



Anopheles species identification: an old and continuing challenge

Maureen Coetzee, Lizette Koekemoer, Basil Brooke
National Institute for Communicable Diseases &
Wits Research Institute for Malaria
Faculty of Health Sciences
University of the Witwatersrand

Background

- Africa's anopheline malaria vectors are found mainly within the *Anopheles funestus* group and *An. gambiae* complex
- However, de Meillon (1947) proposed that the possibility exists for almost all anophelines to act as malaria vectors, when given suitable conditions
- The *Anopheles* genus contains about 500 species of which only a few are important for malaria transmission, making species identification during vector surveillance extremely important

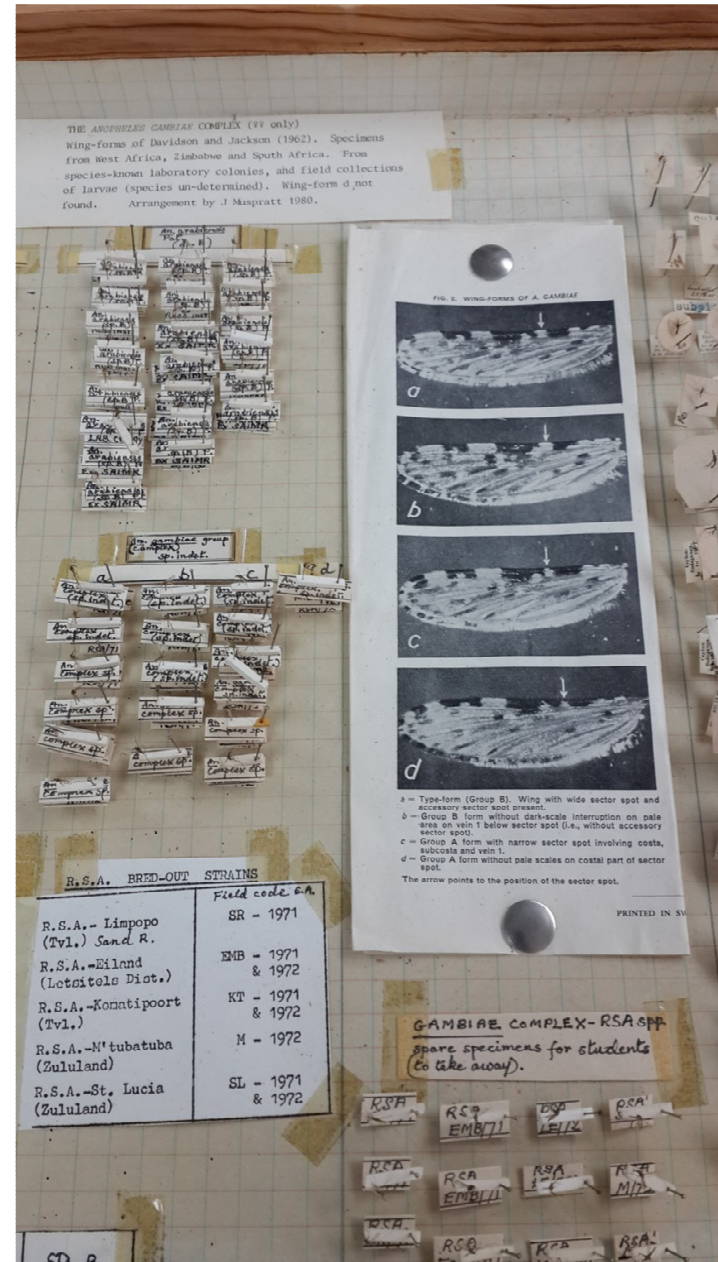
Problem



- *A priori* morphological identification based on the use of dichotomous keys generally forms the basis for further molecular techniques
- However, there are some drawbacks to morphological species identification because it is time-consuming and identification might be incomplete if specimens have lost important external features
- There is a tendency toward developing molecular techniques designed to surpass morphological taxonomy as a form of species identification

Aim

The rationale for this study was to evaluate the impact of incorrect or incomplete morphological identification on molecular species identification of anophelines from southern Africa



Methods

- Anophelines were sampled from five African countries
- Morphologically identified using Gillies & Coetzee (1987)
- Non-vectors were subjected to PCR evaluation using the protocols for *An. funestus* group, *An. gambiae* complex, *An. funestus*-like and *An. rivulorum*-like

Results

Country	Province / Site	Morphological ID	Molecular ID using <i>An. gambiae</i> complex PCR	Molecular ID using <i>An.</i> <i>funestus</i> group PCR
Botswana	Xakanaka	<i>An. wellcomei</i> (n = 1)	-	-
Guinea Conakry	Siguiri	<i>An. rufipes</i> (n = 8)	-	<i>An. leesonii</i> (5)
Mali	Yanfolila	<i>An. rufipes</i> (n = 10)	-	<i>An. rivulorum</i> (1) <i>An. leesonii</i> (1)
Namibia	Katima Mulilo	<i>An. squamosus</i> (n = 2)	<i>An. gambiae</i> (2)	-
South Africa	Kwazulu-Natal	<i>An. rufipes</i> (n = 19)	-	-
	Gauteng	<i>An. crypticus</i> (n = 17)	-	-
		<i>An. marshallii</i> group (n = 1)	-	-
	Mpumalanga	<i>An. coustani</i> group (n = 6)	-	-
		<i>An. tenebrosus</i> (n = 1)	-	-
		<i>An. pretoriensis</i> (n = 20)	-	-
		<i>An. rufipes</i> (n = 9)	<i>An. gambiae</i> / <i>An. merus</i> (1)	-
		<i>An. maculipalpis</i> (n = 10)	-	-
	Limpopo	<i>An. maculipalpis</i> (n = 1)	-	-
		<i>An. rhodesiensis</i> (n = 1)	-	<i>An. leesonii</i> (1)
		<i>An. listeri</i> (n = 12)	<i>An. gambiae</i> (3) <i>An. merus</i> (2)	-

Conclusions

- Misidentifications are obtainable by analyzing non-vector anophelines based on vector-specific molecular assays
- Therefore vital to use molecular assays in conjunction with morphological identification
- If poor morphological identification cannot be corrected during the molecular part of the identification process, then misidentification of non-vector species as vector species will continue to be a growing problem in vector surveillance

Appeal

- Prof Maureen Coetzee is planning to revise the 1968 *Anophelinae of Africa south of the Sahara* by Gillies & de Meillon to bring it up-to-date with all the new species
- The keys (and those of Gillies & Coetzee 1987) also need to be revised and she would very much appreciate it if members of the VCWG could share with her their experiences of using these keys