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**A SUPPLEMENT TO THE ANOPHELINEAE OF
AFRICA SOUTH OF THE SAHARA
(AFROTROPICAL REGION)**

by

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TABLE OF CONTENTS

	Page
Introduction	1
Malaria transmission	2
Classification	2
Taxonomic changes	2
Morphological nomenclature	3
Distribution	7
List of species of Afrotropical <i>Anopheles</i>	9
Key to the females	12
Key to the fourth stage larvae	36
Key to the pupae	59
Supplementary account of species	64
References cited	127
Additional uncited references	139

INTRODUCTION

In the 18 years or so since the publication of the 'Anophelinae of Africa South of the Sahara', progress in understanding this group of medically important insects has been rather uneven. The great wave of interest in the bionomics of vectors, spurred on by the prospects of malaria eradication by house-spraying, has died down. Cataloguing the anopheline fauna of many countries in the region is now well advanced, that of Ethiopia and Angola having been the most recent to be added. Two areas of study, however, have been vigorously pursued. One, the analysis of the *gambiae* complex, both as to differences between member species and between populations of the same species, and two, the recognition of complexes of sibling species in other groups. In both these areas the role of cytogenetics guided by evolutionary theory has been paramount. The details of chromosome banding sequences brought about by inversion arrangements have no place in a work of this sort. But the importance of the genetic insights provided by such studies into the behaviour of vectors and their relevance to the control of disease cannot be over-emphasised.

This supplement is meant to be used in close conjunction with the original volume. In it we give synoptic accounts of the small number of newly described species together with such new information on the biology and distribution of the fauna as has been published since the appearance of the second edition of 'De Meillon'. Coupled with this we provide new, illustrated keys to the adults and larvae. The search for species complexes, recognisable by their karyotypes, has only just begun and already it has revealed that these complexes are a common feature not only of the anopheline fauna of Africa but of other regions of the world as well. These groups are known as 'sibling' or 'cryptic' species. It is worth emphasising that the two disciplines of classical taxonomy and evolutionary genetics are ideally complementary and mutually supporting. Both are essential. Clearly the accuracies of identification provided by the classical method are less than was assumed to be the case by earlier workers.

This work was made possible by the award of a Wellcome fellowship to one of us (MTG) by the Wellcome Trust in London, to whom we express our sincere appreciation. We are most grateful to Mr C. D. Ramsdale for his valuable help in the compilation of the illustrated keys, the figures being entirely contributed by him. We are also indebted to Prof H. E. Paterson, Dr B. A. Harrison, Dr C. A. Green, Mr R. H. Hunt and Dr G. B. White for helpful discussions and comments on the manuscript and to Dr P. S. Cranston for providing access to the collections at the British Museum (Natural History).

We acknowledge permission from Plexus Publishing Inc. to reproduce figs. 66 and 77a from Harbach and Knight's *Taxonomist's Glossary of Mosquito Anatomy* and Blackwell Scientific Publications to reproduce figs. 5 and 6 from Lambert and Coetzee (1982), fig. 3 from Coetzee (1983) and fig. 2 from Coetzee (1984).

Lastly, we would like to express our feelings of warm respect towards Dr Botha de Meillon, still only in partial retirement, for his encouragement and good wishes in undertaking this task.

MALARIA TRANSMISSION

Even though attempted on only a modest scale, the failure of house-spraying campaigns to break transmission completely in many parts of Africa is now a well established fact. It appears that the presence of *arabiensis* as a vector exacerbates the problem. A major factor in the lack of success of conventional control methods in the northern savanna regions was established by the work of Coluzzi (Molineaux and Gramiccia, 1980), who showed that a significant proportion of populations of both *gambiae s.s.* and *arabiensis* was resting outside. This behaviour was, at least partially, under genetic control and, as a consequence, contact of this section of the population with insecticide was slight and its longevity normal. Hence, in this zone of Africa the interruption of transmission by house-spraying was shown to be unattainable at the present time, even when the operation was conducted with exemplary thoroughness.

In the days when malaria eradication was the orthodox view it was assumed that transmission by the main, endophilic vectors, principally the *gambiae* complex and *funestus*, would ultimately be controlled by house-spraying. This raised the question of whether low level transmission might still be maintained by secondary or 'incidental' vectors, on the grounds that they were largely exophilic and would have little contact with insecticide-treated surfaces. A large number of dissections were carried out and some dozen or so species, listed by Gillies and De Meillon (1968), were shown to be naturally infected with sporozoites at a very low frequency. With the abandonment of eradication this question now appears academic and the importance of such minor vectors is for the most part negligible. It is also now recognised that the detection of very low grade transmission is almost impossibly difficult by entomological means alone, and identification of the vector in these circumstances is rarely possible.

One place where this sort of situation exists is in the northern Transvaal, where house-spraying over many years with DDT has led to the apparent elimination of *funestus s.s.* and the extreme rarity of some members of the *gambiae* complex. Nevertheless, sporadic malaria infections have continued to occur and localised outbreaks have occasionally resulted (Smith *et al.* 1977, De Meillon *et al.* 1977). Suspicion fell on a member of the *funestus* group (referred to by the authors as *aruni?* and described here as *vaneedeni*) and on *flavicosta*, both of which could be caught biting man outdoors in some numbers. However, these suspicions were not supported by catches in outdoor resting sites, since precipitin tests showed that most of them had fed on bovines. The problem, therefore, remains unresolved.

To sum up, the overall vectorial situation in tropical Africa continues to be dominated by *An. gambiae s.s.*, *arabiensis* and *funestus*. In those areas where they occur in numbers, *melas*, *merus*, *bwambae*, *moucheti* and man-biting populations of *nili* are also important local vectors. The status of the dozen or so Incidental Vectors listed by Gillies and De Meillon remains unclear. In certain instances, such as *pharoensis* and *squamosus*, the position is further complicated by the demonstration that these 'species' are in reality species complexes.

CLASSIFICATION

Harrison (1980) has pointed out that Reid and Knight (1961) and Reid (1968), in classifying the subgenus *Anopheles* used the term 'section' for a higher category of taxon than Gillies and De Meillon (1968), who employed it for subdivisions of certain series in subgenus *Cellia*. This latter usage is retained here, since it seems to us that the possibilities of confusion are slight and that these subdivisions are helpful for those primarily concerned with the Afrotropical fauna.

The 121 taxa listed below for the Afrotropical Region include 114 full species, of which 3 are known from cytogenetic studies to represent complexes of as yet unnamed sibling species, and 7 subspecies. Following the practice adopted in the 2nd edition we are not dealing with the fauna of Madagascar, since this has been comprehensively covered by Grjebine (1966).

TAXONOMIC CHANGES

Since the publication of the 2nd edition of the Anophelinae South of the Sahara in 1968 one further listing of the fauna of the Afrotropical Region (formerly Ethiopian Zoogeographical Region) has

been published (White, 1980). This list, as part of the Catalogue of the Diptera of the Afrotropical Region also covered the fauna of the Malagasy Region, which is excluded from this Supplement. Changes adopted here since the publication of the Catalogue, include the addition of 5 species, *namibiensis*, *lounibosi*, *letabensis*, *hughi* and *bwambae*, the description of 2 new species, *ethiopicus* and *vaneedeni*, and the elevation of *wellcomei* subsp. *erepens* to specific status. *Anopheles multicolor*, omitted from the Catalogue by White, is retained on the list of Afrotropical species.

MORPHOLOGICAL NOMENCLATURE

In their exhaustive compilation, the Taxonomists' Glossary, Harbach and Knight (1980, 1982) presented a unified system of nomenclature of the anatomical terms for morphological characters used in mosquito taxonomy. This glossary had its origins in Belkin's (1962) system of chaetotaxy, but has been extended to embrace the anatomy of the whole insect. Until recently, except in the case of pupal chaetotaxy, Belkin's system has been relatively little used by those working on *Anopheles* in Africa and not all workers are familiar with it. Moreover, Gillies and De Meillon (1968) used the old, descriptive names for larval hairs in preference to the, at that time new, numerical system. Since this present work is intended to be used in conjunction with the 1968 volume, we are continuing to use the old terms in keys and descriptions of new species, while giving the new terms in parentheses in every case. By this means it is hoped to ensure, albeit a little clumsily, that the work will be accessible to those familiar with either of the two systems.

Wing venation. Two approaches to the naming of veins have been evident over the years; on the one hand a simple, arbitrary system in which the veins are given serial numbers, on the other a system in which an attempt is made to establish homologies with the generalised insect plan. The former has been widely used in the past by mosquito taxonomists, not least because its simplicity made it suitable for the identification of specimens by field workers. In recent years, following Belkin (1962), a more rigorous approach has been advocated with the intention of bringing Culicid terminology into line with that employed in other groups of Diptera. However, complete stability of nomenclature has yet to be achieved, perhaps because of difficulty in getting agreement on all the homologies involved. In view of this, and in view of the fact that the present Supplement is intended for use by field workers, we have decided to continue to use the numerical system, as shown in fig. 1.

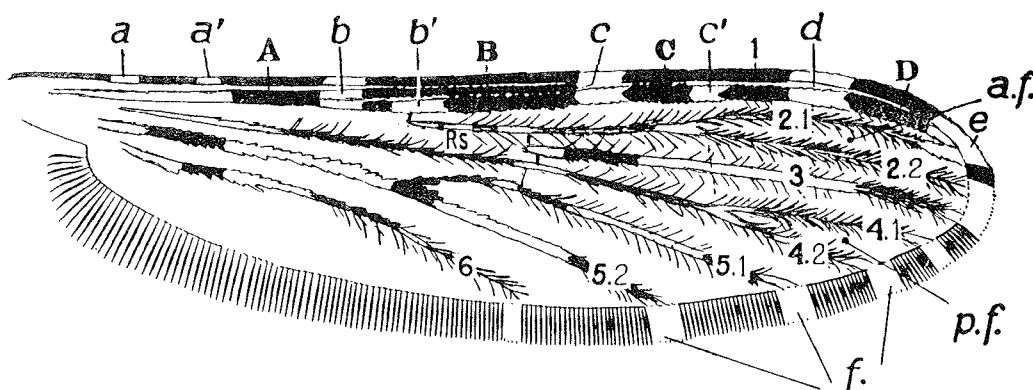


Fig. 1. WING (*marshallii* group), illustrating nomenclature of markings and veins; nomenclature employed by Harbach and Knight (1980) is given in parentheses after each name. Pale markings: *a* humeral (prehumeral pale spot), *a'* pre-sector (humeral pale spot), *b* sector spot (presector pale spot), *b'* accessory sector spot (sector pale spot), *c* sub-costal spot (subcostal pale spot), *c'* pale interruption of third main dark area of 1st vein, *d* subapical pale spot (preapical pale spot), *e* apical spot (apical pale spot), *f* fringe spots. Dark markings: A, B, C, D, the four main dark areas of costa and 1st vein (presector, median, preapical, apical dark spots). Veins: Rs sector or stem of second vein (radial sector), 2.1 and 2.2 upper and lower branches of second vein (R2 and R3). Other veins similarly numbered.

In Table I we show the different systems currently employed. In adopting the numerical system, the applied entomologist will note that he is not required to assign different names to different sections of veins that have functioned, since at least the Oligocene, as single, structural supports.

Adopted here	Harbach & Knight (1980)	Belkin (1962) Tanaka <i>et al.</i> (1979) Harrison (1980), Faran & Linthicum (1981)
Costa	Costa	Costa
Subcosta	Subcosta	Subcosta
Vein 1	Radius (proximally)	Radius (proximally)
	R ₁ (distally)	R ₁ (distally)
Vein 2	Radial sector	Radial sector (proximally)
		R ₂ + 3 (distal part of stem)
Vein 2.1	R ₂	R ₂
2.2	R ₃	R ₃
Vein 3	R ₄ + 5	R ₄ + 5
Vein 4	Media	Media
Vein 4.1	M ₁	M ₁ + 2
4.2	M ₂	M ₃ + 4
Vein 5	CuA	Cubitus
Vein 5.1	M ₃ + 4	Cul
5.2	CuA	Cu ₂
Vein 6	1a	1A

TABLE I: Comparative terminology for venation of wings.

Comparative terminology for the taxonomically important parts of the male genitalia are shown in Table II, while the system of numbering for pupal setae is illustrated in fig. 2. Harbach and Knight's system for the larval setae is shown in fig. 3 and a comparison of their system with that employed here is set out in Table III.

MALE TERMINALIA (GENITALIA)	
Gillies & De Meillon 1968	Harbach & Knight 1980 Harrison 1980
Harpago	Claspette
Club	Lateral club
Apical bristle	Apical seta
Outer accessory hair	Intermediate seta
Inner accessory hair	- (referred to as ventromesad seta or setae)
Phallosome	Phallosome
	Aedeagus (apical portion bearing leaflets)
Leaflets	Leaflets
Coxite	Gonocoxite
Parabasal spines	Accessory setae

TABLE II: Equivalent terms used for parts of male genitalia.

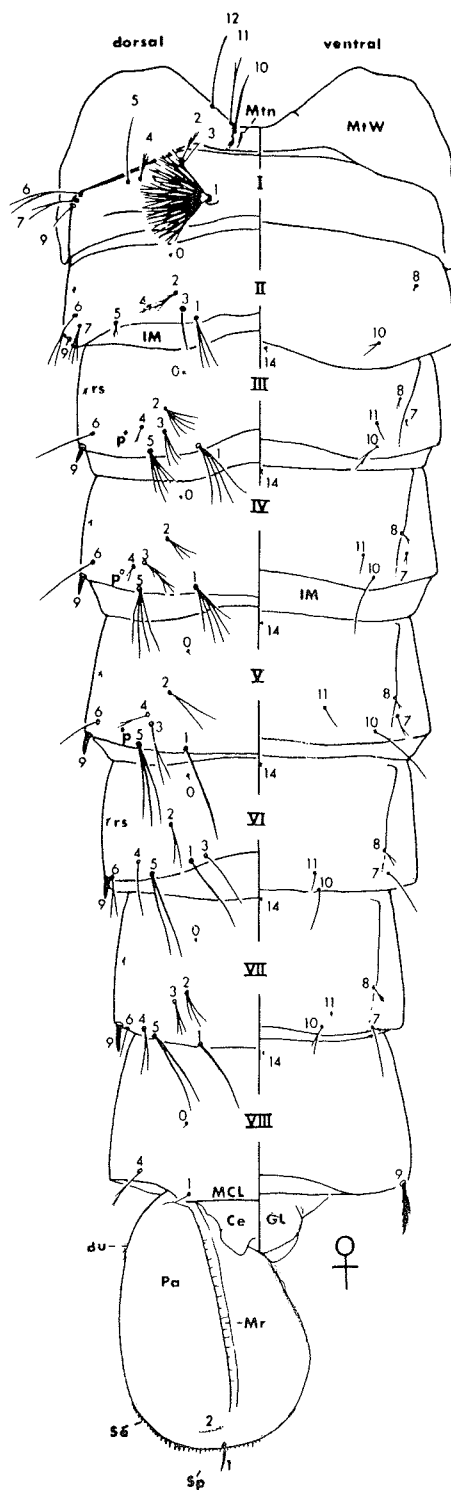


Fig. 2. System of numbering of pupal setae. Setae, 10, 11 and 12 on the metanotum (Mtn) are designated with the suffix CT as are setae 1 to 9 on the cephalothorax. (From Harbach and Knight, 1980).

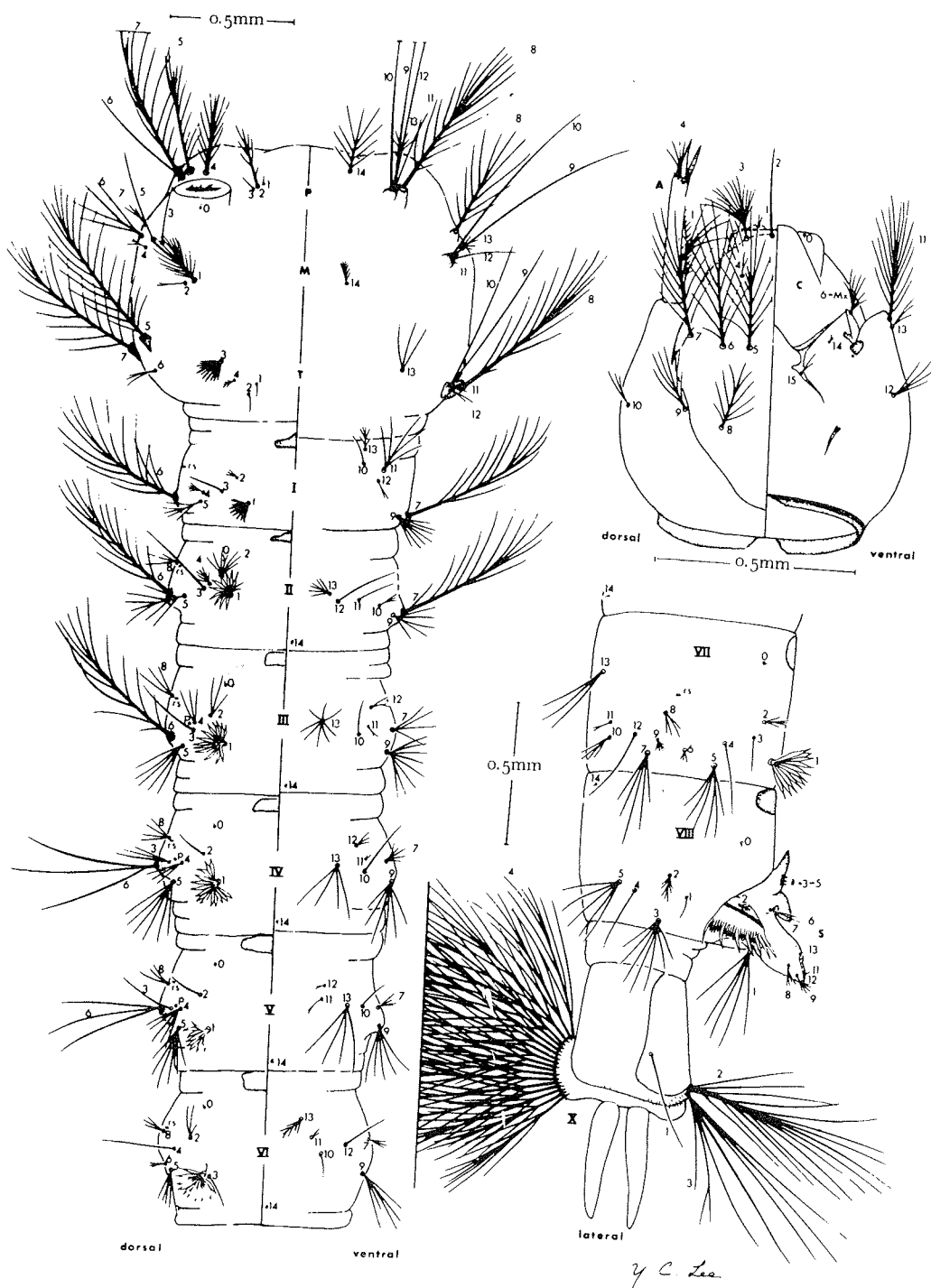


Fig. 3. System of numbering of larval setae. A antenna. C cranium. P,M,T pro-, meso-, metathorax (from Harbach and Knight, 1980)

	Gillies & De Meillon 1968	Harbach & Knight 1980 (Belkin 1962)
Head	Preclypeal Inner clypeal Outer clypeal Posterior clypeal Inner, mid, outer frontal Sutural Vertical	seta 1-C 2-C 3-C 4-C 5-, 6-, 7-C 8-C 9-C
Antenna	Shaft hair	1-A
Prothorax	Inner, median, outer shoulder External dorsal	1-, 2-, 3-P 11-P
Mesothorax	Propleural Dorsolateral	9-, 10-, 12-P 8-M
Metathorax	Long mesopleural Thoracic palmate Long metapleural	9-, 10-M 3-T 9-, 10-T
Abdomen	Palmate Hair 2 Hair 6 (lateral abdominal)	1-I to 1-VII 2-I to 2-VII 6-I to 6-V
Xth segment	Saddle hair Inner, outer caudal	1-X 2-, 3-X

TABLE III: Equivalent terms used in larval chaetotaxy.

DISTRIBUTION

New distribution records, that were not included in the maps provided by Gillies and De Meillon (1968), are given in the text, where they are cited in terms of latitude and longitude. In case the reader should wish to add these new degree-square records to the old maps by inking in the appropriate squares, we provide a blank copy of the map on the same scale as in the original publication, on which readings are for every 6°-line of latitude and longitude (fig. 4).

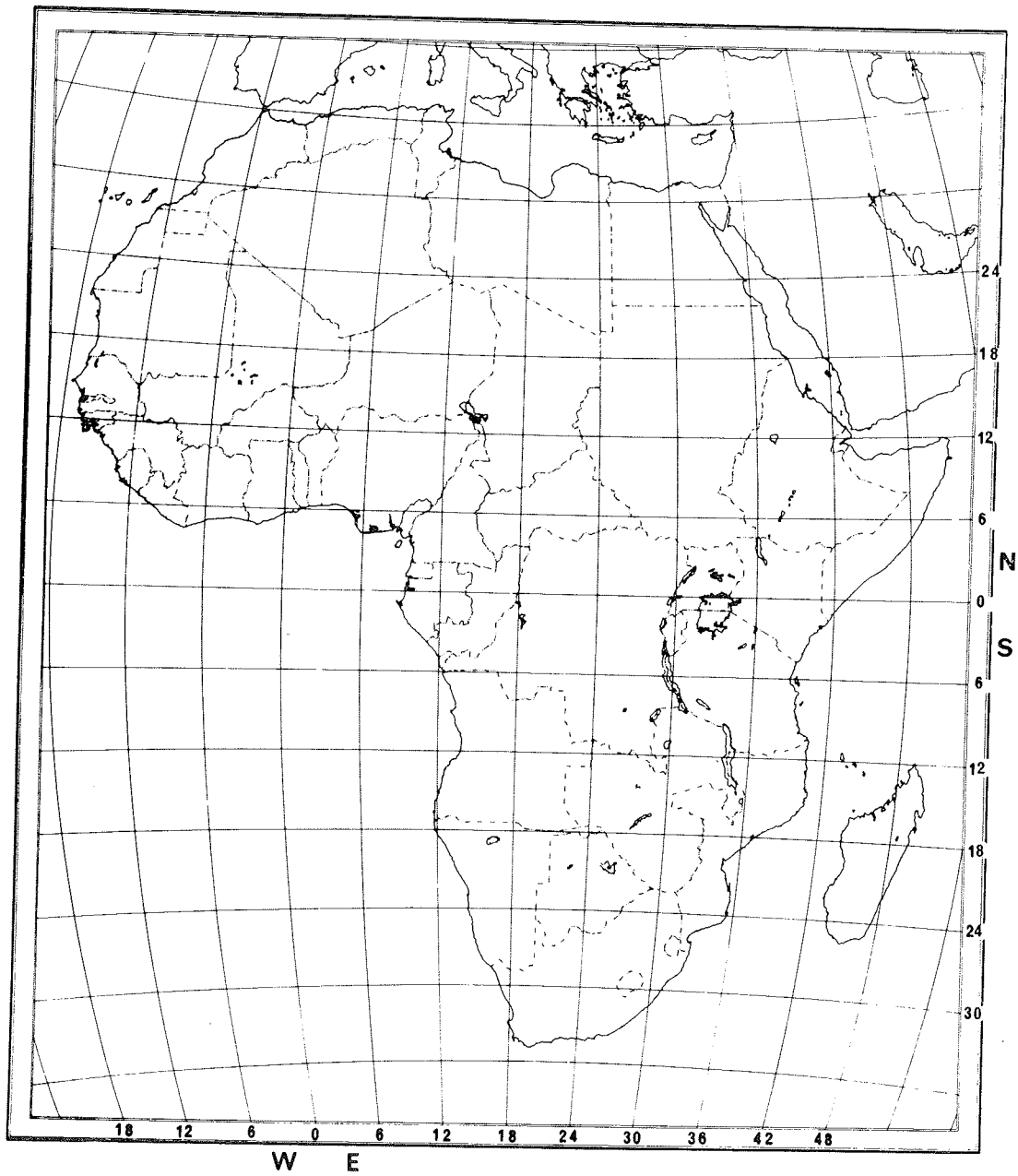


Fig. 4. Map of Africa used for species distributions showing lines of latitude and longitude at 6°-intervals.

LIST OF SPECIES OF AFROTROPICAL ANOPHELES

Species referred to in the text are indicated by page numbers.

SUBGENUS *ANOPHELES* MEIGEN

Myzorhynchus series

<i>An. coustani</i> Laveran, 1900 (complex)	p. 64
<i>An. caliginosus</i> De Meillon, 1943	p. 65
<i>An. namibiensis</i> Coetzee, 1984	p. 66
<i>An. paludis</i> Theobald, 1900	p. 66
<i>An. symesi</i> Edwards, 1928	
<i>An. tenebrosus</i> Dönitz, 1902	p. 66
<i>An. ziemanni</i> Grünberg, 1902	p. 67
<i>An. obscurus</i> (Grünberg), 1905	p. 67

Anopheles series

<i>An. concolor</i> Edwards, 1938	p. 67
Christya series	
<i>An. implexus</i> (Theobald), 1903	p. 68

SUBGENUS *CELLIA* THEOBALD

Neomyzomyia series

Smithii section

<i>An. smithii</i> Theobald, 1905	
<i>An. caroni</i> Adam, 1961	
<i>An. faini</i> Leleup, 1952	
<i>An. hamoni</i> Adam, 1962	
<i>An. jebudensis</i> Froud, 1944	p. 68
<i>An. lovettae</i> Evans, 1934	
<i>An. vanhoofi</i> Wanson & Lebiec, 1945	
<i>An. wilsoni</i> Evans, 1934	

Ardensis section

<i>An. ardensis</i> (Theobald), 1905	p. 68
<i>An. buxtoni</i> Service, 1958	
<i>An. cinctus</i> (Newstead & Carter), 1910	p. 68
<i>An. deemingi</i> Service, 1970	p. 68
<i>An. dureni dureni</i> Edwards, 1938	
<i>An. dureni millecampsii</i> Lips, 1960	p. 69
<i>An. kingi</i> Christophers, 1923	p. 69
<i>An. machardy</i> Edwards, 1930	
<i>An. maliensis</i> Bailly-Choumara & Adam, 1959	
<i>An. natalensis</i> (Hill & Haydon), 1907	p. 70
<i>An. nili</i> (Theobald), 1904	p. 70
<i>An. somalicus</i> Rivola & Holstein, 1957	
<i>An. vernus</i> Gillies & De Meillon, 1968	
<i>An. vinckei</i> De Meillon, 1942	

Rhodesiensis section

<i>An. rhodesiensis rhodesiensis</i> Theobald, 1901	
<i>An. rhodesiensis rupicolus</i> * Lewis, 1937	p. 71
<i>An. cameroni</i> De Meillon & Evans, 1935	p. 71

* Dr D. J. Lewis informs us that, when he originally named this species, the adjectival form *rupicolus* was intended, not the substantive form *rupicola*. The emendation of this name by Knight & Stone (1977) to *rupicola* was therefore incorrect. The emended spelling was followed by Ward (1984).

<i>An. lounibosi</i> new species	p. 73
<i>An. rodhaini</i> Leleup & Lips, 1950	
<i>An. ruarinus</i> Edwards, 1940	p. 75
Myzomyia series	
Unassigned species	
<i>An. azaniae</i> Bailly-Choumara, 1960	p. 75
<i>An. barberellus</i> Evans, 1932	
<i>An. bervoetsi</i> D'Haenens, 1961	
<i>An. brunripes</i> (Theobald), 1910	p. 75
<i>An. culicifacies</i> Giles, 1901 (complex)	p. 75
<i>An. domicolus</i> * Edwards, 1916	
<i>An. dthali</i> Patton, 1905	p. 76
<i>An. erythraeus</i> Corradetti, 1939	
<i>An. ethiopicus</i> new species	p. 76
<i>An. flavicosta</i> Edwards, 1911	p. 76
<i>An. fontinalis</i> Gillies & De Meillon, 1968	
<i>An. longipalpis</i> (Theobald), 1903	p. 78
<i>An. moucheti moucheti</i> Evans, 1925	p. 78
<i>An. moucheti nigeriensis</i> Evans, 1931	
<i>An. schwetzi</i> Evans, 1934	p. 78
<i>An. tchekedii</i> De Meillon & Leeson, 1940	
<i>An. walravensi</i> Edwards, 1930	
Funestus section	
<i>An. funestus</i> sub-group	
<i>An. funestus</i> Giles, 1900	p. 79
<i>An. aruni</i> Sobti, 1968	p. 86
<i>An. parensis</i> Gillies, 1962	
<i>An. vaneedeni</i> new species	p. 81
<i>An. brucei</i> Service, 1960	
<i>An. confusus</i> Evans & Leeson, 1935	p. 86
<i>An. fluvialtilis</i> James, 1902	p. 86
<i>An. fuscivenosus</i> Leeson, 1930	
<i>An. lesoni</i> Evans, 1931	p. 87
<i>An. rivulorum</i> Leeson, 1935	p. 87
Marshallii-hancocki section	
<i>An. marshallii</i> complex	
<i>An. marshallii</i> (Theobald), 1903	p. 87
<i>An. letabensis</i> Lambert & Coetzee, 1982	p. 90
<i>An. hughi</i> Lambert & Coetzee, 1982	p. 91
<i>An. austenii</i> (Theobald), 1905	p. 93
<i>An. berghei</i> Vincke & Leleup, 1949	
<i>An. brohieri</i> Edwards, 1929	p. 93
<i>An. gibbinsi</i> Evans, 1935	p. 93
<i>An. hancocki</i> Edwards, 1929	p. 93
<i>An. hargreavesi</i> Evans, 1927	p. 93
<i>An. harperi</i> Evans, 1936	p. 93
<i>An. mortiauxi</i> Edwards, 1938	
<i>An. mousinhoi</i> De Meillon & Pereira, 1940	
<i>An. njombiensis</i> Peters, 1955	
<i>An. seydeli</i> Edwards, 1929	p. 94
<i>An. upemba</i> Lips, 1960	p. 94

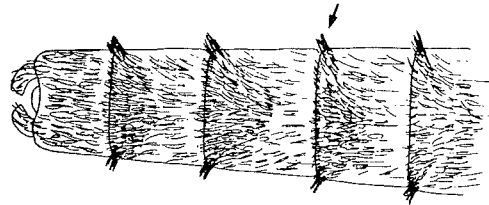
* This is Edwards' original spelling, taken by us to be correct — see note under *rhodesiensis rupicolus*.

Wellcomei section	
<i>An. wellcomei wellcomei</i> Theobald, 1904	p. 94
<i>An. wellcomei ugandae</i> Evans, 1934	p. 95
<i>An. wellcomei ungujae</i> White, 1975	p. 95
<i>An. erepens</i> Gillies, 1958	p. 95
<i>An. distinctus</i> (Newstead & Carter), 1911	p. 95
<i>An. theileri</i> Edwards, 1912	p. 95
Demeilloni section	
<i>An. demeilloni</i> Evans, 1933	p. 96
<i>An. carteri</i> Evans & De Meillon, 1933	
<i>An. freetownensis</i> Evans, 1925	
<i>An. garnhami</i> Edwards, 1930	p. 96
<i>An. keniensis</i> Evans, 1931	
<i>An. lloreti</i> Gil Collado, 1935	
<i>An. sergentii sergentii</i> (Theobald), 1907	
<i>An. sergentii macmahoni</i> Evans, 1936	p. 96
Pyretophorus series	
<i>An. christyi</i> (Newstead & Carter), 1911	p. 96
<i>An. daudi</i> Coluzzi, 1958	p. 96
<i>An. gambiae</i> complex	
<i>An. gambiae</i> Giles, 1902	p. 105
<i>An. arabiensis</i> Patton, 1905	p. 105
<i>An. quadriannulatus</i> (Theobald), 1911	p. 105
<i>An. bwambae</i> White, 1985	p. 117
<i>An. melas</i> Theobald, 1903	p. 118
<i>An. merus</i> Dönitz, 1902	p. 119
Paramyzomyia series	
<i>An. cinereus</i> Theobald, 1901	
<i>An. turkhuudi</i> Liston, 1901	p. 120
<i>An. azevedoi</i> Ribeiro, 1969	p. 120
<i>An. listeri</i> De Meillon, 1931	p. 122
<i>An. multicolor</i> Cambouliu, 1902	p. 122
Neocellia series	
<i>An. dancalicus</i> Corradetti, 1939	
<i>An. maculipalpis</i> Giles, 1902	p. 122
<i>An. pretoriensis</i> (Theobald), 1903	p. 122
<i>An. rufipes rufipes</i> (Gough), 1910	p. 123
<i>An. rufipes brousesi</i> Edwards, 1929	
<i>An. salbati</i> Maffi & Coluzzi, 1958	p. 123
Cellia series	
<i>An. argenteolobatus</i> (Gough), 1910	p. 123
<i>An. brumpti</i> Hamon & Rickenbach, 1955	
<i>An. cristipalpis</i> Service, 1977	p. 124
<i>An. cydippis</i> De Meillon, 1931	p. 124
<i>An. murphyi</i> Gillies & De Meillon, 1968	p. 124
<i>An. pharoensis</i> Theobald, 1901 (complex)	p. 124
<i>An. squamosus</i> Theobald, 1901 (complex)	p. 126
<i>An. swahilicus</i> Gillies, 1964	

KEY TO THE FEMALES

The present key is essentially as presented in Gillies and De Meillon (1968) with the addition of a small number of newly described species. The main difference is the provision of figures to illustrate diagnostic points, so that the key can be used in the absence of the 1968 volume. The illustrations for the first half of each couplet are on the left and for the second half on the right. Two species, *ethiopicus* and *upemba*, are not included owing to a lack of information on certain key characters.

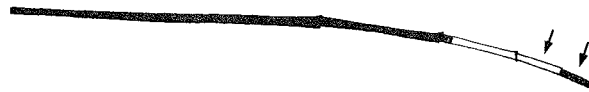
1. Abdominal segments with laterally projecting tufts of scales on segments II-VII.....Section I
 — Abdominal segments not so2



2. Hind tarsus with at least last 2 segments entirely paleSection II
 — Hind tarsus not so3



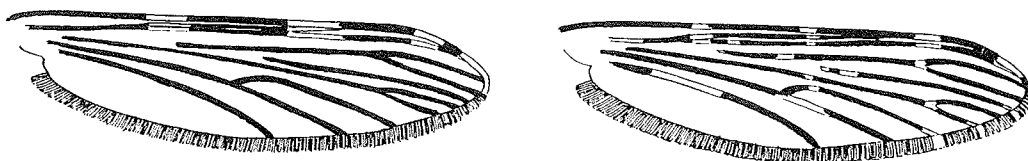
3. Hind tarsus 5 mainly or entirely dark, tarsus 4 whiteSection III
 — Hind tarsus not so4



4. Legs speckled, sometimes sparselySection IV
 — Legs not speckled5



5. Wing entirely dark or with pale spots confined to costa and vein 1Section V
 — Wing not so6



6. Wing without a pale spot on basal half of costa Section VI
 — Wing with at least 1 pale spot on basal half of costa7



7. Palps with apex darkSection VII
 — Palps with apex pale8



8. Palps with 4 pale bandsSection VIII
 — Palps with 3 pale bands9



9. Wing with pale interruption on 3rd main dark area of vein 1, sometimes fused with preceding pale areaSection IX
 — 3rd main dark area with no pale interruption10

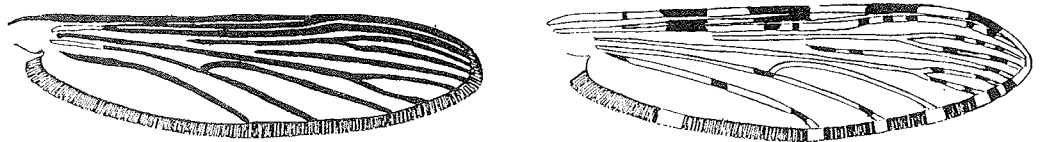


10. Wing with 2 pale spots on vein 5.1Section X
 — Wing with 1 pale spot on vein 5.1Section XI



SECTION I. Mosquitoes with laterally projecting tufts of abdominal scales.

1. Wing almost entirely dark, costa without any pale spots*brumpti*
 — Wing with abundant pale areas, costa with at least 4 pale spots2



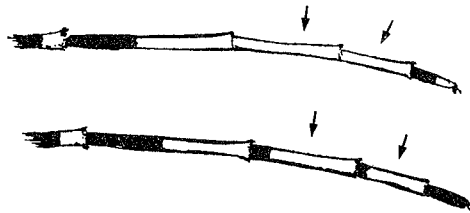
2. Hind tarsus 1-5 entirely dark *argenteolobatus*
 — Hind tarsus 1-4, at least, with apical pale bands 3



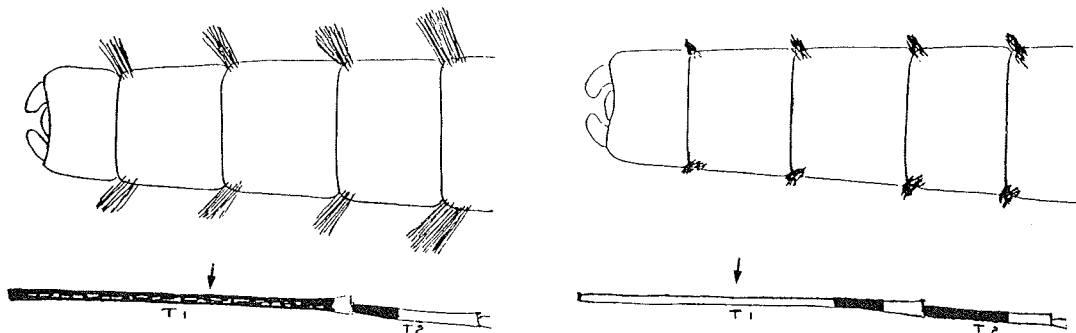
3. Hind tarsus 1 and 2 with definite light and dark rings in addition to apical pale band *cinctus*
 — Hind tarsus 1 and 2 with pale bands at apices only 4



4. Hind tarsus 3 and 4 all white or narrowly dark basally, 5 all dark or at least basal half dark 5
 — Hind tarsus not so 6



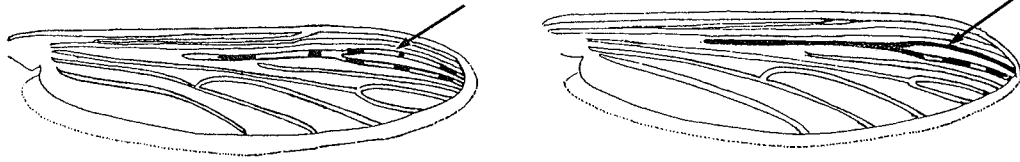
5. Very large species, abdominal segments 1-7 with long lateral tufts of yellowish and dark scales; hind tarsus 1 largely dark *implexus*
 — Moderate sized species; abdominal scale tufts short and dark; half or more of hind tarsus 1 pale *crispipalpis*



6. Hind tarsus 5 and about apical half of 4 pale *pharoensis*
 — Hind tarsus 5 all dark and 4 with much less than apical half pale 7



- 7. Very small species; upper branch of 2nd vein largely pale *swahilicus*
- Small to moderate species; upper branch 2nd vein either entirely dark apart from apex or with a few scattered pale scales only *squamosus*
cydippis



SECTION II. Mosquitoes with hind tarsal segments 4 and 5 entirely white; abdomen without laterally projecting tufts of scales.

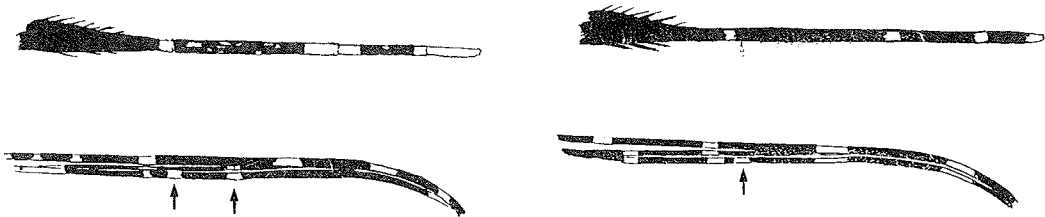
- 1. Legs speckled 2
- Legs not speckled 8



- 2. Hind tarsus 3-5 entirely pale 3
- Hinds tarsus 3 dark at base 5



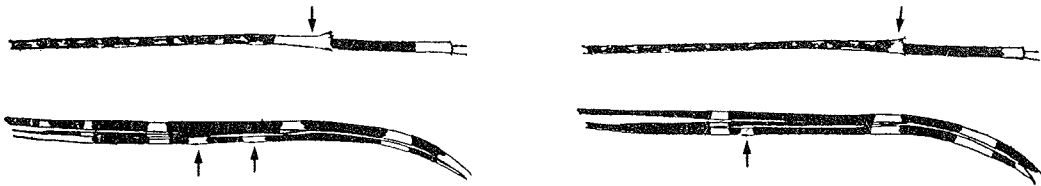
- 3. Palps with 3 pale bands, usually with some speckling; 1st vein with 2 accessory sector pale spots *maculipalpis*
- Palps with 4 pale bands, unspeckled; 1st vein with at most 1 accessory sector pale spot 4



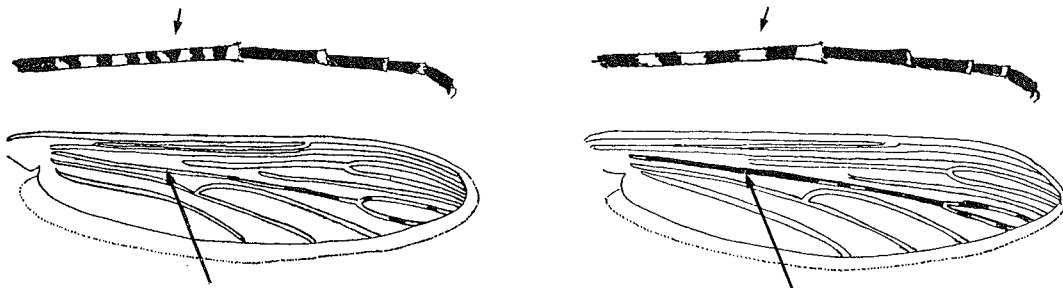
4. Mid tarsus 2-4 entirely dark; vein 1 dark at base, basal half of stem of vein 4 with small pale areas *maliensis*
 — Mid tarsus 2-4 with pale apices; vein 1 pale at base, basal half of stem of vein 4 entirely pale *deemingi*



5. Hind tarsus 1 broadly pale at apex; 1st vein with 2 accessory sector pale spots *pretoriensis*
 — Hind tarsus 1 narrowly pale or dark at apex; 1st vein with 1 accessory sector spot 6



6. Fore tarsus 1 with 5-9 pale rings; stem of 4th vein largely pale *machardy*
 — Fore tarsus 1 with 2-4 pale rings; stem of 4th vein largely dark 7



7. Fore and mid tarsus 2 and 3 pale-ringed apically; 6th fringe spot present on wing *natalensis* (in part)
 — Fore and mid tarsus 2 and 3 dark apically; 6th fringe spot absent *buxtoni*



8. Palps very shaggy and unbanded or with 1-4
irregular narrow pale bands9
- Palps smooth with 3 pale bands, the 2 outer ones broad or rarely fused 14



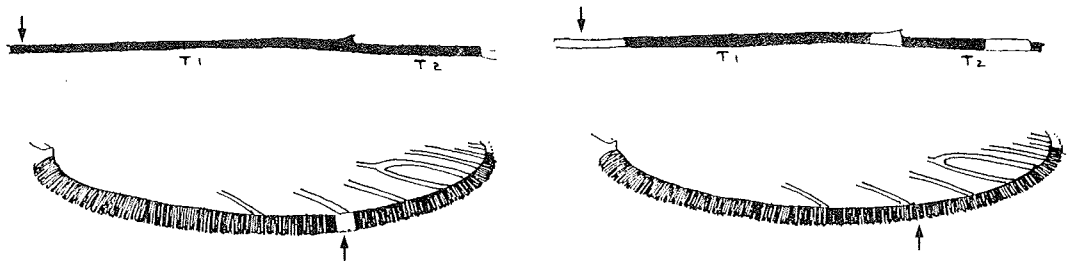
9. Palps without pale bands; no pale spots at apex of
of hind tibia or base of tarsus 1 *caliginosus*
- Palps with 1-4 pale bands; apex of hind tibia broadly or narrowly pale 10



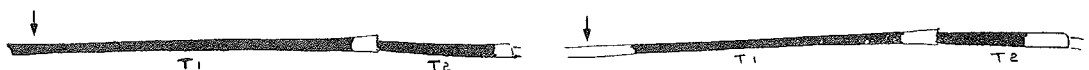
10. Hind tarsus 3 entirely pale11
- Hind tarsus 3 dark at base12



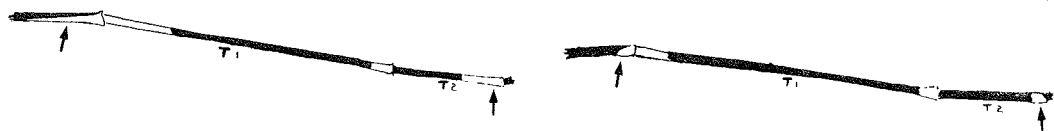
11. Pale fringe spot present opposite vein 5.2; base of
hind tarsus 1 dark *paludis*
- No pale fringe spot opposite vein 5.2; base of hind
tarsus 1 broadly pale *coustani* (in part)



12. Hind tarsus 1 entirely dark basally or with only a few
pale scales there *tenebrosus* (in part)
- Hind tarsus 1 broadly pale at base 13



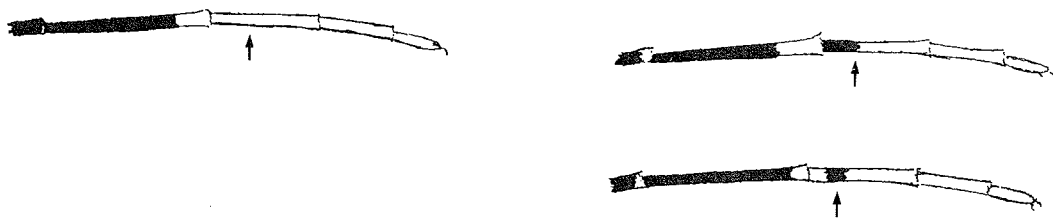
13. Hind tibia with a pale streak on apex, 3-5 times as long as broad; apical pale band on hind tarsus 2 one-eighth to two-fifths length of segment *coustani* (in part)
- Pale streak on tibia 1-3 times as long as broad; apical pale band on tarsus 2 one-fifteenth to one-eighth of segment *ziemanni*
namibiensis



14. 3rd main dark area (preapical dark spot) on vein 1 without a pale interruption; fore tarsus 1-3 without distinct apical pale bands *rufipes* (in part)
- 3rd main dark area on vein 1 with a pale interruption, or with a short extension of the subcostal pale spot into the dark area on vein 1; fore tarsus 1-3 with apical pale bands 15



15. Hind tarsus 3 entirely pale *hancocki*
brohieri (in part)
- Hind tarsus 3 not so *brohieri* (in part) W. Africa
theileri mainly E. and S. Africa

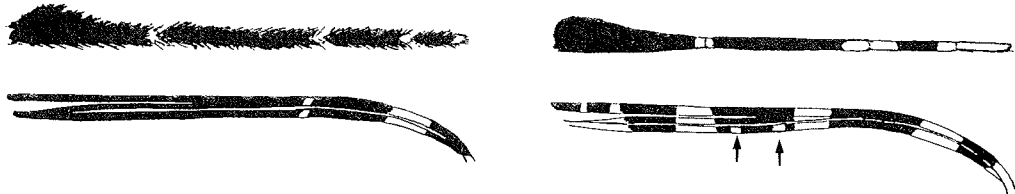


SECTION III. Mosquitoes with hind tarsus 5 mainly or entirely dark, tarsus 4 white; abdominal segments without laterally projecting tufts of scales.

1. Femora and tibiae speckled *kingi*
- Femora and tibiae with at most apical bands only 2



2. Palps shaggy; costa and 1st vein without usual main dark areas*symesi*
 — Palps smooth; 2nd main dark area (median dark spot) of vein 1 well defined and with 2 pale interruptions*rufipes* (in part)

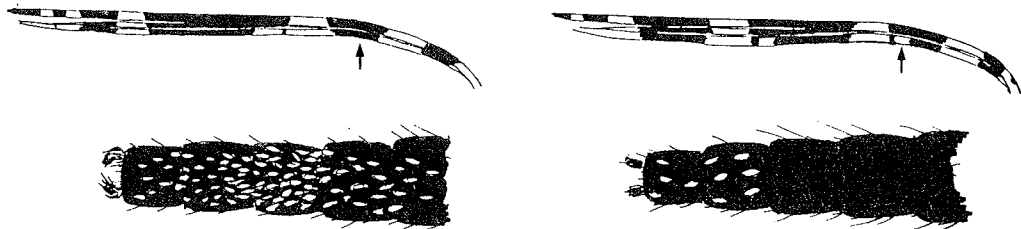


SECTION IV. Mosquitoes with speckled legs, hind tarsus 4 and 5 not entirely pale; abdominal segments without laterally projecting tufts of scales.

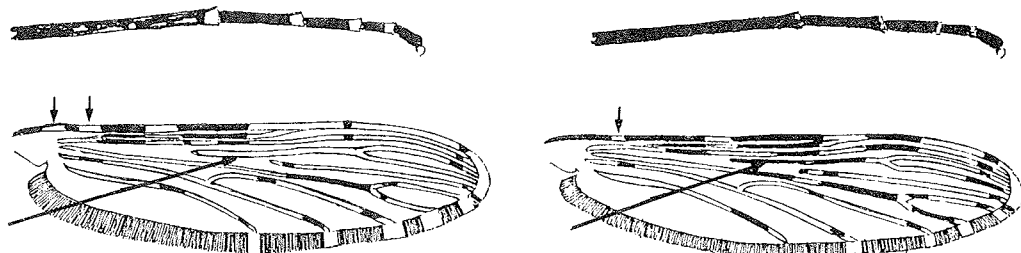
1. Palps with 3 pale bands2
 — Palps with 4 pale bands4



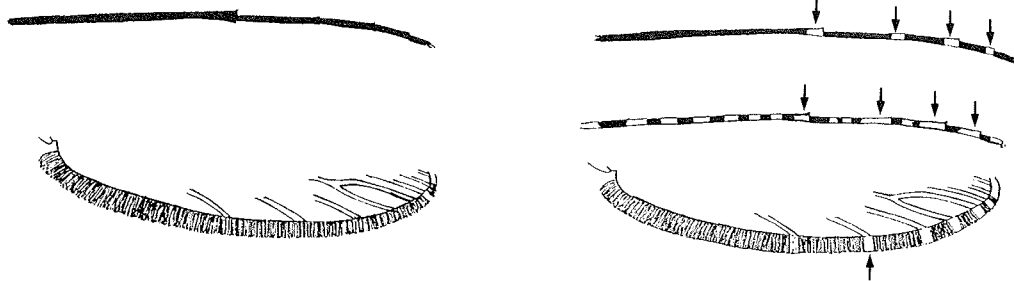
2. 3rd main dark area (preapical dark spot) of 1st vein without a pale interruption; abdominal terga fairly heavily clothed with cream or yellowish scales, especially on segments 6 and 73
 — 3rd main dark area of vein 1 with a pale interruption, sometimes fused with preceding pale spot; scaling on abdomen very scanty, confined to 8th or rarely 7th terga*gambiae* complex (in part)



3. Base of costa with 2 pale spots; stem of vein 2 entirely pale; fore tarsus 1 with some speckling*salbaii*
 — Base of costa with 1 pale spot; stem of vein 2 extensively dark; fore tarsus 1 not speckled*dancalicus*



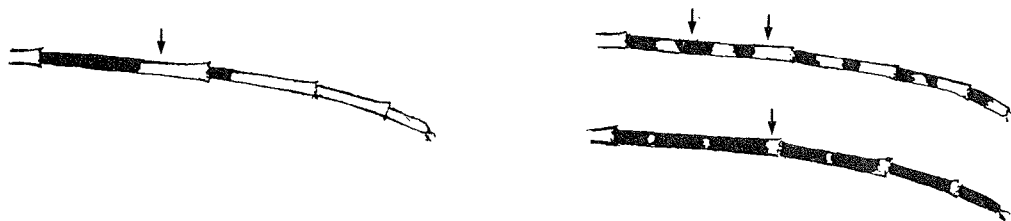
4. All tarsi completely dark; wing without pale fringe spots posterior to 3rd vein *vernus* (in part)
- Tarsi 1-4 with conspicuous pale bands on at least the apices; wing with pale fringe spots up to vein 5.2 or 6 5



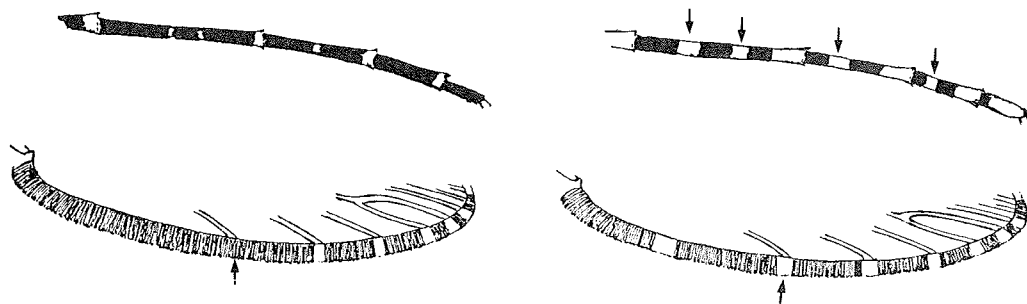
5. 3rd main dark area (preapical dark spot) of vein 1 with a pale interruption, sometimes fused with preceding pale area *gambiae* complex (in part)
- 3rd main dark area with no pale interruption 6



6. Hind tarsus 2 with about apical two-fifths to half white and the rest dark *natalensis* (in part)
- Hind tarsus 2 either with less than apical two-fifths white or else prominently marked with dark and pale bands 7



7. No pale fringe spot opposite vein 6; hind tarsus 2-4 with apical pale rings and otherwise dark except for 1 to 2 pale spots *ardensis*
- Pale fringe spots present opposite vein 6; hind tarsus 2-4 with conspicuous dark and pale rings in addition to apical pale bands 8



8. Fore tarsus mainly pale with narrow dark markings *vinckeii*
 — Fore tarsus mainly dark with narrow pale rings 9



9. Scales on 8th tergum dense and distributed over whole segment, sometimes with a few scales on lateral borders of 7th tergum *dureni dureni*
 — Scales on 8th tergum scanty and confined to posterior margin *dureni millecampsii*

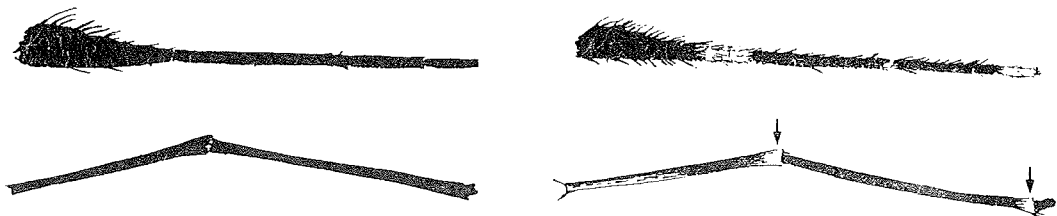


SECTION V. Mosquitoes with wings entirely dark or with pale spots confined to costa and vein 1; legs not speckled, hind tarsus 4 and 5 not entirely pale; abdominal segments without laterally projecting tufts of scales.

1. Wings entirely dark or uni-colourous 2
 — Wings with at least some areas of paler scales on costa or vein 1, these being sometimes inconspicuous 5



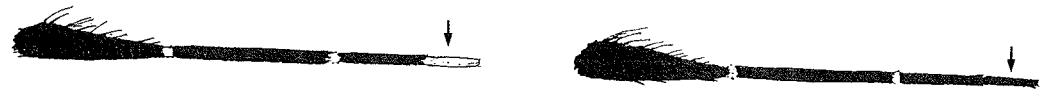
2. Palps and legs entirely dark 3
 — Palps with 2 well marked pale bands; hind femur and tibia narrowly pale at apex *concolor*



3. Large species, wing length 4.5 mm or more *ruarinus*
 — Small species, wing length 3.5 mm or less 4

- 4. Very pale brown species with glossy mesonotum; semi-arid regions only*rhodesiensis rupicolus* (in part)
- General aspect dark brown, mesonotum not so; cave-dwelling.....*caroni* (in part)

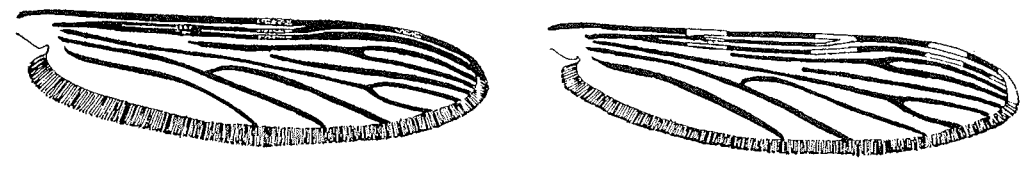
- 5. Palps with 2-3 pale bands, pale at apex6
- Palps with or without pale bands, dark at apex9



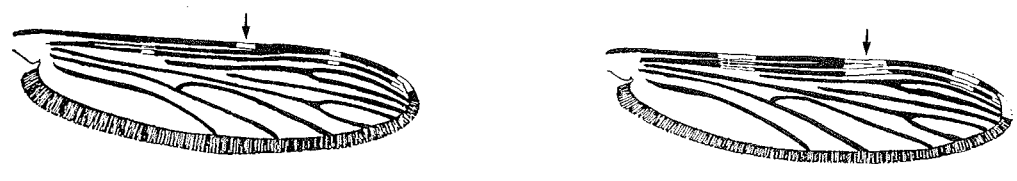
- 6. Head scales narrow, rodlike, yellowish throughout; semi-arid regions only*dthali* (in part)
- Head scales broader, white on vertex, dark laterally; all regions7



- 7. Light and dark areas on wings poorly contrasted; semi-arid regions only*rhodesiensis rupicolus* (in part)
- Contrast between light and dark areas on wing well marked8



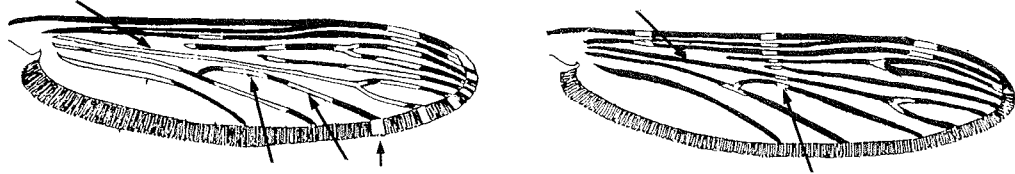
- 8. Pale areas on wing very narrow, subcostal pale spot present on costa only; cave-dwelling*rodhaini*
- Pale areas on wing broader, subcostal pale spot on costa and vein 1*rhodesiensis rhodesiensis lounibosi*



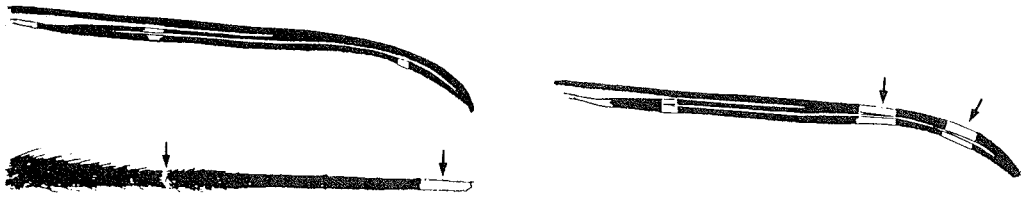
- 9. Palps with 3 pale bands, dark at apex*smithii* (in part)
- Palps unbanded or banding indistinct10



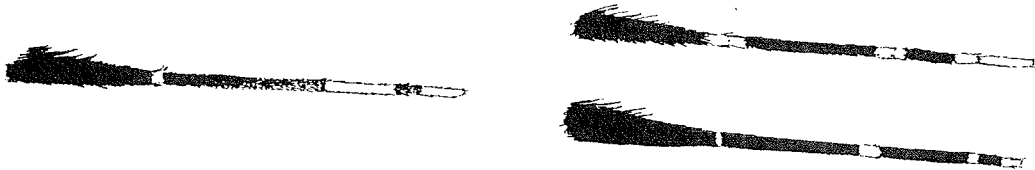
4. Stem of 4th vein largely pale, vein 5.1 with 2 pale spots or largely pale, fringe spots present opposite veins 3-5.1*tchekedii*
 — Stem of vein 4 largely dark, vein 5.1 with 1 narrow pale area, pale fringe spots entirely absent*smithii* (in part)



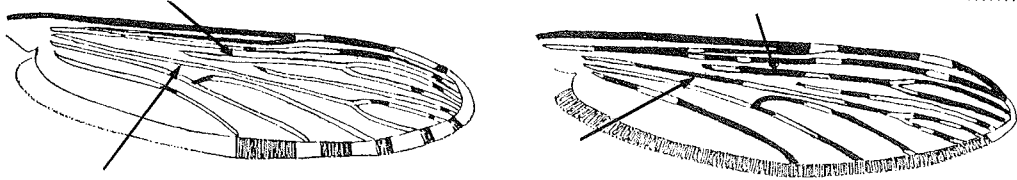
5. Costa entirely dark except for a few indistinct pale scales subapically; palps with a broad apical pale band and otherwise dark except for a narrow sub-basal pale band*daudi*
 — Outer half of costa with 1-3 well marked pale areas; palps not so6



6. Palps with 3 pale bands, the subapical pale band broad and about equal to apical band7
 — Palps either with 4 bands or else with 3 bands, the subapical of these being much narrower than apical band10



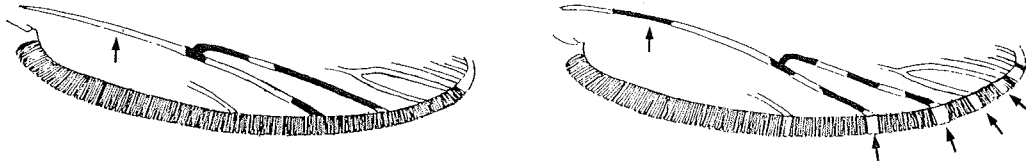
7. Wing apart from costa generally very pale, basal half of stems of veins 2 and 4 entirely pale8
 — Dark areas on wing greater or about equal to pale areas, basal half of stems of veins 2 and 4 largely dark9



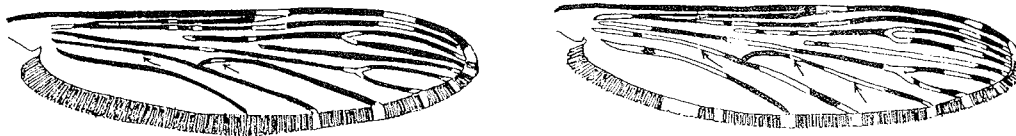
8. Scales on distal half of palps (apart from main pale bands) pale brownish, those on basal half dark brown; distal half of proboscis prominently pale scaled*wellcomei wellcomei*
 — Scales on palps (apart from main pale bands) uniformly dark brown; proboscis dark-scaled or pale scaling inconspicuous*wellcomei ugandae*



9. No pale fringe spots posterior to vein 3, stem of vein 5 pale except at fork and sometimes narrowly near base*erepens*
 — Pale fringe spots present opposite all veins up to 5.2, stem of vein 5 broadly dark near base*keniensis* (in part)



10. Stem of vein 5 and vein 5.2 dark except for a narrow pale spot distal to fork, 5.1 with a single pale spot*fuscivenosus* (in part)
 — Vein 5 with extensive pale areas, 5.1 with 2 pale spots11



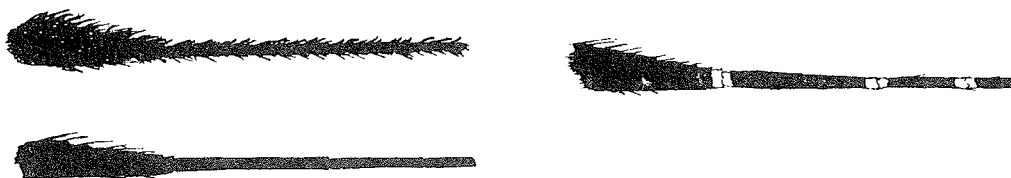
11. Hind tarsus 1-4 with distinct apical pale bands; mesonotum clothed with very narrow scales and with no patch of scales above wing root*distinctus*
 — Hind tarsus 1-4 entirely dark or with a few pale scales at apices of 1-3; mesonotal scales broad, a patch of broad scales present above wing root.....12



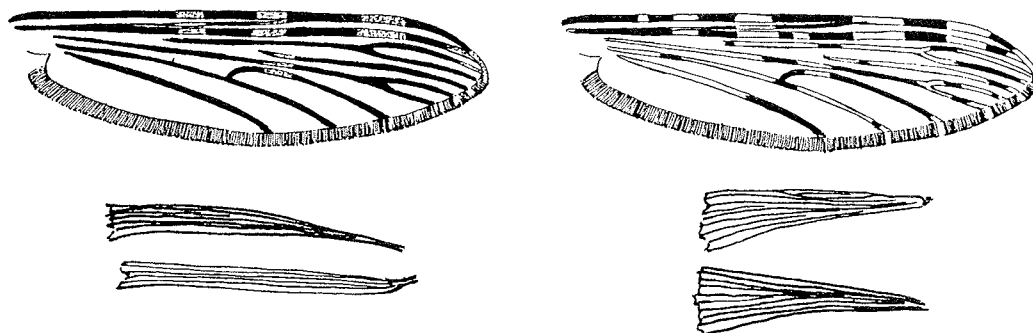
12. Mesonotal scales yellowish or bronze medianally and white elsewhere*schwetzi* (in part)
 — Mesonotal scales white throughout.....*walravensi*
schwetzi (in part)

SECTION VII. Mosquitoes with palps dark at the apex or without distinct apical pale band; at least 1 pale spot on basal half of costa, pale scales not confined to costa and vein 1; legs not speckled, hind tarsus 4 and 5 not entirely pale; abdomen without laterally projecting tufts of scales.

1. Palps entirely dark or without distinct pale bands2
 — Palps with 3 pale bands.....5



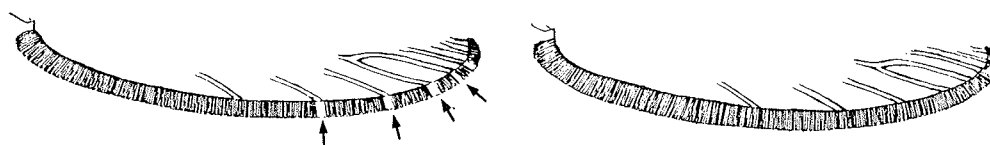
2. Small pale brown species, pale patches on wings indistinct, basal quarter to half of costa entirely dark; head scales narrow and yellowish*azaniae* (in part)
 — Wings with well-contrasting light and dark areas, basal quarter of costa with at least 1 pale area, even if narrow; head scales not so3



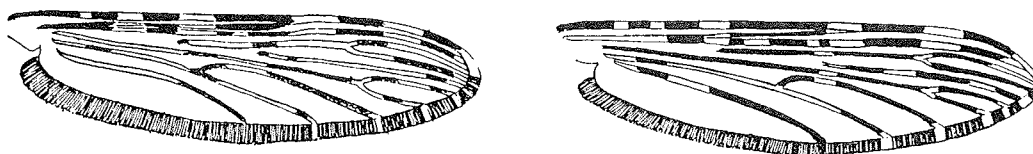
3. Costa with humeral pale spot, no subapical (preapical) pale spot on costa and 1st vein*obscurus* (in part)
 — Costa without a humeral pale spot, subapical pale spot present on costa and 1st vein.....4



4. Wings with pale fringe spots opposite vein 3 up to vein 5.2*jebudensis*
 — Wings with no pale fringe spots behind vein 3.....*faini*



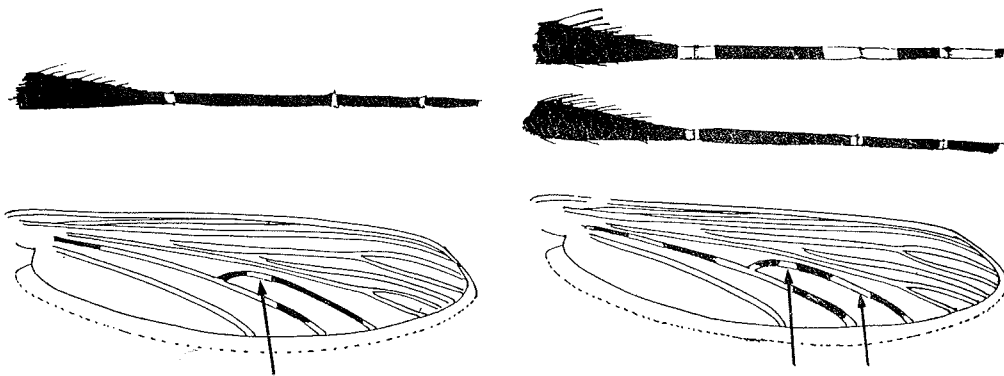
5. Wings generally pale, contrast between pale and dark areas, apart from costa and vein 1 poorly defined; anterior mesonotal scales scanty, not forming conspicuous tuft*turkhudi*
 — Wings with well-contrasting light and dark areas; conspicuous anterior mesonotal scale tuft present6



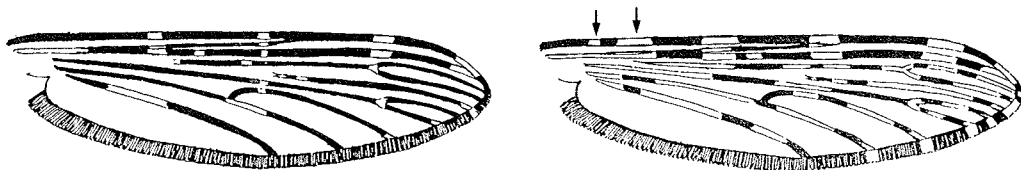
6. 2nd main dark area (median dark spot) on vein 1 with 2 pale interruptions7
 — 2nd main dark area on vein 1 with at most 1 pale interruption8



7. Pale bands on palps very narrow, occupying apices of 2nd, 3rd and 4th segments and not overlapping joints; vein 5.1 with a single pale spot*wilsoni* (in part)
 — Pale bands on palps variable in width, distal 2 bands overlapping joints; 5.1 with 2 pale spots*rufipes brousesi*



8. Wing field apart from costa and vein 1 predominantly dark, no pale spots on basal quarter of costa9
 — Pale and dark areas on wing about equally distributed, humeral and presector pale spots present on costa11



9. Basal fifth of vein 1 entirely pale10
 — Basal fifth of vein 1 either dark or with a sub-basal pale patch not extending to base.....*smithii* (in part)



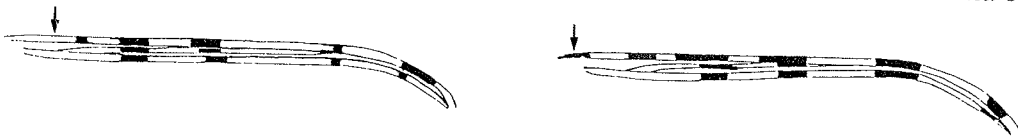
10. Wings scantily scaled, all wing scales very narrow*fontinalis*
 — Wings heavily scaled, upstanding scales moderately broad*lovettae*



11. Basal pale band of palps about equal to or slightly narrower than median band, broadly overlapping base of 3rd segment.....*cinereus* (in part)
- Basal pale band on palps either much narrower than median band, scarcely overlapping base of 3rd segment, or both basal and median pale bands very narrow12



12. Extreme base of costa pale.....*multicolor* north-east Africa only
- Extreme base of costa dark.....*listeri*
azevedoi southern Africa only



SECTION VIII. Mosquitoes with smooth, 4-banded palps, pale at apex, at least 1 pale spot on basal half of costa; pale scales not confined to costa and vein 1; legs not speckled; hind tarsus 4 and 5 not entirely pale; abdomen without laterally projecting tufts of scales.

1. 3rd main dark area (preapical dark spot) of vein 1 with a pale interruption2
- 3rd main dark area without a pale interruption3



2. Abdominal terga clothed with yellowish scales; hind tarsus 1-4 with very broad apical pale bands.....*christyi*
- Abdomen without such scales; hind tarsi entirely dark or with a few pale scales at apices of segments 1-3*schuetzi* (in part)



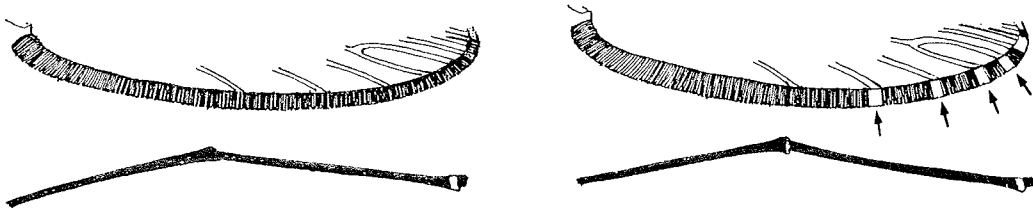
3. 2nd main dark area (median dark spot) of vein 1 with 2 pale interruptions; fore and mid femora with a subapical pale spot*wilsoni* (in part)
- 2nd main dark area of vein 1 with only 1 pale interruption; legs not so4



4. Pale bands on palps broad, basal pale band overlapping base of 3rd segment*cinereus* (in part)
- Pale bands on palps mostly narrow, basal band not overlapping base of 3rd segment.5



5. No pale fringe spots posterior to vein 3, femora and tibiae
inconspicuously speckled*vernus* (in part)
- Pale fringe spots present opposite all main veins up to 5.2 or 6, femora and
tibiae not speckled6



6. Stem of vein 5 and vein 5.2 pale at, and adjacent to, the fork*garnhami* (in part)
- Fork of vein 5 dark7



7. Wing 4mm or less, flattened mesonotal scales not extending onto
scutellum.....*demeilloni* (Berg River form)
- Wing 4.4mm or more; some flattened scales present on scutellum as
well as mesonotum*carteri* (in part)

SECTION IX. Mosquitoes with a pale interruption on 3rd main dark area (preapical dark spot) of vein 1 or else this area entirely absent; costa with at least 1 pale spot on basal half, pale scales not confined to costa and vein 1; palps 3-banded, pale at apex; legs not speckled, hind tarsus 4 and 5 not entirely pale; abdomen without laterally projecting tufts of scales.

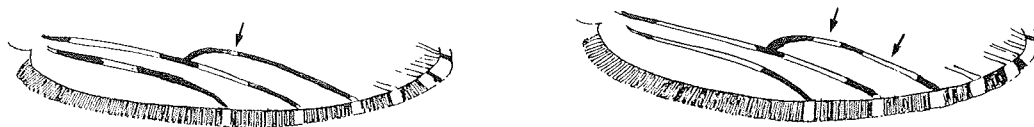
1. 2nd and 3rd main dark areas (median and preapical dark spots)
absent from vein 1*wellcomei ungujae*
- 2nd and 3rd main dark areas present on vein 12



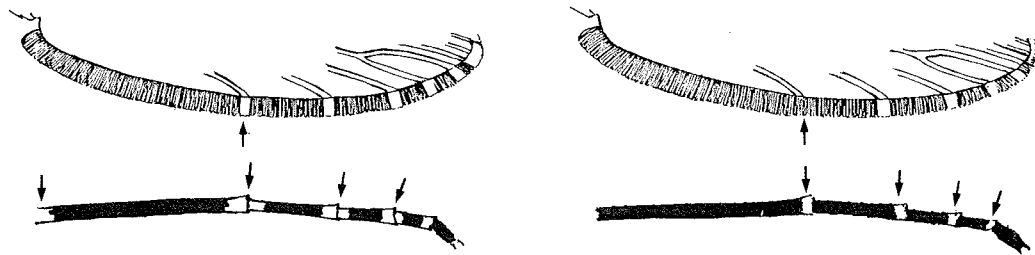
2. Hind tarsus 5 entirely white, tarsus 4 white except for a broad median
dark band.....*seydeli*
- Hind tarsus 5 entirely dark3



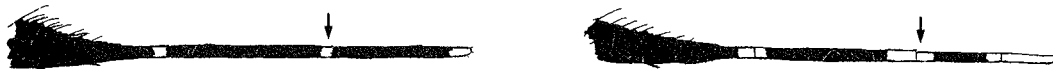
3. Vein 5.1 with 1 pale spot, sometimes with a vestigial 2nd pale spot4
- Vein 5.1 with 2 well developed pale spots5



4. Pale fringe spot present opposite vein 6; fore tarsus 1-4 with conspicuous basal and apical pale bands*mortiauxi*
 — No pale fringe spot opposite vein 6; fore tarsus 1-4 narrowly pale apically only*berghei*



5. Subapical pale band on palps very narrow, confined to apex of 3rd segment.....6
 — Subapical pale band on palps broad, overlapping apex of 3rd and base of 4th segment.....7



6. Base of costa with 2 pale interruptions*brunnipes*
 — Basal quarter of costa entirely dark*walravensi* (in part)

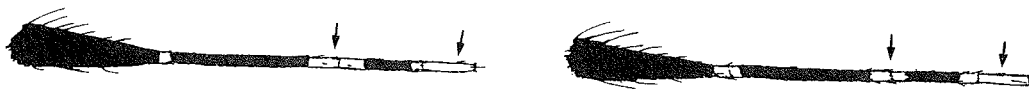


7. Hind tarsus either all dark or with apical pale bands on segments I and 2 only8
 — Hind tarsus 1-4 with well marked apical pale bands10



8. Scutal fossae and lateral areas of mesonotum above wing root with scattered or abundant broadish scales9
 — Fossae and lateral areas of mesonotum without scales*harperi*

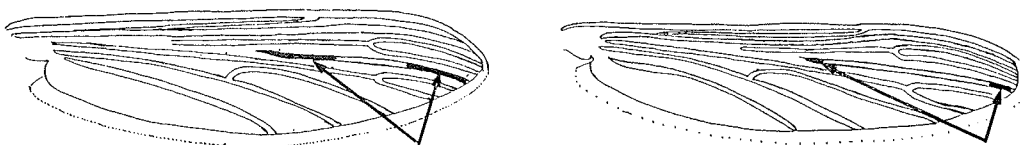
9. Subapical pale band on palps about equal to or slightly narrower than apical band*njombiensis*
 — Subapical pale band on palps much narrower than apical band.....*walravensi* (in part)



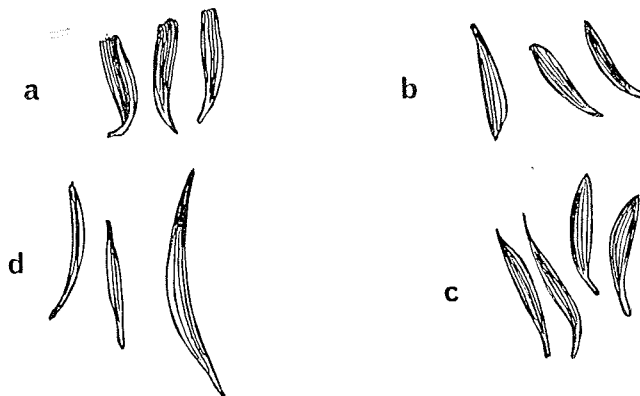
10. Apical pale bands on hind tarsus 1-4 very broad, equalling at least twice the apical width of the segments *austeni*
— Hind tarsus bands narrower, about equalling or less than apical width of segments 11



11. Vein 3 largely dark or broadly dark at either end; mesonotal scales very narrow and golden *gibbinsi* (in part)
— Vein 3 narrowly dark at ends; mesonotal scales various 12

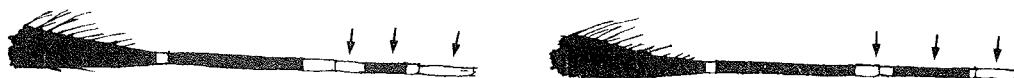


12. Mesonotal scales as in A *hargreavesi*
Mesonotal scales as in B *mousinhoi*
Mesonotal scales as in C *marshallii*
..... *letabensis*
..... *hughi*
Mesonotal scales as in D *gibbinsi* (in part)



SECTION X. Mosquitoes with vein 5.1 with 2 pale spots; no pale interruption on 3rd main dark area of vein 1, costa with at least 1 pale spot on basal half, pale scales not confined to costa and vein 1, palps 3-banded, pale at apex; legs not speckled, hind tarsus 4 and 5 not entirely pale; abdomen without laterally projecting tufts of scales.

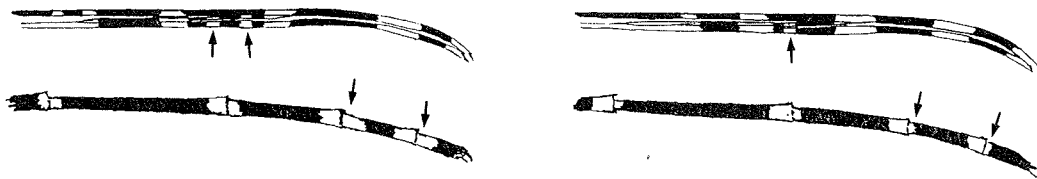
1. Apical and subapical pale bands on palps broad so that intervening dark band is either slightly broader, about equal to or narrower than either pale band 2
— Apical and subapical pale bands narrower, intervening dark band much broader than pale bands 16



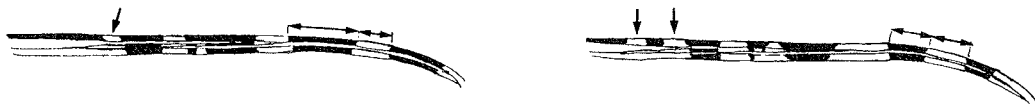
2. Apical pale bands on hind tarsus 4, and sometimes on tarsus 2 and 3 also, extending onto bases of succeeding segments.....3
 — Bases of hind tarsus 5 and of other segments dark6



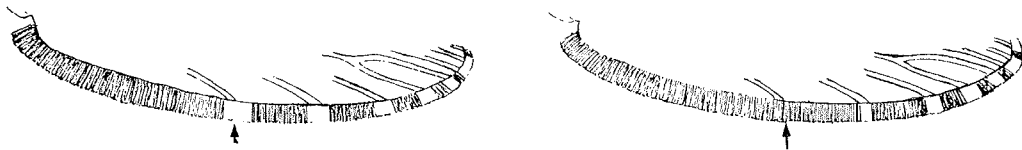
3. 2nd main dark area (median dark spot) on vein 1 with 2 pale interruptions; bases of hind tarsus 4 and 5 sometimes broadly pale.....*rufipes brousesi* (in part)
 — 2nd main dark area on vein 1 with 1 pale interruption; bases of hind tarsus 4 and 5 at most narrowly pale.....4



4. Base of costa with 1 pale interruption, 3rd main dark area (preapical dark spot) on costa and vein 1 much broader than subcostal pale spot.....*domicolus*
 — Base of costa with 2 pale interruptions; 3rd main dark area equal to or narrower than subcostal pale spot5



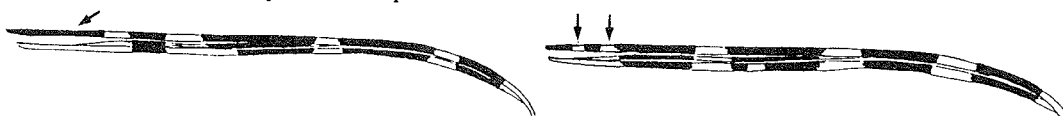
5. Pale fringe spot present opposite vein 6*lloreti*
 — No pale fringe spot opposite vein 6*barberellus*



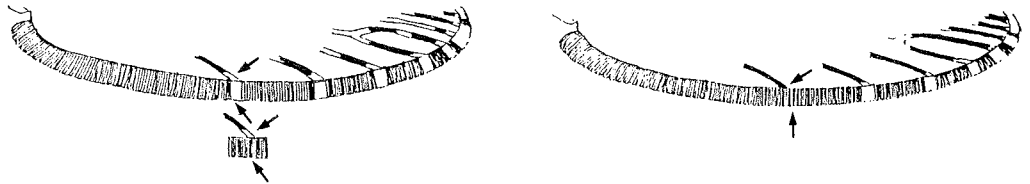
6. Apices of hind tarsus 3 and 4 dark or at most with a few pale scales.....7
 — Apices of hind tarsus 1-3, and sometimes 1-4, distinctly pale-banded.....12



7. Base of costa with 1 or no pale interruption8
 — Base of costa with 2 pale interruptions9



8. Vein 6 either with pale fringe spot or with pale scales at apex*brucei* (in part)
 of vein.....
 — Vein 6 without pale fringe spot and with no pale scales at its apex*rivulorum* (in part)



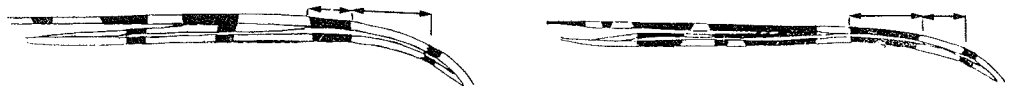
9. Mesonotal scales fairly broad, extending over whole scutum and onto scutellum.....*carteri* (in part)
 — Mesonotal scales variable, but flattened scales confined to at most anterior two thirds of scutum10

10. Very small species, wing length 2.8mm or less*brucei* (in part)
 — Small or moderate species, wing length 2.9mm or more11

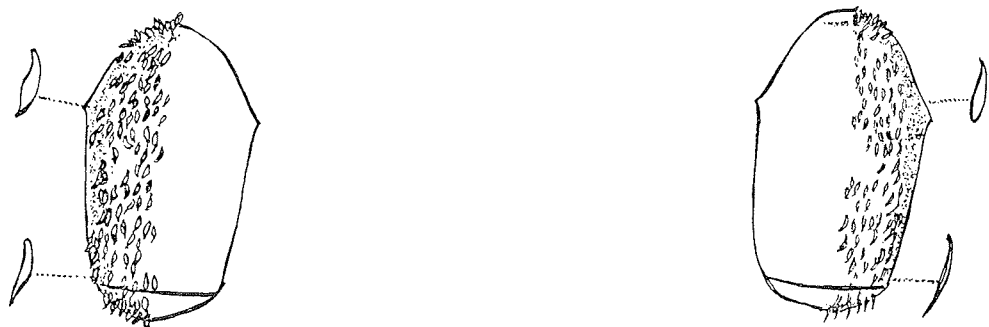
11. Hind tarsus entirely dark; preaccessory dark spot on vein 1 usually absent.....*freetownensis*
 — Hind tarsus 1 and 2 narrowly but distinctly pale apically; pre-accessory dark spot present*demeilloni* (in part)



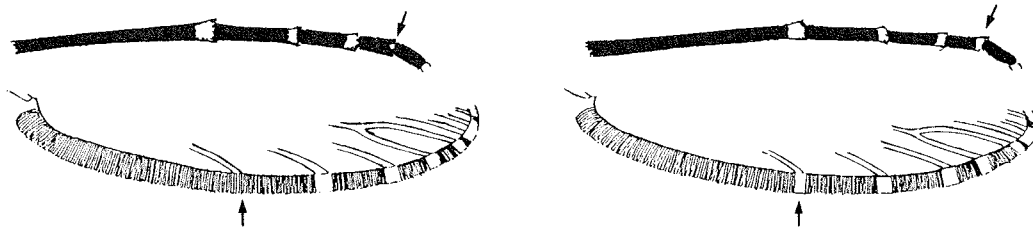
12. 3rd main dark area (preapical dark spot) equal to or narrower than subapical pale spot*flavicosta* (in part)
 — 3rd main dark area much broader than subapical pale spot13



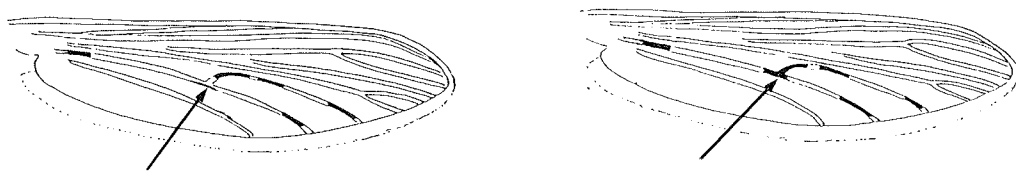
13. Mesonotal scales broadish and white, only slightly less dense on posterior third of scutum than anteriorly, and extending onto scutellum.....*flavicosta* (in part)
 — Mesonotal scales on posterior third of scutum scanty, narrow and yellowish-brown14



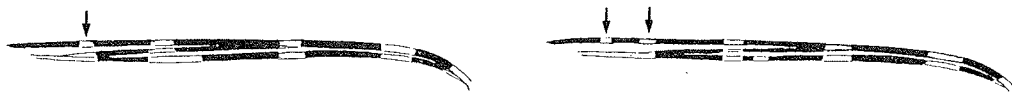
14. Moderate-sized species, wing more than 3.2mm*keniensis* (in part)
 — Small species, wing 3mm or less.....15
15. Fore tarsus 4 dark or indistinctly pale at apex; pale fringe spot
 opposite vein 6 usually absent**moucheti*
 — Fore tarsus 4 with well marked apical pale band; 6th fringe spot present**bervoetsi*



16. Large species; fork of vein 5 pale.....*garnhami* (in part)
 — Small or moderate-sized species; vein 5 dark at fork.....17



17. Base of costa with 1 or no pale interruption18
 — Base of costa with 2 pale interruptions.....*demeilloni* (in part)



18. Small species, wing about 2.5-3.3mm*rivulorum* (in part)
 — Small or moderate-sized species, wing 2.9-4.2mm.....*demeilloni* (in part)

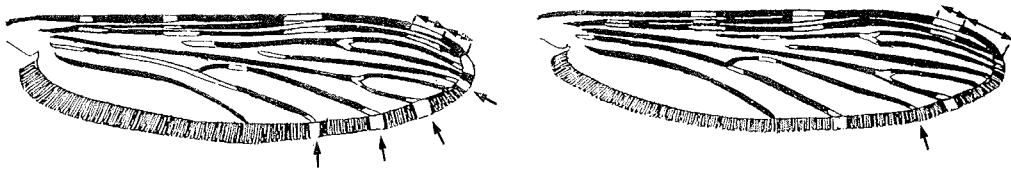
SECTION XI. Mosquitoes with 1 pale spot on vein 5.1, no pale interruption on 3rd main dark area (preapical dark spot) of vein 1, costa with at least 1 pale spot on basal half; palps with less than 4 bands, pale at apex; legs not speckled, hind tarsus 4 and 5 not entirely pale; abdomen without laterally projecting tufts of scales.

1. Palps with apex pale and no other pale bands2
 — Palps with 3 pale bands3



*But see note under *moucheti nigeriensis* in Gillies and De Meillon, (1968).

2. Subapical pale spot on costa and vein 1 about equal to or broader than 4th main dark area (apical dark spot), pale fringe spots present opposite veins 3, 4.2, 5.1 and 5.2.....*nili* Congo form
- Subapical pale spot narrower, usually much narrower, than 4th main dark areas, no pale fringe spot present opposite vein 5.1*nili somalicus*



3. Joints of hind tarsal segments narrowly or broadly enveloped in pale bands, at least tarsus 5 pale-ringed basally.....*longipalpis*
- Pale banding on hind tarsus narrow and apical only4



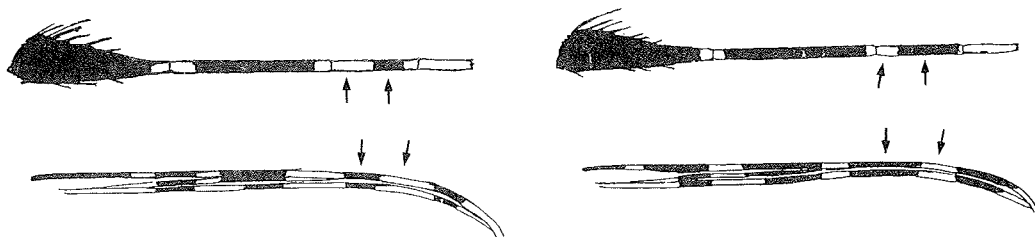
4. Preaccessory dark spot on vein 1 about twice as broad as pale spots on either side of it*fuscivenosus* (in part)
- Preaccessory dark spot absent or, if present, narrower or only slightly broader than adjoining pale spots5



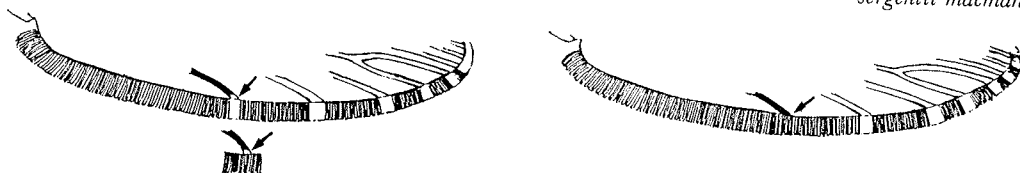
5. Basal area of vein 1 proximal to 1st main dark area (presector dark spot), pale with a broad dark spot.....*culicifacies*
- Basal area of vein 1 entirely pale6



6. Subapical pale band on palps broader than or slightly narrower than subapical dark band **and** 3rd main dark area (preapical dark spot) of costa and vein 1 equal to or narrower than sub-costal pale spot.....*aruni* (in part)
- Subapical pale band on palps much narrower than subapical dark band, **or** 3rd main dark area broader than subcostal pale spot.....7



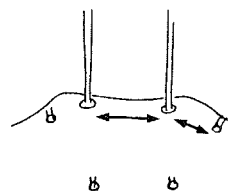
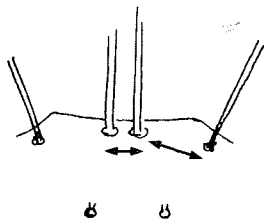
- 7. Moderate-sized species, wing more than 3.3 mm *demeilloni* (in part)
- Small species, wing 3.3 mm or less 8
- 8. Tip of vein 6 with a few pale scales, 6th fringe spot sometimes present *parensis* (in part)
- Tip of vein 6 dark, no 6th fringe spot present *funestus* group
- demeilloni* (in part; mainly highlands)
- cameroni* (extreme southern Africa only)
- sergentii macmahoni*



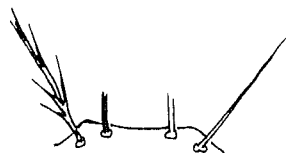
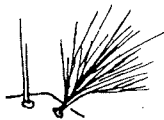
KEY TO THE FOURTH STAGE LARVAE

The following species, known only as adults, are not included: *caliginosus*, *vernus*, *deemingi*, *fontinalis*, *fuscivenosus*, *ethiopicus*, *berghei*, *mortiauxi*, *upemba*, *daudi*, *brumpti*, and *cristipalpis*.

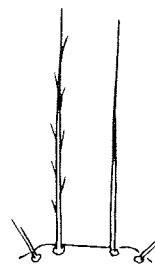
- 1. Inner clypeal hairs (setae 2-C) close together, separated from each other by a distance much less than between inner and outer clypeals (2-C and 3-C) Section I
- Inner clypeals separated from each other by a distance about equal to or greater than between inner and outer clypeals 2



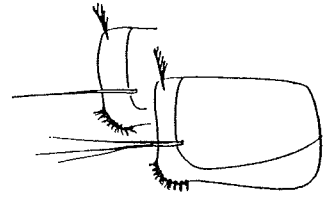
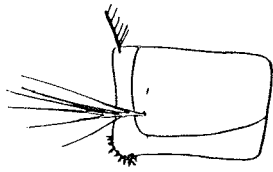
- 2. Outer clypeal hairs (setae 3-C) with 8 or more branches Section II
- Outer clypeals simple or with less than 8 branches 3



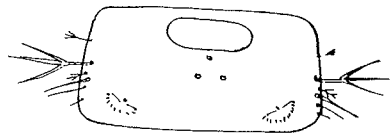
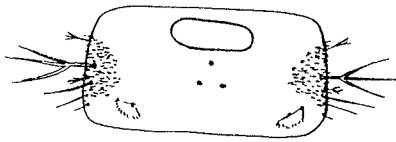
- 3. Inner clypeal hairs (setae 2-C) strongly branched in apical half Section III
- Inner clypeals simple, frayed or lightly feathered, the fraying if present not mainly confined to apical half 4



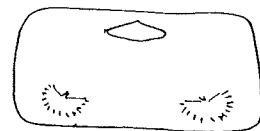
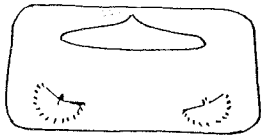
4. Saddle hair (seta 1-X) with at least 5 branchesSection IV
 — Saddle hair simple or with 2-4 branches5



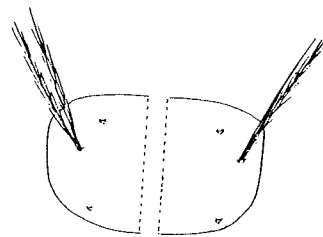
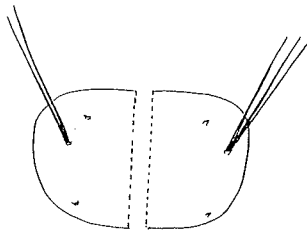
5. Thorax and abdomen laterally and ventrally with numerous spicules, not arranged in beltsSection V
 — Sides of abdomen and thorax without spicules6



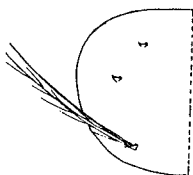
6. Width of main abdominal plate on segment V equal to at least three-quarters distance between bases of palmate hairs (setae 1-V)Section VI
 — This plate not more than two-thirds distance between palmate hairs7



7. Both long mesopleural hairs (setae 9-M,10-M) simple, occasionally one split into 2-3 branchesSection VII
 — 1, at least, of the long mesopleural hairs feathered or with more than 3 branches8



8. 1 long metapleural hair (seta 9-T) simple, 1 (seta 10-T) featheredSection VIII
 — Both long metapleurals featheredSection IX

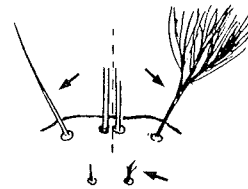
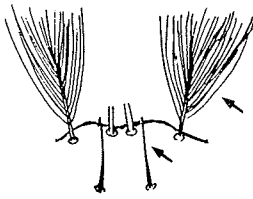


SECTION I. Larvae with inner clypeal hairs (setae 2-C) much closer together than distance between inner and outer clypeals (sub-genus *Anopheles*).

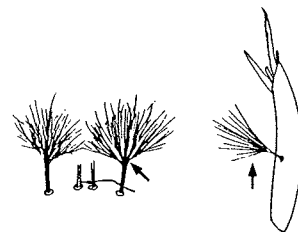
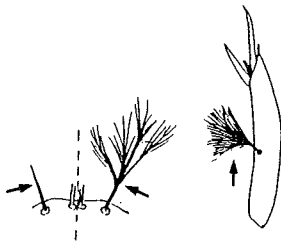
1. Leaflets of abdominal palmate hairs on segments III-VII (setae 1-III to 1-VII)
 - simple, without serrations *implexus* (in part)
 - Palmate hairs on segments III-VII with well developed serrations 2



2. Branching of outer clypeals (setae 3-C) extending over almost whole length of stem; posterior clypeals (setae 4-C) long, reaching as far as bases of inner clypeals (2-C)..... *concolor*
- Outer clypeals simple or branched, branching not extending to basal quarter of stem; posterior clypeals very short, not reaching much more than half-way to bases of inner clypeals..... 3

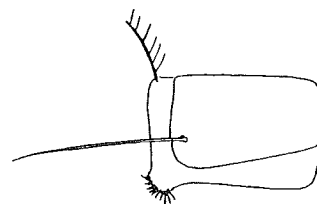
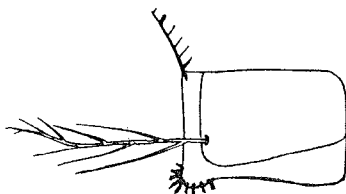


3. Antennal shaft hair (seta 1-A) with more or many more than 20 branches; outer clypeal hairs (setae 3-C) either short and simple or else long and with up to about 30 branches *obscurus*
- Antennal shaft hair with less than 20 branches; outer clypeals with 40 or more branches *coustani* group

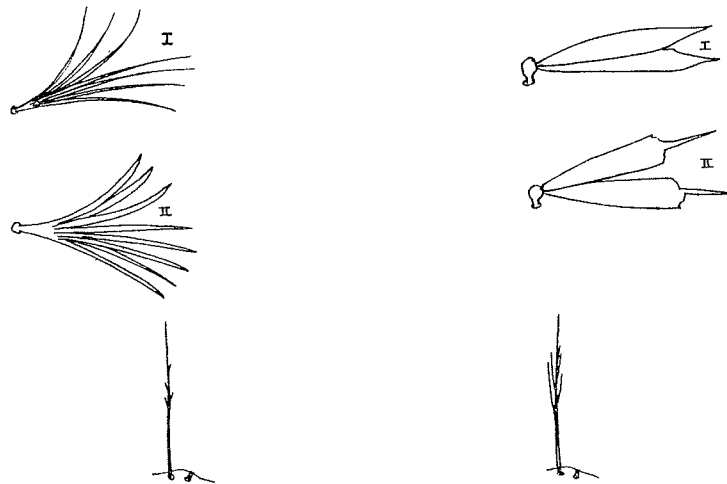


SECTION II. Larvae with outer clypeal hairs (setae 3-C) with 8 or more branches, inner clypeal hairs (setae 2-C) widely separated.

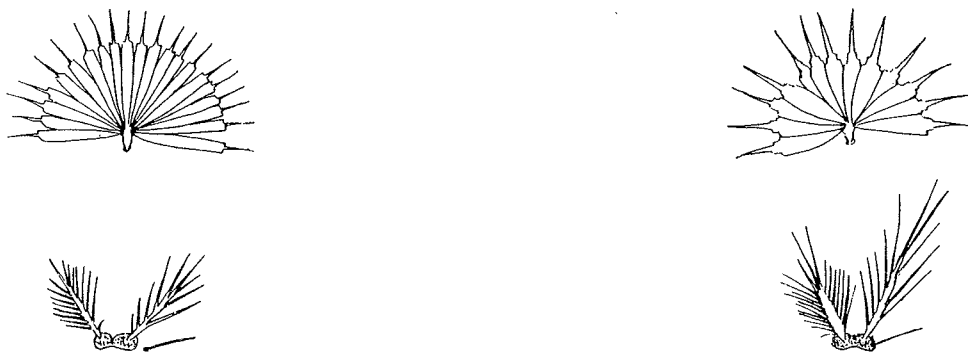
1. Saddle hair (seta 1-X) with more than 5 branches *bervoetsi* (in part)
- Saddle hair simple 2



2. Palmate hairs on abdominal segments I and II (setae 1-I, 1-II) undifferentiated; inner clypeal hairs (2-C) with delicate fraying*argenteolobatus* (in part)
murphyi
- Palmate hairs partly differentiated on segment I (1-I) and fully so on segment II (1-II); inner clypeals (2-C) with well marked branching3



3. Palmate hairs on segments II-VII (setae 1-II to 1-VII) with 20 or more leaflets; shoulder hairs (setae 1-P, 2-P) on basal tubercles that are partially fused or separated, inner hair (1-P) with 16-21 branches*swahilicus*
- Palmate hairs averaging per specimen less than 20 leaflets; shoulder hairs on large fused tubercles, inner hair with 19-30 branches4

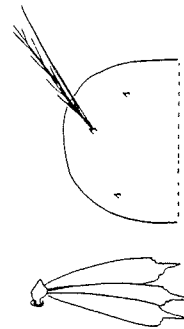
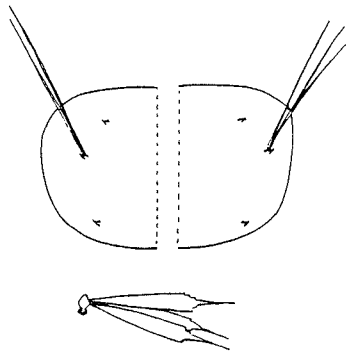


4. Filaments of abdominal palmate hairs on segments III-VII (setae 1-III to 1-VII) short and blunt*pharoensis* (in part)
- Filaments of palmates longer and drawn out.....*pharoensis* (in part)
squamosus



SECTION III. Larvae with inner clypeal hairs (setae 2-C) strongly branched in apical half; outer clypeal hairs (setae 3-C) with less than 8 branches; inner clypeal hairs separated by a distance equal to or greater than that between inner and outer hairs.

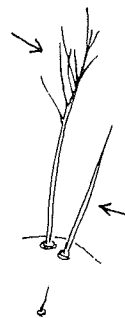
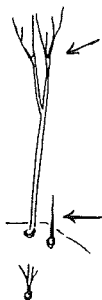
1. Both long mesopleural hairs (setae 9-M, 10-M) simple or occasionally 1 split; filaments of abdominal palmate hairs (setae 1) long and drawn out.....2
- One long mesopleural feathered; palmate hairs with short blunt-tipped filaments*rufipes* (in part)



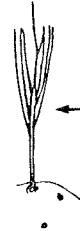
2. Inner shoulder hairs (setae 1-P) not especially flattened, mounted on inconspicuous tubercles*wilsoni*
lovettae
- Inner shoulder hairs greatly flattened, mounted on well formed basal tubercles3



3. Outer clypeal hairs (setae 3-C) very short, one quarter or less length of inner clypeals (2-C); branches of inner clypeals arising from both sides of their stem.....4
- Outer clypeals half or more length of inner clypeals; branches of inner clypeals largely confined to inner aspect5



4. Inner clypeal hairs (setae 2-C) with most secondary branches arising near apex *cinctus*
vinckei
 — Inner clypeals with most secondary branches arising about half-way up the stem *dureni*

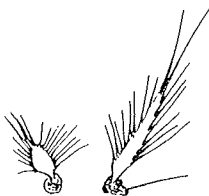


5. Outer clypeal hairs (setae 3-C) half to three-quarters length of inner clypeals (setae 2-C), posterior clypeals (4-C) reaching not more than half-way to bases of inner clypeals (2-C)..... *nili*
 — Outer clypeals about as long as inner clypeals, posterior clypeals extending up to or beyond bases of inner clypeals *somalicus*



SECTION IV. Larvae with saddle hair (setae 1-X) having at least 5 branches; outer clypeal hairs (setae 3-C) with less than 8 branches; inner clypeal hairs (2-C) widely separated and not strongly branched.

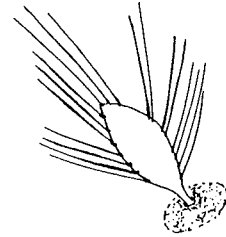
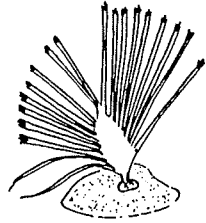
1. Shoulder hairs (setae 1-P, 2-P) mounted on large basal tubercles which are widely separated; inner shoulder hair (1-P) much flattened.....2
 — Shoulder hairs on basal tubercles which are either fused or narrowly separated, inner shoulder hairs not especially flattened.....6



2. Outer clypeal hairs (setae 3-C) about half length of inner clypeals (2-C) *kingi*
 — Outer clypeals much less than half length of inner clypeals3



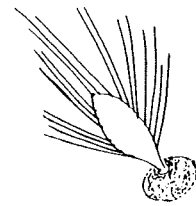
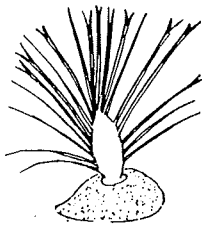
3. Inner shoulder hairs (setae 2-C) with at least half of the branches flattened and leaf-like, the apices fimbriated.....4
 — Inner shoulder hairs with no fimbriated branches although some may be bifid apically5



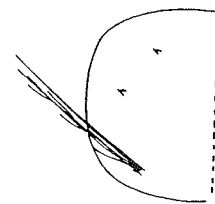
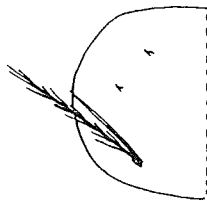
4. Outer and posterior clypeal hairs (setae 3-C, 4-C) less than one-fifth length of inner clypeals (setae 2C).....*maliensis*
 — Outer and posterior clypeals about one-third to two-fifths length of inner clypeals*machardy*



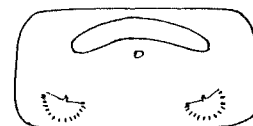
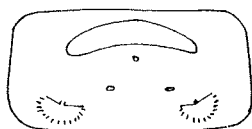
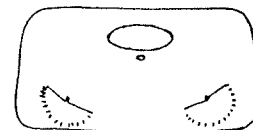
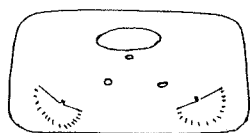
5. Inner shoulder hairs (setae 1-P) with one-third to half of the branches bifid, some of them deeply forked*buxtoni*
 — Inner shoulder hairs with at most a few only of the branches bifid apically*ardensis* (in part)



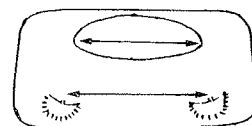
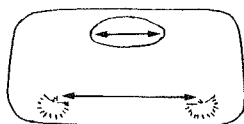
6. The simple long metapleural hair (setae 10-T) flattened and lance-like, about two-thirds length of feathered hair (seta 9-T)*brunnipes* (in part)
 — Metapleural hairs not so7



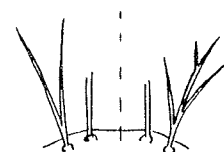
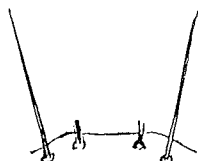
7. 2-3 accessory tergal plates present on most abdominal segments8
 — Only 1 accessory tergal plate present11



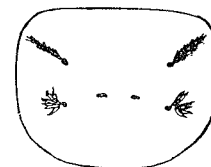
8. Main tergal plate on 5th abdominal segment two-thirds or less distance between bases of palmate hairs (setae I-V)*austeni* (in part)
 — Main tergal plate three-quarters or more distance between palmate hairs9



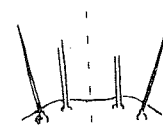
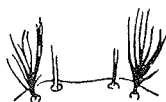
9. Outerclypeal hairs (setae 3-C) simple*brohieri* (in part)
 — Outer clypeals with 2-4 branches10



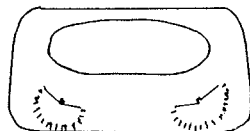
10. Posterior clypeal hairs (setae 4-C) less than quarter length of inner clypeals (setae 2-C); no metathoracic tergal plates present*schwetzi* (in part)
 — Posterior clypeals at least half length of inner clypeals; paired metathoracic plates present*domicolus* (in part)



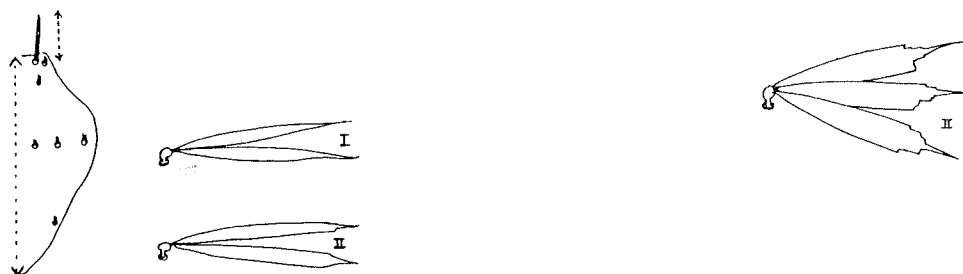
11. Outer clypeal hairs (setae 3-C) with 6 or more branches*bervoetsi* (in part)
 — Outer clypeals simple or with a few fine branches12



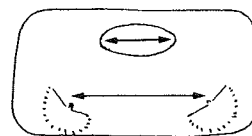
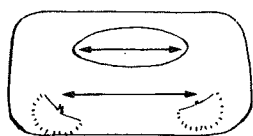
12. Main tergal plate on abdominal segment V wider than distance between bases of palmate hairs (setae 1-V) and occupying one third to half length of segment.....*flavicosta* (in part)
 — Main tergal plate not so13



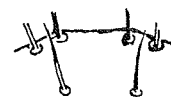
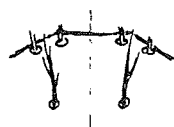
13. Inner clypeal hairs (setae 2-C) short and abruptly pointed, not more than quarter length of frontoclypeus; 1st abdominal palmate (seta 1-I) undifferentiated, 2nd palmate (1-II) only partially so.....*gibbinsi*
 — Inner clypeals not so; 1st abdominal palmate differentiated, 2nd palmate as on rest of abdomen14



14. Main tergal plate on abdominal segment V almost equal to distance between bases of palmate hairs (setae 1-V).....*brohieri* (in part)
seydeli (in part)
 — Main tergal plate half to three-quarters distance between palmate hairs15



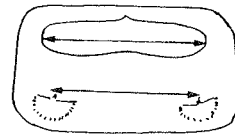
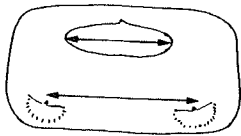
15. Posterior clypeal hairs (setae 4-C) bifid or with well marked lateral branches.....*marshallii* (in part)
 — Poster clypeals simple16



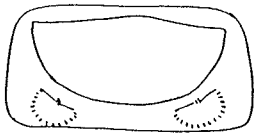
2. Inner shoulder hair (seta 1-P) with about 5-12 branches, mounted on very small, scarcely developed tubercle *azaniae*
 — Inner shoulder hair with about 15-20 branches, mounted on a well developed tubercle 3



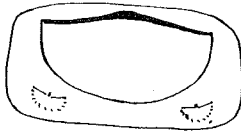
3. Width of main abdominal tergal plate at most four-fifths distance between palmate hairs (setae 1-V) *sergentii sergentii*
 — Main tergal plate four-fifths or greater than distance between palmate hairs *sergentii macmahoni*



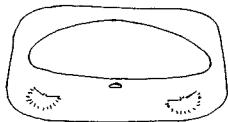
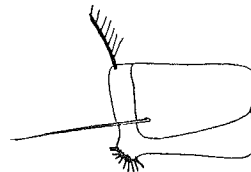
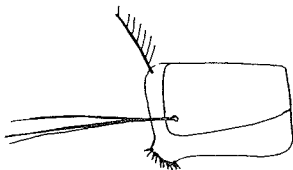
4. Depth of main abdominal tergal plate on segment V equal to about half or more depth of segment 5
 — Main tergal plate much less than half depth of segment 8



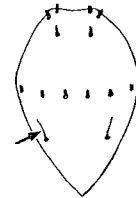
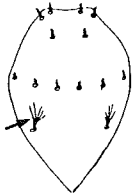
5. Main abdominal tergal plate on segment V more or less twice as wide as deep, normally with no completely detached accessory plates *funestus* subgroup
 — Main tergal plate 3 or more times as wide as deep, 1-3 accessory plates present on nearly all segments 6



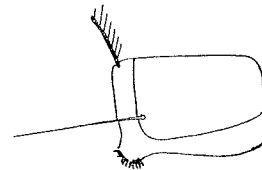
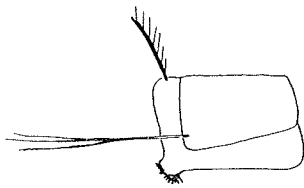
6. Saddle hair (seta 1-X) with 3-4 branches; 1 accessory tergal plate present on most segments *flavicosta* (in part)
 — Saddle hair simple, 2 accessory tergal plates 7



7. Sutural hair (seta 8-C) branched; ventral surface of abdomen without spicules *leesoni*
 — Sutural hair simple; ventral surface of abdomen with belts of very fine spicules *confusus*



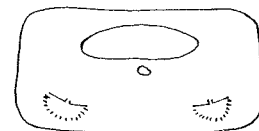
8. Saddle hair (seta 1-X) with 2-4 branches 9
 — Saddle hair simple 14



9. Inner clypeal hairs (setae 2-C) abruptly tapered, distal third fine and filamentous *tchekedii*
 — Inner clypeals not so 10



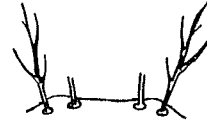
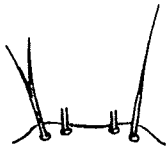
10. With 3 accessory tergal plates on most segments 11
 — 1 accessory tergal plate *barberellus* (in part)



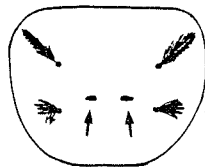
11. Outer and posterior clypeal hairs (setae 3-C, 4-C) very short with 2-3 branches, not more than quarter length of inner clypeals (setae 2-C) *schwetzi*
 — Outer and posterior clypeals at least half of inner clypeals 12



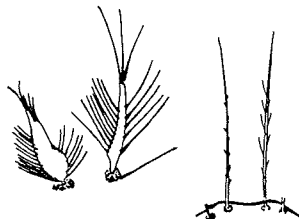
12. Outer clypeal hairs (setae 3-C) simple or bifid13
 — Outer clypeals with 3-4 branches*domicolus* (in part)



13. Paired metathoracic plates present; 1st abdominal segment usually with
 2 accessory plates*domicolus* (in part)
 — No metathoracic plates; no accessory plates on 1st abdominal
 segment*longipalpis*



14. Inner shoulder hair (seta 1-P) greatly flattened, widely separated from
 median hair (seta 2-P); inner clypeal hairs (setae 2-C)
 frayed or with fine branches*natalensis*
 — Inner shoulder hair not so, bases of shoulder hairs close together; inner
 clypeals simple15



15. Main abdominal tergal plate $2\frac{1}{2}$ —3 times as wide as deep; sutural hair
 (seta 8-C) simple or bifid*mousinhoi*
 — Main tergal plate 3 — $4\frac{1}{2}$ times as wide as deep; sutural hair branched
 from base*rivulorum*
brucei

