva, 284 pp.

**APPENDIX.** Lists of *Anopheles* species recorded from Afrotropical countries, with notes on changes from the lists presented in Kyalo *et al.* (2017).

#### Angola

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. argenteolobatus*
- 4) *An. austenii*
- 5) *An. azevedoi*
- 6) *An. barberellus*
- 7) *An. brunnipes*
- 8) *An. caliginosus*
- 9) *An. cinctus*
- 10) *An. coluzzii*
- 11) *An. concolor*
- 12) *An. coustani*
- 13) *An. cydippis*
- 14) *An. demeilloni*
- 15) *An. distinctus*
- 16) *An. durenii*



- 17) *An. flavicosta*
- 18) *An. funestus*
- 19) *An. fuscivenosus*
- 20) *An. gambiae s.s.*
- 21) *An. hancocki*
- 22) *An. harperi*
- 23) *An. implexus*
- 24) *An. jebudensis*
- 25) *An. lesoni*
- 26) *An. listeri*
- 27) *An. longipalpis*
- 28) *An. maculipalpis*
- 29) *An. marshallii*
- 30) *An. melas*
- 31) *An. natalensis*
- 32) *An. nili*
- 33) *An. njombiensis*
- 34) *An. obscurus*
- 35) *An. paludis*
- 36) *An. pharoensis*
- 37) *An. pretoriensis*
- 38) *An. rhodesiensis*
- 39) *An. rivulorum*
- 40) *An. ruarinus*
- 41) *An. rufipes*
- 42) *An. schwetzi*
- 43) *An. squamosus*
- 44) *An. tchekedii*
- 45) *An. tenebrosus*
- 46) *An. theileri*
- 47) *An. walravensi*
- 48) *An. wellcomei*
- 49) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. walravensi*, which is not in the Africa Vectors database (Snow 2017), but was recorded from Angola by Gandara (1956) and is given in Gillies & de Meillon (1968).
- 2) The WRBU list did not have *An. jebudensis*, although this species is noted in de Barros Machado *et al.* (1981) and Gillies & Coetzee (1987).
- 3) The WRBU list, Gillies & de Meillon (1968), Gillies & Coetzee (1987) and the Kyalo *et al.* (2017) database do not mention *An. hancocki*. However, a specimen from Dundo, Angola was found in the Natural History Museum, London, so it is included here.

#### Benin

- 1) *An. arabiensis*
- 2) *An. brohieri*
- 3) *An. brunnipes*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. domicolus*
- 7) *An. flavicosta*



- 8) *An. funestus*
- 9) *An. gambiae s.s.*
- 10) *An. hargreavesi*
- 11) *An. lesoni*
- 12) *An. maculipalpis*
- 13) *An. melas*
- 14) *An. nili*
- 15) *An. obscurus*
- 16) *An. paludis*
- 17) *An. pharoensis*
- 18) *An. pretoriensis*
- 19) *An. rhodesiensis*
- 20) *An. rivulorum*
- 21) *An. rufipes*
- 22) *An. squamosus*
- 23) *An. wellcomei*
- 24) *An. ziemanni*

### Comments

1) Kyalo *et al.* (2017) list *An. fuscicolor*, which is not in the Africa Vectors database (Snow 2017) (type locality in Madagascar, and the WRBU lists its distribution as only Madagascar). This record is from Gnanguenon *et al.* (2014), who mention the presence of *An. fuscicolor* in Benin. However, it is not a species found in the keys that Gnanguenon *et al.* used for identification (Gillies & de Meillon 1968; Gillies & Coetzee 1987), so we assume that the record in Gnanguenon is a misspelling of *An. fuscivenosus*, which is morphologically very similar to *An. funestus* but whose presence in Benin will need to be confirmed. We have therefore not included *An. fuscicolor* here.

2) Kyalo *et al.* (2017) also list *An. smithii* (the WRBU lists *An. smithii* as present in Nigeria and Ghana, so its presence in Benin would not be unexpected) but it is not in the Africa Vectors database (Snow 2017). The “Togo and Dahomey” country list of Gillies & de Meillon (1968) includes this species but it is not clear to which country it is referring; hence, the species is not included in the list here pending confirmation of this species in Benin.

### Botswana

- 1) *An. arabiensis*
- 2) *An. argenteolobatus*
- 3) *An. caliginosus*
- 4) *An. coustani*
- 5) *An. cydippis*
- 6) *An. demeilloni*
- 7) *An. distinctus*
- 8) *An. funestus*
- 9) *An. lesoni*
- 10) *An. listeri*
- 11) *An. longipalpis*
- 12) *An. maculipalpis*
- 13) *An. marshallii*
- 14) *An. nili*
- 15) *An. parensis*
- 16) *An. pharoensis*
- 17) *An. pretoriensis*
- 18) *An. quadriannulatus*
- 19) *An. rhodesiensis*
- 20) *An. rivulorum*

- 21) *An. rufipes*
- 22) *An. seretsei*
- 23) *An. squamosus*
- 24) *An. tchekedii*
- 25) *An. tenebrosus*
- 26) *An. vaneedeni*
- 27) *An. walravensi*
- 28) *An. wellcomei*
- 29) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. cydippis*, *An. walravensi*, *An. wellcomei ugandae* and *An. ziemanni*, which were not in the Africa Vectors database (Snow 2017). Gillies & de Meillon (1968) list all of these as present in Botswana. Chayabejara *et al.* (1975) records *An. wellcomei ugandae*, *An. ziemanni* and *An. caliginosus*. The World Health Organization (1963) records *An. argenteolobatus*.
- 2) The WRBU lists *An. nili* as being present in Botswana, as does Gillies & de Meillon (1968) (in the text and distribution map (fig. 24), but not in the country list). We include it here.
- 3) *Anopheles funestus* was recorded from northwest Botswana by Koekemoer *et al.* (1999).
- 4) No records of *An. gambiae s.s.* have been found.

### Burkina Faso

- 1) *An. arabiensis*
- 2) *An. argenteolobatus*
- 3) *An. brohieri*
- 4) *An. brumpti*
- 5) *An. brunnipes*
- 6) *An. coluzzii*
- 7) *An. coustani*
- 8) *An. cydippis*
- 9) *An. domicolus*
- 10) *An. dureni*
- 11) *An. flavicosta*
- 12) *An. freetownensis*
- 13) *An. funestus*
- 14) *An. gambiae s.s.*
- 15) *An. hancocki*
- 16) *An. implexus*
- 17) *An. lesoni*
- 18) *An. longipalpis*
- 19) *An. maculipalpis*
- 20) *An. murphyi*
- 21) *An. natalensis*
- 22) *An. nili*
- 23) *An. obscurus*
- 24) *An. paludis*
- 25) *An. pharoensis*
- 26) *An. pretoriensis*
- 27) *An. rhodesiensis*
- 28) *An. rivulorum*
- 29) *An. rufipes*
- 30) *An. sergentii*

- 31) *An. somalicus*
- 32) *An. squamosus*
- 33) *An. theileri*
- 34) *An. wellcomei*
- 35) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. subpictus* Grassi, which is primarily found in Australia and Asia. As it seems unlikely to be present in Burkina Faso (also no records were found in the database), it is not listed here. The Table also lists *An. sergentii*—*Anopheles macmahoni* (a subspecies of *An. sergentii*) was recorded by Choumara *et al.* (1959).
- 2) Choumara *et al.* (1959) also listed *An. paludis*, *An. rhodesiensis*, *An. obscurus*, *An. implexus* and *An. freetownensis* as being present in the pilot area, so they are included here.
- 3) Hamon *et al.* (1966) listed a number of other species as being present in Burkina Faso, including *An. paludis*, *An. theileri*, *An. obscurus*, *An. implexus*, *An. brunnipes*, *An. somalicus*, *An. cydippis*, *An. rhodesiensis* and *An. freetownensis*. *Anopheles brumpti* is shown as being on the border of Mali and Burkina Faso, and this is probably a record from Hamon & Rickenbach (1955), the collection which resulted in the description of *An. brumpti*.
- 4) Gillies & de Meillon (1968) listed *An. murphyi* for Burkina Faso.
- 5) *Anopheles moucheti* was mentioned by Robert (1989) in his thesis, but he does not cite any records from Burkina Faso, so this species is not included on the list.

### Burundi

- 1) *An. arabiensis*
- 2) *An. brohieri*
- 3) *An. christyi*
- 4) *An. coustani*
- 5) *An. cydippis*
- 6) *An. demeilloni*
- 7) *An. funestus*
- 8) *An. gambiae s.l.*
- 9) *An. garnhami*
- 10) *An. gibbinsi*
- 11) *An. implexus*
- 12) *An. longipalpis*
- 13) *An. maculipalpis*
- 14) *An. marshallii*
- 15) *An. moucheti*
- 16) *An. natalensis*
- 17) *An. nili*
- 18) *An. pharoensis*
- 19) *An. seydeli*
- 20) *An. squamosus*
- 21) *An. theileri*
- 22) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. ardensis* and *An. wellcomei ugandae* as being present in Burundi but they are not in the database. A record for *An. ardensis* was found in Vincke & Jadin (1946), which describes it in nearby Democratic Republic of the Congo. Both *An. ardensis* and *An. wellcomei* are listed in Gillies & de Meillon (1968) but as these authors combined Rwanda and Burundi in their country lists, the presence of these species in Burundi is not confirmed, and they are not included in the present list pending future confirmation.
- 2) The Africa Indoor Residual Spray program included *An. brohieri* in their 2014 report (Africa Indoor Residual Spraying

(AIRS) Project 2014).

3) *Anopheles gambiae s.l.* appears not to have been tested for the molecular forms M and S or the chromosomal forms Mopti and Savanna.

### **Cabo Verde**

- 1) *An. arabiensis*
- 2) *An. pretoriensis*

### **Comment**

1) Ribeiro *et al.* (1979) described *An. quadriannulatus davidsoni* as a new sub-species from Cape Verde, but this was subsequently shown to be *An. arabiensis* by Cambournac *et al.* (1982) and “*davidsoni*” was synonymized with it.

### **Cameroon**

- 1) *An. arabiensis*
- 2) *An. bervoetsi*
- 3) *An. brohieri*
- 4) *An. brunnipes*
- 5) *An. buxtoni*
- 6) *An. carnevalei*
- 7) *An. christyi*
- 8) *An. cinctus*
- 9) *An. coluzzii*
- 10) *An. concolor*
- 11) *An. coustani*
- 12) *An. cydippis*
- 13) *An. deemingi*
- 14) *An. demeilloni*
- 15) *An. domicolus*
- 16) *An. dualaensis*
- 17) *An. eouzani*
- 18) *An. flavicosta*
- 19) *An. freetownensis*
- 20) *An. funestus*
- 21) *An. gambiae s.s.*
- 22) *An. hancocki*
- 23) *An. hargreavesi*
- 24) *An. implexus*
- 25) *An. jebudensis*
- 26) *An. leesoni*
- 27) *An. longipalpis*
- 28) *An. maculipalpis*
- 29) *An. marshallii*
- 30) *An. melas*
- 31) *An. moucheti*
- 32) *An. mousinhoi*
- 33) *An. multicinctus*
- 34) *An. namibiensis*
- 35) *An. natalensis*
- 36) *An. nili*
- 37) *An. obscurus*

- 38) *An. okuensis*
- 39) *An. ovengensis*.
- 40) *An. paludis*
- 41) *An. pharoensis*
- 42) *An. pretoriensis*
- 43) *An. rageai*
- 44) *An. rhodesiensis*
- 45) *An. rivulorum*
- 46) *An. rivulorum*-like
- 47) *An. rufipes*
- 48) *An. sergentii*
- 49) *An. smithii*
- 50) *An. somalicus*
- 51) *An. squamosus*
- 52) *An. tenebrosus*
- 53) *An. wellcomei*
- 54) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. deemingi* (as *An. deeming*), *An. eouzani* and *An. multicinctus* with no references in the database. Brunhes *et al.* (2003) described *An. deemingi* and *An. eouzani* from western Cameroon. Mouchet *et al.* (1960) described *An. multicinctus*.
- 2) As *An. nigeriensis* refers to a subspecies of *An. moucheti*, it is not included here.
- 3) Brunhes *et al.* (1997) described *An. okuensis* and Awono-Ambene *et al.* (2004) described *An. ovengensis* from Cameroon.
- 4) The only record found for *An. theileri* is in Adam & Mouchet (1957), who examined a specimen in a poor state, which seemed to be *An. theileri*. They stated that this finding should not be considered a record of collection, but should spur further research to see if the species is present in Cameroon. It has been removed from the list.
- 5) A new species not yet formally named, i.e. *An. rivulorum*-like (see Cohuet *et al.* 2003), is included in the list.
- 6) In the IRD database, *An. vaneedeni* was noted from Cameroon. As *An. vaneedeni* has only previously been found in eastern and southern Africa, this species is not added to the Cameroon list pending confirmation.

### Central African Republic

- 1) *An. bervoetsi*
- 2) *An. brohieri*
- 3) *An. cinctus*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. cydippis*
- 7) *An. domicolus*
- 8) *An. flavicosta*
- 9) *An. freetownensis*
- 10) *An. funestus*
- 11) *An. gambiae s.s.*
- 12) *An. gibbinsi*
- 13) *An. hancocki*
- 14) *An. hargreavesi*
- 15) *An. implexus*
- 16) *An. leesoni*
- 17) *An. maculipalpis*
- 18) *An. marshallii*
- 19) *An. moucheti*



- 20) *An. multicoloratus*
- 21) *An. natalensis*
- 22) *An. nili*
- 23) *An. obscurus*
- 24) *An. paludis*
- 25) *An. pharoensis*
- 26) *An. pretoriensis*
- 27) *An. rhodesiensis*
- 28) *An. rufipes*
- 29) *An. squamosus*
- 30) *An. wellcomei*
- 31) *An. ziemanni*

#### Comments

- 1) Geoffroy (1982) recorded *An. moucheti gibbinsi* and *An. natalensis multicoloratus*, both of which have been elevated to species status, the former by Gillies & de Meillon (1968) and the latter by Brunhes *et al.* (1998).
- 2) *Anopheles longipalpis* is included in the list of Kyalo *et al.* (2017), but the two supporting references do not indicate a clear collection record. Rickenbach (1969) only referred to *Aedes longipalpis* (not *An. longipalpis*) and Hamon *et al.* (1956) do not distinguish between *An. domicolus* and *An. longipalpis* in reporting these species from Oubangui-Chari, so it is not clear that both are present in the country. For this reason, *An. longipalpis* has been removed from list.

#### Chad

- 1) *An. arabiensis*
- 2) *An. christyi*
- 3) *An. cinereus*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. cydippis*
- 7) *An. dthali*
- 8) *An. funestus*
- 9) *An. gambiae s.s.*
- 10) *An. nili*
- 11) *An. pharoensis*
- 12) *An. rhodesiensis*
- 13) *An. rufipes*
- 14) *An. sergentii*
- 15) *An. squamosus*
- 16) *An. tenebrosus*
- 17) *An. wellcomei*
- 18) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. rhodesiensis* and *An. dthali* based on the records provided by Rioux (1961), who discussed northern Chad (north of the 17<sup>th</sup> parallel used to define sub-Saharan Africa). Both species are recorded in Gillies & de Meillon (1968) and therefore remain on the list.
- 2) Regarding *An. cinereus*, it is not clear whether the mosquitoes collected by Rioux (1961) were *An. hispaniola* or *An. cinereus*, and according to Gillies & de Meillon (1968) the occurrence of *An. cinereus* this far west has not been confirmed. *Anopheles cinereus* remains on the list with Rioux (1961) as the justification, but we acknowledge that its presence requires confirmation.
- 3) Kyalo *et al.* (2017) list *An. cinctus* but this seems to be an error, as this species is not listed for Chad by Lacan (1958) or Gillies & de Meillon (1968). It is removed from the list.
- 4) Buck *et al.* (1968) found *An. coustani* var. *tenebrosus*, which has since been elevated to species rank.

### Comoros

- 1) *An. comorensis*
- 2) *An. coustani*
- 3) *An. funestus*
- 4) *An. gambiae s.s.*
- 5) *An. maculipalpis*
- 6) *An. mascarensis*
- 7) *An. merus*
- 8) *An. pretoriensis*

### Comment

1) Kyalo *et al.* (2017) list *An. arabiensis* and in the database referred to Brunhes (1977), but *An. arabiensis* is not referred to in this document. Similarly, no reference to *An. coluzzii* was found, so this is also removed from the list.

### Côte d'Ivoire

- 1) *An. barberellus*
- 2) *An. brohieri*
- 3) *An. brunnipes*
- 4) *An. carnevalei*
- 5) *An. cinctus*
- 6) *An. coluzzii*
- 7) *An. coustani*
- 8) *An. demeilloni*
- 9) *An. domicolus*
- 10) *An. durenii*
- 11) *An. flavicosta*
- 12) *An. freetownensis*
- 13) *An. funestus*
- 14) *An. gambiae s.s.*
- 15) *An. hancocki*
- 16) *An. hargreavesi*
- 17) *An. implexus*
- 18) *An. jebudensis*
- 19) *An. lesoni*
- 20) *An. maculipalpis*
- 21) *An. marshallii*
- 22) *An. melas*
- 23) *An. moucheti*
- 24) *An. natalensis*
- 25) *An. nili*
- 26) *An. obscurus*
- 27) *An. paludis*
- 28) *An. pharoensis*
- 29) *An. pretoriensis*
- 30) *An. rageaui*
- 31) *An. rhodesiensis*
- 32) *An. rivulorum*
- 33) *An. rivulorum-like*
- 34) *An. rodhaini*
- 35) *An. rufipes*
- 36) *An. sergentii*

- 37) *An. smithii*
- 38) *An. somalicus*
- 39) *An. squamosus*
- 40) *An. wellcomei*
- 41) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. arabiensis*, but this species is not mentioned in the literature cited.
- 2) Kyalo *et al.* (2017) did not list *An. carnevalei* but this species is referenced in the database.
- 3) *Anopheles rageaui* was recorded as *An. smithii rageaui* by Adam & Hamon (1958). Hamon *et al.* (1962) report *An. smithii* in Man (western Côte d'Ivoire). Both species are included in the list.
- 4) *Anopheles rivulorum*-like was found in Ganse (Adja *et al.* 2006).
- 5) The record of *An. marshallii* in Doucet *et al.* (1960) was always preceded by a question mark. The species is included in the country lists of Gillies & de Meillon (1968), although they suggest that West African records of *An. marshallii* may have been confused with *An. hargreavesi*. *Anopheles marshallii* is retained on the list here with the caveat that more collections are needed to confirm its presence in Côte d'Ivoire.
- 6) The only record for *An. rodhaini* is that of Adam (1965), who considered it to be a dark form of *An. rhodesiensis*. It seems Adam was using this example to show how close *An. rodhaini* is to *An. rhodesiensis*, rather than recording *An. rodhaini* in Côte d'Ivoire. It has been removed from the list.
- 7) In the IRD database, *An. longipalpis* was noted from Cameroon. As *An. longipalpis* has only previously been found in eastern and southern Africa, this species is not added to the Côte d'Ivoire list pending confirmation.

### Democratic Republic of Congo

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. argenteolobatus*
- 4) *An. austenii*
- 5) *An. barberellus*
- 6) *An. berghei*
- 7) *An. bervoetsi*
- 8) *An. brunnipes*
- 9) *An. caliginosus*
- 10) *An. christyi*
- 11) *An. cinctus*
- 12) *An. coluzzii*
- 13) *An. concolor*
- 14) *An. confusus*
- 15) *An. coustani*
- 16) *An. cydippis*
- 17) *An. demeilloni*
- 18) *An. distinctus*
- 19) *An. domicolus*
- 20) *An. durenii*
- 21) *An. faini*
- 22) *An. funestus*
- 23) *An. gambiae s.s.*
- 24) *An. garnhami*
- 25) *An. gibbinsi*
- 26) *An. hancocki*
- 27) *An. hargreavesi*
- 28) *An. implexus*
- 29) *An. jebudensis*

- 30) *An. keniensis*
- 31) *An. kingi*
- 32) *An. lesoni*
- 33) *An. longipalpis*
- 34) *An. maculipalpis*
- 35) *An. marshallii*
- 36) *An. melas*
- 37) *An. millecampsi*
- 38) *An. mortiauxi*
- 39) *An. moucheti*
- 40) *An. mousinhoi*
- 41) *An. multicinctus*
- 42) *An. natalensis*
- 43) *An. nili*
- 44) *An. njombiensis*
- 45) *An. obscurus*
- 46) *An. paludis*
- 47) *An. pharoensis*
- 48) *An. pretoriensis*
- 49) *An. rageaui*
- 50) *An. rhodesiensis*
- 51) *An. rivulorum*
- 52) *An. rodhaini*
- 53) *An. rufipes*
- 54) *An. schwetzi*
- 55) *An. seydeli*
- 56) *An. squamosus*
- 57) *An. symesi*
- 58) *An. tenebrosus*
- 59) *An. theileri*
- 60) *An. vanhoofi*
- 61) *An. vinckei*
- 62) *An. walravensi*
- 63) *An. wellcomei*
- 64) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. jebudensis* and *An. njombiensis*, which are not in the database. *Anopheles jebudensis* was collected by Vincke & Laarman (1956) in Kivu. *Anopheles njombiensis* is listed in Gillies & de Meillon (1968).
- 2) The mention of *An. ugandae* may refer to *An. distinctus ugandae* listed in Rahm & Vermeylen (1967) or to the subspecies of *An. wellcomei* listed in Gillies & de Meillon (1968). In either case it is at most a subspecies and is removed from the list.
- 3) *Anopheles cinctus* is listed by Kyalo *et al.* (2017) based on Rahm & Vermeylen (1967), but there is no mention of *An. cinctus* by those authors. However, Vincke & Laarman (1956) record this species.
- 4) *Anopheles millecampsi* was collected from Lubumbashi by Vincke (1946), although it was not clear in that publication that he had collected a new species. It was formally recognized as a species by Brunhes *et al.* (1997).

### Djibouti

- 1) *An. arabiensis*
- 2) *An. azaniae*
- 3) *An. dancalicus*
- 4) *An. dthali*
- 5) *An. harperi*
- 6) *An. pharoensis*

- 7) *An. rhodesiensis*
- 8) *An. salbaii*
- 9) *An. sergentii*
- 10) *An. stephensi*
- 11) *An. turkhudi*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. gambiae s.l.*, and although no references for *An. arabiensis* have been found, the World Health Organization (1990, 2014) recognize it as a principle vector of malaria in Djibouti.
- 2) Carteron *et al.* (1978) noted the presence of *An. pharoensis*.
- 3) Faulde *et al.* (2014) and Seyfarth *et al.* (2019) reported the presence of *An. stephensi* in Djibouti. This is an introduced species, found in the Middle East and southern Asian countries.

#### Equatorial Guinea

- 1) *An. brunnipes*
- 2) *An. carnevalei*
- 3) *An. cinctus*
- 4) *An. coluzzii*
- 5) *An. funestus*
- 6) *An. gambiae s.s.*
- 7) *An. lesoni*
- 8) *An. lloreti*
- 9) *An. melas*
- 10) *An. moucheti*
- 11) *An. obscurus*
- 12) *An. ovengensis*
- 13) *An. smithii*

#### Comments

- 1) While Kyalo *et al.* (2017) mention *An. ovengensis* in their database (and it is in Ridl *et al.* 2008), this species was not included in their list. It is included in the list here.
- 2) Pappa *et al.* (2011) recorded *An. lesoni*, which has been added to the list.
- 3) No records were found for *An. nili* (surprisingly). Only records for *An. carnevalei* and *An. ovengensis* of the *An. nili* complex were found. *Anopheles nili* is removed from the list.

#### Eritrea

- 1) *An. arabiensis*
- 2) *An. christyi*
- 3) *An. cinereus*
- 4) *An. coustani*
- 5) *An. culicifacies*
- 6) *An. dancalicus*
- 7) *An. demeilloni*
- 8) *An. dthali*
- 9) *An. erythraeus*
- 10) *An. funestus*
- 11) *An. garnhami*
- 12) *An. harperi*
- 13) *An. pharoensis*
- 14) *An. pretoriensis*



- 15) *An. rhodesiensis*
- 16) *An. rivulorum*
- 17) *An. rufipes*
- 18) *An. salbaii*
- 19) *An. sergentii*
- 20) *An. squamosus*
- 21) *An. turkhudi*
- 22) *An. wellcomei*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. rhodesiensis rupicolus*. As this is a subspecies of *An. rhodesiensis*, it has been removed as a separate entity.
- 2) Kyalo *et al.* (2017) do not list *An. pretoriensis*, but this species was recorded by Raffaele (1942).
- 3) *Anopheles culicifacies* was recorded by Jannone *et al.* (1946) and is added to the list.
- 4) Shililu *et al.* (2003) recorded *An. wellcomei* and *An. harperi*.
- 5) The only record for *An. nili* seems to come from Nyanjom *et al.* (2003), who do not indicate where the *An. nili* were collected (Ethiopia or Eritrea). *Anopheles nili* has been removed from the list.
- 6) A specimen of *Anopheles salbaii* from Arafali is in the collection of the Natural History Museum, London.

#### Eswatini (previously Swaziland)

- 1) *An. arabiensis*
- 2) *An. caliginosus*
- 3) *An. cinereus*
- 4) *An. coustani*
- 5) *An. cydippis*
- 6) *An. funestus*
- 7) *An. gambiae s.s.*
- 8) *An. maculipalpis*
- 9) *An. marshallii*
- 10) *An. merus*
- 11) *An. nili*
- 12) *An. pretoriensis*
- 13) *An. quadriannulatus*
- 14) *An. rhodesiensis*
- 15) *An. rivulorum*
- 16) *An. ruarinus*
- 17) *An. rufipes*
- 18) *An. squamosus*

#### Comments

- 1) Kyalo *et al.* (2017) do not list *An. gambiae s.s.* However, de Almeida Franco *et al.* (1984), page 40, mentioned that G.E. Bakri, a WHO entomologist who visited Swaziland in 1978, recorded the collection of 95 *An. gambiae* (species A), 80 *An. arabiensis*, seven *An. quadriannulatus* and one *An. merus*. All were identified cytogenetically by Davidson and Coluzzi. *Anopheles gambiae s.s.* has been added to the list.
- 2) *Anopheles cinereus*, *An. cydippis*, *An. rhodesiensis* and *An. ruarinus* were found in the National Institute for Communicable Diseases/National Health Laboratory Service collection (Johannesburg, South Africa).

#### Ethiopia

- 1) *An. amharicus*
- 2) *An. arabiensis*
- 3) *An. ardensis*

- 4) *An. azaniae*
- 5) *An. christyi*
- 6) *An. cinctus*
- 7) *An. cinereus*
- 8) *An. confusus*
- 9) *An. coustani*
- 10) *An. culicifacies*
- 11) *An. cydippis*
- 12) *An. dancalicus*
- 13) *An. demeilloni*
- 14) *An. domicolus*
- 15) *An. dthali*
- 16) *An. ethiopicus*
- 17) *An. funestus*
- 18) *An. garnhami*
- 19) *An. gibbinsi*
- 20) *An. harperi*
- 21) *An. implexus*
- 22) *An. kingi*
- 23) *An. lesoni*
- 24) *An. longipalpis*
- 25) *An. maculipalpis*
- 26) *An. marshallii*
- 27) *An. natalensis*
- 28) *An. nili*
- 29) *An. obscurus*
- 30) *An. paludis*
- 31) *An. parensis*
- 32) *An. pharoensis*
- 33) *An. pretoriensis*
- 34) *An. rhodesiensis*
- 35) *An. rivulorum*
- 36) *An. rufipes*
- 37) *An. salbaii*
- 38) *An. sergentii*
- 39) *An. seydeli*
- 40) *An. squamosus*
- 41) *An. stephensi*
- 42) *An. tenebrosus*
- 43) *An. theileri*
- 44) *An. turkhudi*
- 45) *An. wellcomei*
- 46) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. erythraeus*, which is mentioned by Giaquinto-Mira (1950), but this is a record in Eritrea only, not in present day Ethiopia and O'Connor (1967) removed the species from his list.
- 2) Kyalo *et al.* (2017) do not list *An. cinctus* but this species is reported by Massebo & Lindtjorn (2013).
- 3) Gillies & de Meillon (1968) noted that *An. theileri* listed by Verrone (1962a, b) possibly refers to *An. brohieri* (adult) or *An. wellcomei* (larva), but as this species is reported by O'Connor (1967) it remains on the list.
- 4) Carter *et al.* (2018) record the presence of *An. stephensi* in Ethiopia. This is an introduced species, found in the Middle East and southern Asian countries.

- 5) A specimen of *An. ethiopicus* collected in Gambella is deposited in the collection in the Natural History Museum, London.
- 6) *Anopheles azaniae* was collected by Animut *et al.* (2012).

### Gabon

- 1) *An. carnevalei*
- 2) *An. caroni*
- 3) *An. cinctus*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. eouzani*
- 7) *An. faini*
- 8) *An. fontenillei*
- 9) *An. funestus*
- 10) *An. gabonensis*
- 11) *An. gambiae s.s.*
- 12) *An. hancocki*
- 13) *An. hargreavesi*
- 14) *An. implexus*
- 15) *An. jebudensis*
- 16) *An. maculipalpis*
- 17) *An. marshallii*
- 18) *An. melas*
- 19) *An. moucheti*
- 20) *An. natalensis*
- 21) *An. nili*
- 22) *An. obscurus*
- 23) *An. paludis*
- 24) *An. pharoensis*
- 25) *An. pretoriensis*
- 26) *An. rhodesiensis*
- 27) *An. rufipes*
- 28) *An. schwetzi*
- 29) *An. smithii*
- 30) *An. squamosus*
- 31) *An. tenebrosus*
- 32) *An. theileri*
- 33) *An. vinckei*
- 34) *An. wellcomei*
- 35) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) do not include *An. carnevalei* or *An. eouzani*, which were found by Paupy *et al.* (2013) and have been added to the list.
- 2) Elissa *et al.* (1999) reported *An. squamosus*, which has been added to the list.
- 3) Barrón *et al.* (2019) described *An. fontenillei* from the National Park of La Lopé in central Gabon, based primarily on molecular and cytogenic analyses.

### The Gambia

- 1) *An. arabiensis*

- 2) *An. brohieri*
- 3) *An. brucei*
- 4) *An. brunnipes*
- 5) *An. coluzzii*
- 6) *An. coustani*
- 7) *An. flavicosta*
- 8) *An. funestus*
- 9) *An. gambiae s.s.*
- 10) *An. maculipalpis*
- 11) *An. melas*
- 12) *An. murphyi*
- 13) *An. nili*
- 14) *An. pharoensis*
- 15) *An. rufipes*
- 16) *An. squamosus*
- 17) *An. wellcomei*
- 18) *An. ziemanni*

#### **Comment**

1) There is a specimen of *An. brucei* from Tambana in the Natural History Museum, London. On the label, the identification is written as “*A. brucei?*”

#### **Ghana**

- 1) *An. arabiensis*
- 2) *An. brohieri*
- 3) *An. brunnipes*
- 4) *An. cinctus*
- 5) *An. coluzzii*
- 6) *An. coustani*
- 7) *An. demeilloni*
- 8) *An. domicolus*
- 9) *An. flavicosta*
- 10) *An. freetownensis*
- 11) *An. funestus*
- 12) *An. gambiae s.s.*
- 13) *An. hancocki*
- 14) *An. hargreavesi*
- 15) *An. implexus*
- 16) *An. lesoni*
- 17) *An. maculipalpis*
- 18) *An. marshallii*
- 19) *An. melas*
- 20) *An. moucheti*
- 21) *An. nili*
- 22) *An. obscurus*
- 23) *An. paludis*
- 24) *An. pharoensis*
- 25) *An. pretoriensis*
- 26) *An. rageai*
- 27) *An. rhodesiensis*
- 28) *An. rufipes*

- 29) *An. squamosus*
- 30) *An. wellcomei*
- 31) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. watsoni*, which is a synonym of *An. rufipes* and is not included in the list.
- 2) No reference was found for *An. theileri* that did not refer to *An. brohieri*, so it is not included on the list.
- 3) The Gillies & de Meillon (1968) queried the presence of *An. demeilloni*. This species is reported by Chinery (1995).
- 4) Brady (1965) reported *An. smithii* var. *rageaui*. This appears to be the only record of *An. smithii* in Ghana, and since it refers to *An. rageaui* (Brunhes *et al.* 1999), *An. rageaui* is added to the list and *An. smithii* is removed.
- 5) A specimen of *An. moucheti* is in the Natural History Museum, London.

#### Guinea

- 1) *An. arabiensis*
- 2) *An. barberellus*
- 3) *An. brohieri*
- 4) *An. brunnipes*
- 5) *An. cinctus*
- 6) *An. coluzzii*
- 7) *An. coustani*
- 8) *An. domicolus*
- 9) *An. flavicosta*
- 10) *An. freetownensis*
- 11) *An. finestus*
- 12) *An. gambiae s.s.*
- 13) *An. hancocki*
- 14) *An. hargreavesi*
- 15) *An. implexus*
- 16) *An. lesoni*
- 17) *An. longipalpis*
- 18) *An. maculipalpis*
- 19) *An. maliensis*
- 20) *An. marshallii*
- 21) *An. melas*
- 22) *An. moucheti*
- 23) *An. nili*
- 24) *An. obscurus*
- 25) *An. pharoensis*
- 26) *An. pretoriensis*
- 27) *An. rageaui*
- 28) *An. rhodesiensis*
- 29) *An. rivulorum*
- 30) *An. rufipes*
- 31) *An. sergentii*
- 32) *An. smithii*
- 33) *An. somalicus*
- 34) *An. squamosus*
- 35) *An. wellcomei*
- 36) *An. ziemanni*

#### Comment

- 1) Kyalo *et al.* (2017) list *An. cavernicolus*, *An. nigeriensis* and *An. sergentii macmahoni*. *Anopheles nigeriensis* and *An.*

*sergentii macmahoni* are represented on the species list as *An. moucheti* and *An. sergentii*, respectively. *Anopheles cavernicolus* was described from specimens collected near Dalaba, Guinea, (Abonnenc 1954) but was synonymized with *An. smithii* by Gillies & de Meillon (1968), and is deleted from the list.

#### Guinea-Bissau

- 1) *An. arabiensis*
- 2) *An. cinereus*
- 3) *An. coluzzii*
- 4) *An. coustani*
- 5) *An. funestus*
- 6) *An. gambiae s.s.*
- 7) *An. hargreavesi*
- 8) *An. maculipalpis*
- 9) *An. melas*
- 10) *An. nili*
- 11) *An. pharoensis*
- 12) *An. rufipes*
- 13) *An. smithii*
- 14) *An. squamosus*
- 15) *An. ziemanni*

#### Comment

1) Kyalo *et al.* (2017) list *An. dancalicus*, which was reported by Ferreira *et al.* (1948) but this record is so far from the known range of the species that it has been removed from the list. Furthermore, Gillies & de Meillon (1968) suggested this record was a misidentification of *An. maculipalpis*.

#### Kenya

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. azaniae*
- 4) *An. christyi*
- 5) *An. cinereus*
- 6) *An. confusus*
- 7) *An. coustani*
- 8) *An. demeilloni*
- 9) *An. dthali*
- 10) *An. erepens*
- 11) *An. flavicosta*
- 12) *An. funestus*
- 13) *An. gambiae s.s.*
- 14) *An. garnhami*
- 15) *An. gibbinsi*
- 16) *An. hancocki*
- 17) *An. harperi*
- 18) *An. implexus*
- 19) *An. keniensis*
- 20) *An. kingi*
- 21) *An. lesoni*
- 22) *An. longipalpis*
- 23) *An. lounibosi*



- 24) *An. maculipalpis*
- 25) *An. marshallii*
- 26) *An. merus*
- 27) *An. moucheti*
- 28) *An. multicinctus*
- 29) *An. natalensis*
- 30) *An. nili*
- 31) *An. paludis*
- 32) *An. parensis*
- 33) *An. pharoensis*
- 34) *An. pretoriensis*
- 35) *An. rhodesiensis*
- 36) *An. rivulorum*
- 37) *An. rufipes*
- 38) *An. salbairi*
- 39) *An. sergentii*
- 40) *An. smithii*
- 41) *An. squamosus*
- 42) *An. swahilicus*
- 43) *An. symesi*
- 44) *An. tenebrosus*
- 45) *An. theileri*
- 46) *An. vaneedeni*
- 47) *An. wellcomei*
- 48) *An. wilsoni*
- 49) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list both *An. lounibosi* and *An. rabaiensis* Lounibos, as well as *An. salbairi* and *An. wellcomei erepens*. *Anopheles rabaiensis* is a *nomen nudum* for *An. lounibosi* (Gillies & Coetzee 1987) and is removed from the list. *Anopheles salbairi* is not in the Kyalo database but Cooke *et al.* (2015) reported this species so it is retained on the list. Gillies (1958) notes that *An. wellcomei erepens* has been found in the Taveta region of Kenya, and it has been included in the list as *An. wellcomei*.
- 2) Symes (1931) noted that *An. theileri* var. *hancocki* has been collected in several districts in Kenya. Evans (1938) noted that the description given by Symes (1931) is “evidently that of *hancocki*”, which is included in the list.
- 3) A specimen of *An. erepens* from Taveta is in the Natural History Museum, London.

#### Lesotho

- 1) *An. carteri*

#### Comment

- 1) Two specimens of *An. carteri* were found in the National Institute for Communicable Diseases/National Health Laboratory Service collection (Johannesburg, South Africa). The specimens were initially identified as *An. demeilloni*, but were re-identified as *An. carteri* by M. Gillies, and confirmed by one of us (MC).

#### Liberia

- 1) *An. barberellus*
- 2) *An. cinctus*
- 3) *An. coluzzii*
- 4) *An. coustani*

- 5) *An. funestus*
- 6) *An. gambiae s.s.*
- 7) *An. hancocki*
- 8) *An. hargreavesi*
- 9) *An. melas*
- 10) *An. nili*
- 11) *An. obscurus*
- 12) *An. paludis*
- 13) *An. pretoriensis*
- 14) *An. smithii*
- 15) *An. squamosus*
- 16) *An. ziemanni*

#### Comments

- 1) Hamon *et al.* (1956) listed Liberia as one of the countries where *An. wellcomei* is present, but this is not included in the table in the same publication, and no collection site is provided in this document or a later paper on the distribution of *Anopheles* in West Africa (Hamon *et al.* 1966), so *An. wellcomei* is not included in the list. It is also not listed in Gillies & de Meillon (1968). However, Gelfand (1954) listed it as one of the mosquitoes he collected. Its presence in Liberia requires confirmation.
- 2) Records of *An. squamosus* are not provided in the references in the Kyalo *et al.* database. Gelfand (1954) includes *An. squamosus* in the identification key but does not say it was found in Liberia. Hamon *et al.* (1956) include it as present in Liberia, but do not provide collection data, and, similar to *An. wellcomei*, no records are provided in the later document (Hamon *et al.* 1966), but Gillies & de Meillon (1968) provided a location for the collection of *An. squamosus* in Liberia, so it is retained on the list. However, its presence in the country should be verified.

#### Madagascar

- 1) *An. arabiensis*
- 2) *An. brunnipes*
- 3) *An. coustani*
- 4) *An. cydippis*
- 5) *An. flavicosta*
- 6) *An. funestus*
- 7) *An. fuscicolor*
- 8) *An. gambiae s.s.*
- 9) *An. grassei*
- 10) *An. grenieri*
- 11) *An. griveaudi*
- 12) *An. lacani*
- 13) *An. maculipalpis*
- 14) *An. mascarensis*
- 15) *An. merus*
- 16) *An. milloti*
- 17) *An. notleyi*
- 18) *An. pauliani*
- 19) *An. pharoensis*
- 20) *An. pretoriensis*
- 21) *An. radama*
- 22) *An. ranci*
- 23) *An. roubaudi*
- 24) *An. rufipes*
- 25) *An. squamosus*
- 26) *An. tenebrosus*

### Comment

- 1) Wilson (1947) recorded *An. marshallii* on Madagascar, however Chauvet (1962) determined, after examination of the cibarial armature, that all “*An. marshallii*” from Madagascar were actually *An. mascarensis*. *Anopheles marshallii* is also excluded from the extensive treatment of Madagascan *Anopheles* provided by Grjebine (1966). This species is therefore not included on the list.
- 2) The IRD database lists *An. nili* as being present in Madagascar, but due to the lack of any other records, this species has not been added to the list pending confirmation.

### Malawi

- 1) *An. arabiensis*
- 2) *An. cinereus*
- 3) *An. coustani*
- 4) *An. demeilloni*
- 5) *An. distinctus*
- 6) *An. funestus*
- 7) *An. funestus*-like.
- 8) *An. gambiae s.s.*
- 9) *An. longipalpis*
- 10) *An. maculipalpis*
- 11) *An. marshallii*
- 12) *An. parensis*
- 13) *An. pharoensis*
- 14) *An. pretoriensis*
- 15) *An. quadriannulatus*
- 16) *An. rhodesiensis*
- 17) *An. rivulorum*
- 18) *An. rufipes*
- 19) *An. seydeli*
- 20) *An. squamosus*
- 21) *An. tenebrosus*
- 22) *An. ziemanni*

### Comments

- 1) Mzilahowa *et al.* (2008) found *An. quadriannulatus* in the lower Shire Valley.
- 2) The as yet unnamed species, *An. funestus*-like, is included here (see Spillings *et al.* 2009).

### Mali

- 1) *An. arabiensis*
- 2) *An. brohieri*
- 3) *An. brunnipes*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. domicolus*
- 7) *An. dithali*
- 8) *An. flavicosta*
- 9) *An. funestus*
- 10) *An. gambiae s.s.*
- 11) *An. hancocki*
- 12) *An. lesoni*
- 13) *An. maculipalpis*

- 14) *An. nili*
- 15) *An. obscurus*
- 16) *An. paludis*
- 17) *An. pharoensis*
- 18) *An. pretoriensis*
- 19) *An. rhodesiensis*
- 20) *An. rivulorum*
- 21) *An. rufipes*
- 22) *An. sergentii*
- 23) *An. squamosus*
- 24) *An. somalicus*
- 25) *An. wellcomei*
- 26) *An. ziemanni*

#### Comment

- 1) Kyalo *et al.* (2017) list *An. longipalpis*, which is recorded in Hamon *et al.* (1961), but this refers to *An. longipalpis domicolus* (*An. domicolus*), so it is removed from the list.
- 2) The IRD database includes *An. azaniae* and *An. turkhudi*. As these are far outside the normal distribution of the species, they are not included in the list pending confirmation.

#### Mauritania

- 1) *An. arabiensis*
- 2) *An. coluzzii*
- 3) *An. coustani*
- 4) *An. demeilloni*
- 5) *An. domicolus*
- 6) *An. dthali*
- 7) *An. freetownensis*
- 8) *An. funestus*
- 9) *An. melas*
- 10) *An. pharoensis*
- 11) *An. pretoriensis*
- 12) *An. rhodesiensis*
- 13) *An. rufipes*
- 14) *An. squamosus*
- 15) *An. wellcomei*
- 16) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) did not include *An. gambiae s.s.* because only *An. coluzzii* and *An. arabiensis* were identified when further analysis of *An. gambiae s.l.* mosquitoes was conducted.
- 2) *Anopheles wellcomei* was noted by Diallo *et al.* (2005) and is added to the list.
- 3) *Anopheles flavicosta* is stated to be present in Mauritania in the CD-ROM identification key by Hervy *et al.* (1998). As no other mention of this species can be found in the literature, it is left off the list.
- 4) Kyalo *et al.* (2017) included *An. hancocki*, with reference to Khromov (1969) in the database; however, this report contains no mention of *An. hancocki*, so it is removed from the list.

#### Mauritius

- 1) *An. arabiensis*
- 2) *An. coustani*
- 3) *An. maculipalpis*

- 4) *An. merus*

#### **Comment**

1) *Anopheles gambiae* s.s. (as *An. gambiae* species A) (Davidson 1966) and *An. funestus* of MacGregor (1924) were collected in Mauritius before the DDT and HCH (hexachlorocyclohexane) spraying campaigns. However, Bryan & Gerbert (1976) did not find *An. gambiae* species A, and Dowling (1953) reported an absence of *An. funestus*. Gopaul (1995) reported only four species of *Anopheles* in Mauritius, the same species listed above.

#### **Mayotte**

- 1) *An. coustani*
- 2) *An. funestus*
- 3) *An. gambiae* s.s.
- 4) *An. maculipalpis*
- 5) *An. mascarensis*
- 6) *An. merus*
- 7) *An. pretoriensis*

#### **Comment**

- 1) Grjebine (1966) noted the presence of *An. merus* on Mayotte, so it is added to the list.

#### **Mozambique**

- 1) *An. arabiensis*
- 2) *An. brunnipes*
- 3) *An. cinereus*
- 4) *An. confusus*
- 5) *An. coustani*
- 6) *An. cydippis*
- 7) *An. demeilloni*
- 8) *An. funestus*
- 9) *An. gambiae* s.s.
- 10) *An. lesoni*
- 11) *An. letabensis*
- 12) *An. listeri*
- 13) *An. longipalpis*
- 14) *An. maculipalpis*
- 15) *An. marshallii*
- 16) *An. merus*
- 17) *An. mousinhoi*
- 18) *An. natalensis*
- 19) *An. nili*
- 20) *An. parensis*
- 21) *An. pharoensis*
- 22) *An. pretoriensis*
- 23) *An. quadriannulatus*
- 24) *An. rhodesiensis*
- 25) *An. rivulorum*
- 26) *An. rufipes*
- 27) *An. seydeli*
- 28) *An. squamosus*
- 29) *An. tenebrosus*

- 30) *An. theileri*
- 31) *An. wellcomei*
- 32) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) included *An. paludis* as mentioned by Soromenho (1923). Soromenho's report is not accompanied by any description and probably refers to *An. coustani*, recorded extensively in surveys conducted in Mozambique by de Meillon & de Carvalho Pereira (1940). The distribution maps in Gillies & de Meillon (1968) show no records of *An. paludis* from Mozambique. It is therefore deleted from the list.
- 2) Gillies & de Meillon (1968) note that the presence of *An. domicolus* in Mozambique remains to be confirmed. It is therefore not included on the list here.
- 3) Cornel *et al.* (2018) reported *An. parensis* from Vilankulo, Inhambane Province in Mozambique, which is added to the list.

#### Namibia

- 1) *An. arabiensis*
- 2) *An. azevedoi*
- 3) *An. cinereus*
- 4) *An. coustani*
- 5) *An. demeilloni*
- 6) *An. distinctus*
- 7) *An. fontinalis*
- 8) *An. funestus*
- 9) *An. gambiae s.s.*
- 10) *An. listeri*
- 11) *An. maculipalpis*
- 12) *An. marshallii*
- 13) *An. namibiensis*
- 14) *An. nili*
- 15) *An. pharoensis*
- 16) *An. pretoriensis*
- 17) *An. quadriannulatus*
- 18) *An. rhodesiensis*
- 19) *An. rivulorum*
- 20) *An. ruarinus*
- 21) *An. rufipes*
- 22) *An. squamosus*
- 23) *An. vaneedeni*
- 24) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. moucheti*, found by de Meillon (1951) in the larval stage. Gillies & de Meillon (1968) noted that this record refers to either *An. domicolus* or *An. longipalpis*. Further confirmation of the species is needed and therefore none of the three species is included on the list here.
- 2) *Anopheles azevedoi* was collected as larvae in central Namibia (Ntomwa *et al.* 2006).

#### Niger

- 1) *An. arabiensis*
- 2) *An. cinereus*
- 3) *An. coluzzii*



- 4) *An. domicolus*
- 5) *An. dthali*
- 6) *An. flavicosta*
- 7) *An. funestus*
- 8) *An. gambiae s.s.*
- 9) *An. hervyi*
- 10) *An. maculipalpis*
- 11) *An. multicolor*
- 12) *An. nili*
- 13) *An. pharoensis*
- 14) *An. pretoriensis*
- 15) *An. rhodesiensis*
- 16) *An. rivulorum*
- 17) *An. rufipes*
- 18) *An. salbaii*
- 19) *An. squamosus*
- 20) *An. wellcomei*
- 21) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) included *An. rhodesiensis* and *An. rhodesiensis rupicolus*. The subspecies is removed from the list.
- 2) *Anopheles hervyi* was noted by Labbo *et al.* (2010) and is added to the list.
- 3) Julvez *et al.* (1998) lists *An. hispaniola*, *An. domicolus* and *An. flavicosta*, and these are added to the list. *Anopheles hispaniola* is added as *An. cinereus*, as it was synonymized with *An. cinereus* (Dahl & White 1978).
- 4) Julvez *et al.* (1998) stated that probably only *An. ziemanni* is present in Niger, and that records of *An. coustani* prior to 1970 did not distinguish between *An. coustani* and *An. ziemanni*. Until specific records of *An. coustani* are provided, this species is removed from the list.
- 5) The IRD database includes *An. moucheti*, but as this is far from its known distribution, it has not been included in the list pending confirmation.

#### Nigeria

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. barberellus*
- 4) *An. brohieri*
- 5) *An. brucei*
- 6) *An. brunnipes*
- 7) *An. cinctus*
- 8) *An. coluzzii*
- 9) *An. coustani*
- 10) *An. cristipalpis*
- 11) *An. deemingi*
- 12) *An. domicolus*
- 13) *An. flavicosta*
- 14) *An. freetownensis*
- 15) *An. funestus*
- 16) *An. gambiae s.s.*
- 17) *An. hancocki*
- 18) *An. hargreavesi*
- 19) *An. implexus*
- 20) *An. jebudensis*

- 21) *An. lesoni*
- 22) *An. maculipalpis*
- 23) *An. marshallii*
- 24) *An. melas*
- 25) *An. moucheti*
- 26) *An. nili*
- 27) *An. obscurus*
- 28) *An. paludis*
- 29) *An. pharoensis*
- 30) *An. pretoriensis*
- 31) *An. rhodesiensis*
- 32) *An. rivulorum*
- 33) *An. rufipes*
- 34) *An. smithii*
- 35) *An. squamosus*
- 36) *An. theileri*
- 37) *An. wellcomei*
- 38) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. watsoni* Edwards and *An. moucheti nigeriensis*. *Anopheles watsoni* is a synonym of *An. rufipes* and is not included in the list. *Anopheles moucheti nigeriensis* is a subspecies of *An. moucheti*, so is not included on the list.
- 2) Ayanda (2009) collected *An. ardensis*, so this is added to the list.
- 3) The type specimen of *An. deemingi* is in the Natural History Museum, London

#### Republic of Congo

- 1) *An. ardensis*
- 2) *An. barberellus*
- 3) *An. brohieri*
- 4) *An. brunnipes*
- 5) *An. caroni*
- 6) *An. cinctus*
- 7) *An. cinereus*
- 8) *An. coluzzii*
- 9) *An. coustani*
- 10) *An. cydippis*
- 11) *An. demeilloni*
- 12) *An. dureni*
- 13) *An. freetownensis*
- 14) *An. funestus*
- 15) *An. gambiae s.s.*
- 16) *An. gibbinsi*
- 17) *An. hamoni*
- 18) *An. hancocki*
- 19) *An. hargreavesi*
- 20) *An. implexus*
- 21) *An. jebudensis*
- 22) *An. lesoni*
- 23) *An. longipalpis*
- 24) *An. marshallii*
- 25) *An. melas*

- 26) *An. moucheti*
- 27) *An. natalensis*
- 28) *An. nili*
- 29) *An. obscurus*
- 30) *An. paludis*
- 31) *An. pretoriensis*
- 32) *An. rageaui*
- 33) *An. rhodesiensis*
- 34) *An. rivulorum*
- 35) *An. rufipes*
- 36) *An. squamosus*
- 37) *An. vanhoofi*
- 38) *An. ziemanni*

#### Comments

- 1) Adam (1964) indicated that larvae of *An. smithii rageaui* (now *An. rageaui*) had been found at Sounda by Taufflieb.
- 2) The record of *An. cinereus* seems out of the normal range of the species, but it is recorded by Lacan (1958) as being collected by Grjebine near Brazzaville. Lacan also recorded a collection of *An. gibbinsi* (as *An. moucheti gibbinsi*) in Moyen-Congo.
- 3) *Anopheles buxtoni* is included in the IRD database, but as this is far from its normal distribution, it is not included pending confirmation.

#### La Réunion

- 1) *An. arabiensis*
- 2) *An. coustani*

#### Comment

1) *Anopheles funestus* and *An. squamosus* have been recorded on La Réunion, but in light of the absence of any specimens in museums, Hamon & Dufour (1954) doubted the presence of these species on the island. In the absence of any recent collections or proof of previous collections, these species are not included on the list.

#### Rwanda

- 1) *An. arabiensis*
- 2) *An. christyi*
- 3) *An. coustani*
- 4) *An. cydippis*
- 5) *An. demeilloni*
- 6) *An. durenii*
- 7) *An. funestus*
- 8) *An. gambiae s.s.*
- 9) *An. garnhami*
- 10) *An. gibbinsi*
- 11) *An. implexus*
- 12) *An. maculipalpis*
- 13) *An. marshallii*
- 14) *An. moucheti*
- 15) *An. natalensis*
- 16) *An. paludis*
- 17) *An. pharoensis*
- 18) *An. pretoriensis*
- 19) *An. squamosus*

- 20) *An. tenebrosus*
- 21) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) did not include *An. cydippis*. Vincke & Jadin (1946) noted its presence in Astrida (Butare) as *An. squamosus entebbiensis*.
- 2) *Anopheles gibbinsi* is not listed by Kyalo *et al.* (2017) but was found by Vincke & Jadin (1946) and is added to the list.
- 3) We could not find records of *An. nili* or *An. ardensis* in Rwanda, however, they are listed as being present in Ruanda Urundi by Gillies & De Meillon (1968). Vermeylen (1967) listed *An. nili* as being present in Burundi but not Rwanda. Until records of either species can be found, we remove these two species from the list.

### São Tomé e Príncipe

- 1) *An. coluzzii*
- 2) *An. coustani*
- 3) *An. funestus*
- 4) *An. melas*
- 5) *An. paludis*
- 6) *An. pharoensis*

### Comment

- 1) Kyalo *et al.* (2017) did not include *An. gambiae s.s.* Recent reports only indicate that *An. coluzzii* is present (della Torre *et al.* 2001; Marshall *et al.* 2008; Salgueiro *et al.* 2013).

### Senegal

- 1) *An. arabiensis*
- 2) *An. brohieri*
- 3) *An. brunnipes*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. domicolus*
- 7) *An. flavicosta*
- 8) *An. freetownensis*
- 9) *An. funestus*
- 10) *An. gambiae s.s.*
- 11) *An. hancocki*
- 12) *An. lesoni*
- 13) *An. maculipalpis*
- 14) *An. melas*
- 15) *An. nili*
- 16) *An. paludis*
- 17) *An. pharoensis*
- 18) *An. pretoriensis*
- 19) *An. rhodesiensis*
- 20) *An. rivulorum*
- 21) *An. rufipes*
- 22) *An. sergentii*
- 23) *An. squamosus*
- 24) *An. wellcomei*
- 25) *An. ziemanni*

## Comment

1) Kyalo *et al.* (2017) did not include *An. lesoni* and *An. rivulorum*, however, Kobylnski (2011) noted their presence near Kedougou, and they are added to the list.

## Sierra Leone

- 1) *An. barberellus*
- 2) *An. brohieri*
- 3) *An. brunnipes*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. domicolus*
- 7) *An. flavicosta*
- 8) *An. freetownensis*
- 9) *An. funestus*
- 10) *An. gambiae s.s.*
- 11) *An. hancocki*
- 12) *An. hargreavesi*
- 13) *An. marshallii*
- 14) *An. melas*
- 15) *An. moucheti*
- 16) *An. nili*
- 17) *An. obscurus*
- 18) *An. paludis*
- 19) *An. pharoensis*
- 20) *An. rhodesiensis*
- 21) *An. rufipes*
- 22) *An. smithii*
- 23) *An. somalicus*
- 24) *An. squamosus*
- 25) *An. tenebrosus*
- 26) *An. theileri*
- 27) *An. ziemanni*

## Comments

- 1) The only reference in the spreadsheet that Kyalo *et al.* (2017) use for *An. quadriannulatus* in Sierra Leone is Evans (1931), who mentioned *An. quadriannulatus* in passing. However, this publication is about observations carried out in southern Nigeria and should not be included in the Sierra Leone references. *Anopheles quadriannulatus* is removed from the list.
- 2) No record of *An. cinctus* having been collected in Sierra Leone was found, so it has been removed from the list.

## Somalia

- 1) *An. arabiensis*
- 2) *An. azaniae*
- 3) *An. cinereus*
- 4) *An. coluzzii*
- 5) *An. coustani*
- 6) *An. culicifacies*
- 7) *An. daudi*
- 8) *An. demeilloni*
- 9) *An. dthali*
- 10) *An. funestus*

- 11) *An. gambiae s.s.*
- 12) *An. garnhami*
- 13) *An. merus*
- 14) *An. nili*
- 15) *An. paludis*
- 16) *An. pharoensis*
- 17) *An. pretoriensis*
- 18) *An. rhodesiensis*
- 19) *An. salbaii*
- 20) *An. sergentii*
- 21) *An. somalicus*
- 22) *An. squamosus*
- 23) *An. tenebrosus*
- 24) *An. turkhudi*

#### Comments

- 1) Kyalo *et al.* (2017) list *An. culicifacies* and *An. sergentii macmahoni*. Diallo *et al.* (2014) reported the presence of *An. culicifacies*. *Anopheles sergentii macmahoni* is a subspecies of *An. sergentii*, so is not included on the list.
- 2) *Anopheles tenebrosus* was found by Coluzzi (1958) and is added to the list.
- 3) Diallo *et al.* (2014) reported the presence of *An. garnhami*, which is added to the list.

#### South Africa

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. argenteolobatus*
- 4) *An. azevedoi*
- 5) *An. cameroni*
- 6) *An. carteri*
- 7) *An. cinctus*
- 8) *An. cinereus*
- 9) *An. confusus*
- 10) *An. coustani*
- 11) *An. crypticus*
- 12) *An. cydippis*
- 13) *An. demeilloni*
- 14) *An. flavicosta*
- 15) *An. funestus*
- 16) *An. gambiae s.s.*
- 17) *An. garnhami*
- 18) *An. hughii*
- 19) *An. implexus*
- 20) *An. kosiensis*
- 21) *An. lesoni*
- 22) *An. letabensis*
- 23) *An. listeri*
- 24) *An. longipalpis*
- 25) *An. maculipalpis*
- 26) *An. marshallii*
- 27) *An. merus*
- 28) *An. mousinhoi*
- 29) *An. natalensis*



- 30) *An. nili*
- 31) *An. parensis*
- 32) *An. pharoensis*
- 33) *An. pretoriensis*
- 34) *An. quadriannulatus*
- 35) *An. rhodesiensis*
- 36) *An. rivulorum*
- 37) *An. rivulorum*-like
- 38) *An. ruarinus*
- 39) *An. rufipes*
- 40) *An. schwetzi*
- 41) *An. squamosus*
- 42) *An. tenebrosus*
- 43) *An. theileri*
- 44) *An. vaneedeni*
- 45) *An. vernus*
- 46) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) list *An. azevedoi*, *An. kosiensis*, *An. mousinhoi* and *An. turkhudi*. *Anopheles azevedoi* was collected in the Cape Province and initially described as *An. deaconi* by de Meillon & van Eeden (1976). *Anopheles kosiensis* was described from specimens collected in KwaZulu/Natal Province (Coetzee *et al.* 1987). Hunt & Coetzee (1992) noted the presence of *An. mousinhoi* in South Africa. Van der Linde *et al.* (1982) noted the presence of *An. turkhudi* in the Free State Province. Van der Linde *et al.* give three different species identifications for the same specimens (*An. cinereus*, *An. listeri* and *An. turkhudi*) but the authors stated that they considered their specimens as belonging to the “cinereus group”. The former two species both occur in South Africa. Since *An. turkhudi* is confined to the northeastern Horn of Africa, it is unlikely that it occurs in South Africa and is therefore deleted from the list.
- 2) *Anopheles coustani* is a common species and is added to the list (Gillies & de Meillon 1968; Gillies & Coetzee 1987).
- 3) Smith *et al.* (1977) recorded *An. flavicosta* from South Africa and this species is added to the list.
- 4) There is a single record (Miles 1978) of *An. gambiae s.s.* from Pelindaba in northern Kwazulu/Natal Province on the Mozambique border.
- 5) Mouatcho *et al.* (2018) recorded *An. rivulorum*-like, an as yet unnamed new species.
- 6) Kyalo *et al.* (2017) also did not include *An. fontinalis*, *An. schwetzi* and *An. theileri*. All three species are mentioned in Gillies & de Meillon (1968) and are included here.
- 7) Two specimens of *An. schwetzi* from Olifantsvlei, Johannesburg are in the Natural History Museum, London.

### South Sudan

- 1) *An. arabiensis*
- 2) *An. brohieri*
- 3) *An. coustani*
- 4) *An. demeilloni*
- 5) *An. flavicosta*
- 6) *An. funestus*
- 7) *An. gambiae s.l.*
- 8) *An. garnhami*
- 9) *An. gibbinsi*
- 10) *An. implexus*
- 11) *An. leesoni*
- 12) *An. longipalpis*
- 13) *An. maculipalpis*
- 14) *An. marshallii*

- 15) *An. moucheti*
- 16) *An. nili*
- 17) *An. obscurus*
- 18) *An. paludis*
- 19) *An. pharoensis*
- 20) *An. pretoriensis*
- 21) *An. rhodesiensis*
- 22) *An. rivulorum*
- 23) *An. rufipes*
- 24) *An. sergentii*
- 25) *An. squamosus*
- 26) *An. symesi*
- 27) *An. wellcomei*
- 28) *An. ziemanni*

#### Comment

1) Kyalo *et al.* (2017) did not include *An. gambiae s.s.* Asma (2012) reported *An. gambiae* separately from *An. arabiensis*, but did not distinguish between *An. gambiae s.s.* or *An. coluzzii* (at that time S and M forms), so *An. gambiae s.l.* is noted here. Kyalo *et al.* (2017) also did not include *An. gibbinsi*, which was recorded by Lewis (1956) as *An. marshallii* var. *gibbinsi*. *Anopheles gibbinsi* is thus added to the list.

#### Sudan

- 1) *An. arabiensis*
- 2) *An. cinereus*
- 3) *An. coustani*
- 4) *An. dthali*
- 5) *An. funestus*
- 6) *An. gambiae s.s.*
- 7) *An. implexus*
- 8) *An. lesoni*
- 9) *An. maculipalpis*
- 10) *An. marshallii*
- 11) *An. multicolor*
- 12) *An. nili*
- 13) *An. paludis*
- 14) *An. pharoensis*
- 15) *An. pretoriensis*
- 16) *An. rhodesiensis*
- 17) *An. rivulorum*
- 18) *An. rufipes*
- 19) *An. sergentii*
- 20) *An. squamosus*
- 21) *An. turkhudi*
- 22) *An. wellcomei*
- 23) *An. ziemanni*

#### Comments

1) Kyalo *et al.* (2017) list *An. rhodesiensis rupicolus*, which is a subspecies and deleted from the list.

2) Kyalo *et al.* (2017) did not include *An. gambiae s.s.* although it is listed in the database. Petrarca *et al.* (2000) noted a single *An. gambiae* specimen from Sennar. All other specimens in this paper are recorded as the Savannah/Forest chromosomal forms, i.e. *An. gambiae s.s.*, albeit from South Sudan. This species is included in the list here.

- 3) Lewis (1944) recorded *An. multicolor* from Faras West, an area that was flooded with the creation of Lake Nasser. Later records also place it near Port Sudan (Lewis 1956).
- 4) There is a single specimen of *An. implexus* in the Natural History Museum, London.

#### **Tanzania (Mainland)**

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. argenteolobatus*
- 4) *An. brunnipes*
- 5) *An. christyi*
- 6) *An. cinereus*
- 7) *An. confusus*
- 8) *An. coustani*
- 9) *An. cydippis*
- 10) *An. demeilloni*
- 11) *An. distinctus*
- 12) *An. erepens*
- 13) *An. funestus*
- 14) *An. gambiae s.s.*
- 15) *An. garnhami*
- 16) *An. gibbinsi*
- 17) *An. implexus*
- 18) *An. keniensis*
- 19) *An. kingi*
- 20) *An. lesoni*
- 21) *An. letabensis*
- 22) *An. longipalpis*
- 23) *An. lovettae*
- 24) *An. machardyi*
- 25) *An. maculipalpis*
- 26) *An. marshallii*
- 27) *An. merus*
- 28) *An. moucheti*
- 29) *An. namibiensis*
- 30) *An. natalensis*
- 31) *An. nili*
- 32) *An. njombiensis*
- 33) *An. paludis*
- 34) *An. parensis*
- 35) *An. pharoensis*
- 36) *An. pretoriensis*
- 37) *An. quadriannulatus*
- 38) *An. rhodesiensis*
- 39) *An. rivulorum*
- 40) *An. rufipes*
- 41) *An. schwetzi*
- 42) *An. seydeli*
- 43) *An. squamosus*
- 44) *An. swahilicus*
- 45) *An. tenebrosus*
- 46) *An. theileri*

- 47) *An. walravensi*
- 48) *An. wellcomei*
- 49) *An. wilsoni*
- 50) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) included *An. vaneedeni* but this species was not found in the records listed in the database and is removed from the list. In Koekemoer *et al.* (1999), *An. vaneedeni* is reported from Tzaneen, South Africa, which may be the source of confusion. Kyalo *et al.* (2017) also included *An. quadriannulatus*, reported by Fornadel & Norris (2015), and it remains on the list.
- 2) Bødker *et al.* (2003) reported the collection of 36 *An. letabensis* from the Usambara. It is added to the list.
- 3) *Anopheles erepens* is noted by Gillies (1958), as *An. wellcomei erepens*, raised to species level by Gillies & Coetzee (1987), and is added to the list.
- 4) Peters (1953) recorded *An. walravensi* from Njombe, and is added to the list.
- 5) Wilson (1936) noted *An. moucheti* from Amani, and is added to the list.
- 6) The IRD database lists *An. namibiensis* from Mahongo, Tanzania.

#### Tanzania (Zanzibar)

- 1) *An. arabiensis*
- 2) *An. aruni*
- 3) *An. coustani*
- 4) *An. funestus*
- 5) *An. gambiae s.s.*
- 6) *An. lesoni*
- 7) *An. longipalpis*
- 8) *An. maculipalpis*
- 9) *An. marshallii*
- 10) *An. merus*
- 11) *An. obscurus*
- 12) *An. paludis*
- 13) *An. parensis*
- 14) *An. pretoriensis*
- 15) *An. quadriannulatus*
- 16) *An. rivulorum*
- 17) *An. rufipes*
- 18) *An. squamosus*
- 19) *An. swahilicus*
- 20) *An. tenebrosus*
- 21) *An. wellcomei*
- 22) *An. ziemanni*

#### Comments

- 1) Kyalo *et al.* (2017) did not include *An. rufipes* although Gillies & de Meillon (1968) do. It is added to the list.
- 2) *Anopheles gambiae s.s.* is noted by Mnzava & Kilama (1986) and added to the list.

#### Togo

- 1) *An. arabiensis*
- 2) *An. coluzzii*
- 3) *An. coustani*
- 4) *An. flavicosta*

- 5) *An. funestus*
- 6) *An. gambiae s.s.*
- 7) *An. hargreavesi*
- 8) *An. marshallii*
- 9) *An. melas*
- 10) *An. nili*
- 11) *An. pharoensis*
- 12) *An. pretoriensis*
- 13) *An. rivulorum*
- 14) *An. rufipes*
- 15) *An. squamosus*
- 16) *An. wellcomei*
- 17) *An. ziemanni*

### Comments

- 1) Kyalo *et al.* (2017) did not include *An. domicolus*, *An. lesoni* and *An. smithii* but these are listed in the “Togo and Dahomey” country list of Gillies & de Meillon (1968). They are not included here until such time as their presence in Togo can be confirmed.
- 2) Kyalo *et al.* (2017) included *An. brunnipes*, *An. maculipalpis*, *An. obscurus*, *An. paludis*, *An. rhodesiensis*, *An. rivulorum* and *An. ziemanni*, but no records were found for these species. Until we have specific records for the presence of these species in Togo, they are removed from the list.

### Uganda

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. brohieri*
- 4) *An. bwambae*
- 5) *An. christyi*
- 6) *An. cinereus*
- 7) *An. coustani*
- 8) *An. cydippis*
- 9) *An. demeilloni*
- 10) *An. domicolus*
- 11) *An. funestus*
- 12) *An. gambiae s.s.*
- 13) *An. garnhami*
- 14) *An. gibbinsi*
- 15) *An. hancocki*
- 16) *An. hargreavesi*
- 17) *An. harperi*
- 18) *An. implexus*
- 19) *An. keniensis*
- 20) *An. kingi*
- 21) *An. lesoni*
- 22) *An. longipalpis*
- 23) *An. maculipalpis*
- 24) *An. marshallii*
- 25) *An. moucheti*
- 26) *An. natalensis*
- 27) *An. nili*
- 28) *An. obscurus*

- 29) *An. paludis*
- 30) *An. parensis*
- 31) *An. pharoensis*
- 32) *An. pretoriensis*
- 33) *An. quadriannulatus*
- 34) *An. rhodesiensis*
- 35) *An. rivulorum*
- 36) *An. rufipes*
- 37) *An. squamosus*
- 38) *An. symesi*
- 39) *An. tenebrosus*
- 40) *An. theileri*
- 41) *An. vinckei*
- 42) *An. wellcomei*
- 43) *An. ziemanni*

### Comments

- 1) Mutebi *et al.* (2018) recorded *An. theileri*, which is added to the list.
- 2) The reference for *An. bervoetsi* provided by Antonio-Nkondjio *et al.* (2008) does not include collection data for this species in Uganda, instead, it refers to collections made in the Democratic Republic of the Congo. This species is removed from the list.
- 3) Gibbins (1936) reported a collection of a single specimen of “*costalis* var. *quadriannulatus*”, which was confirmed by Alwen Evans. It is added to the list but requires molecular confirmation of species identity.

### Zambia

- 1) *An. arabiensis*
- 2) *An. argenteolobatus*
- 3) *An. brunnipes*
- 4) *An. coustani*
- 5) *An. cydippis*
- 6) *An. demeilloni*
- 7) *An. distinctus*
- 8) *An. domicolus*
- 9) *An. funestus*
- 10) *An. gambiae* s.s.
- 11) *An. implexus*
- 12) *An. lesoni*
- 13) *An. longipalpis*
- 14) *An. maculipalpis*
- 15) *An. marshallii*
- 16) *An. merus*
- 17) *An. nili*
- 18) *An. parensis*
- 19) *An. pharoensis*
- 20) *An. pretoriensis*
- 21) *An. quadriannulatus*
- 22) *An. rhodesiensis*
- 23) *An. rivulorum*
- 24) *An. rufipes*
- 25) *An. schwetzi*
- 26) *An. seydeli*
- 27) *An. squamosus*



- 28) *An. tenebrosus*
- 29) *An. theileri*
- 30) *An. vaneedeni*
- 31) *An. walravensi*
- 32) *An. wellcomei*
- 33) *An. ziemanni*

#### Comments

- 1) McCullough & Friis-Hansen (1961) noted *An. squamosus cydippis*, which is added to the list as *An. cydippis*.
- 2) The reference provided to justify the presence of *An. coluzzii* in Zambia (Das *et al.* 2016) does not provide records of this species, so it is removed from the list.
- 3) *Anopheles tenebrosus* seems to be recognized in Zambia by Gillies & de Meillon (1968), and a specimen from Livingstone is in the Natural History Museum, London.
- 4) Specimens of *An. merus* from *Avicennia* swamps in Pemba are in the Natural History Museum, London.

#### Zimbabwe

- 1) *An. arabiensis*
- 2) *An. ardensis*
- 3) *An. argenteolobatus*
- 4) *An. brunnipes*
- 5) *An. carteri*
- 6) *An. cinereus*
- 7) *An. coluzzii*
- 8) *An. confusus*
- 9) *An. coustani*
- 10) *An. cydippis*
- 11) *An. demeilloni*
- 12) *An. distinctus*
- 13) *An. domicolus*
- 14) *An. funestus*
- 15) *An. fuscivenosus*
- 16) *An. gambiae s.s.*
- 17) *An. garnhami*
- 18) *An. keniensis*
- 19) *An. lesoni*
- 20) *An. listeri*
- 21) *An. longipalpis*
- 22) *An. maculipalpis*
- 23) *An. marshallii*
- 24) *An. merus*
- 25) *An. mousinhoi*
- 26) *An. multinctus*
- 27) *An. natalensis*
- 28) *An. nili*
- 29) *An. parensis*
- 30) *An. pharoensis*
- 31) *An. pretoriensis*
- 32) *An. quadriannulatus*
- 33) *An. rhodesiensis*
- 34) *An. rivulorum*
- 35) *An. ruarinus*

- 36) *An. rufipes*
- 37) *An. schwetzi*
- 38) *An. seydeli*
- 39) *An. squamosus*
- 40) *An. tenebrosus*
- 41) *An. theileri*
- 42) *An. vaneedeni*
- 43) *An. walravensi*
- 44) *An. wellcomei*
- 45) *An. ziemanni*

#### Comments

- 1) Reid & Woods (1957) noted *An. multicinctus* (as *An. natalensis* var. *multicinctus*), *An. wellcomei* (as *An. walravensi* var. *milesi*) and *An. distinctus*, and these species are added to the list.
- 2) Masendu *et al.* (2004) recorded both *An. gambiae* s.s. and *An. coluzzii* in the Zambezi Valley, Zimbabwe. This record of *An. coluzzii* is very unusual, being far out of the known distribution of the species, and needs confirmation. It is retained on the list.
- 3) Specimens of *An. keniensis* were found in the collection of the Natural History Museum, London, with the locality listed as “Nyangura River, Ndonga”