Contribution to the knowledge of the mosquitoes *(Diptera, Culicidae)* of Gabon

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RÉSUMÉ.

Une étude des moustiques à Lambaréné au Gabon a été réalisée durant les mois de janvier à mars, à la fin de la saison sèche. Dix-huit espèces sur quarante-quatre capturées sur appât humain, au piège lumineux Monks Wood et de CDC, et sous forme larvaire sont rapportées pour la première fois du Gabon. Les pièges lumineux Monks Wood ont capturé un plus grand nombre d'espèces (35) *que les autres méthodes d'échantillonnage. Le moustique le plus fréquent est* Mansonia uniformis. *Seuls quelques exemplaires d'*Anopheles gambiae *ont été capturés, mais l'espèce A du complexe est identifiée pour la première fois à Lambaréné. L'Anophèle anthropophile le plus commun est* An. moucheti.

Une liste-catalogue, composée d'après des publications et des informations non publiées montre que 83 espèces, sous-espèces et variétés de moustiques sont connues du Gabon. L'identité d'un certain nombre reste cependant douteuse.

ABSTRACT.

A mosquito survey was undertaken in January-March, at the end of the dry season, in Lambaréné, Gabon. Eighteen of the 44 mosquito species caught in human bait catches, in Monks Wood and CDC light-trap collections and as larvae were recorded for the first time from Gabon. The Monks Wood light-trap caught more species (35) than the other sampling methods. The commonest mosquito was Mansonia uniformis. *Few* Anopheles gambiae *were caught, but species A of the complex was identified for the first time from Lambaréné. The commonest anthropophilic anopheline was* An. moucheti.

A checklist compiled from both published and unpublished records shows that 83 species, subspecies and varieties of mosquitoes have been recorded from Gabon. The identity of a few, however remain doubtful.

1. INTRODUCTION.

At the end of the short dry season, in January-March of 1976, trials were undertaken in Gabon by the Wellcome Foundation to evaluate the effectiveness of ULV applications of synthetic pyrethroids for the control of mosquitoes in Lambaréné, a medium sized town situated on the River Ogooé in equatorial rain forest. Both prior to and during the time of insecticidal fogging a mosquito survey was undertaken of the area. The results of this survey in Lambaréné are presented here, together with a review of the mosquito species recorded in Gabon.

2. SAMPLING METHODS AND RESULTS.

Mosquitoes species caught.

Human bait catches were performed 5-6 times each week from 2100-2230 hours in the compounds of houses in Lambaréné, these being situated at the edge of the "bush". A few bait catches were also made at other hours of the night. On the same nights as these biting catches 1-2 Monks Wood light-traps (Service, 1970) employing a 6 W daylight fluorescent tube were placed in the compounds, and 2 CDC traps (Johnston *et al.*, 1973) using a 2 V instrument panel light bulb were placed in the bedrooms of houses.

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Mosquito larvae were also collected from a few habitats.

Of the 44 mosquito species collected in Lambaréné 18 are recorded for the first time from Gabon (table I). A total of 13 species were caught in the bait catches, including *Aedes aegypti formosus, Ae. argenteopunctatus* and *Ae. lineatopennis,* species which were not caught by the light-traps. Twenty species, including *An. obscurus, An. hancocki, Eratmapodites chrysogaster* grp. and *Culex perfuscus,* mosquitoes not caught at bait or in Monks Wood light traps, were caught in the indoor CDC traps. The 35 species caught in the Monks Wood light-traps constituted 81.4 % of the total species collected in Lambaréné, moreover 17 were caught only in the Monks Wood light-traps.

TABLE I. — Mosquitoes caught at human bait, in light-traps and as larvae at Lambaréné, Gabon, during January - February, 1976.

Species	Human bait catches	Monks Wood light-traps outdoors	CDC light-traps, indoors	Larval collections
Anopheles coustani Laveran		×		
A. tenebrosus Dönitz	×	×		
A. paludis Theo.	×	×	×	
A. obscurus Grünberg			×	
A. moucheti Evans	×	×	×	
A. hancocki Edwards			×	
A. hargreavesi Evans	×	×	×	
A. gambiae Giles complex	×	×	×	
**A. gambiae* species A				×
**A. pretoriensis* (Theo.)		×		
**Malaya taeniarostris* (Theo.)		×	×	
**Hodgesia cuptopus* Theo.		×	×	
Uranotaenia pallidocephala Theo.		×	×	
**U. balfouri* Theo.		×		
U. mashonaensis Theo.		×		
**U. nigromaculata* Edwards		×		
Aedeomyia africana Neveu-Lemaire		×	×	
Mimomyia mimomyiaformis (Newstead)		×		
**M. plumosa* (Theo.)		×		
**M. mediolineata* (Theo.)		×		
**Mansonia cristata* (Theo.)		×		
M. aurites (Theo.)		×		
M. africana (Theo.)	×	×	×	
M. uniformis (Theo.)	×	×	×	
**Aedes scatophagoides* (Theo.)		×		
**Ae. aegypti formosus* (Walker)	×			
Ae. simpsoni (Theo.)		×		
Ae. africanus (Theo.)				×
**Ae. unilineatus* (Theo.)		×		
**Ae. argenteopunctatus* (Theo.)	×			
Ae. domesticus (Theo.)		×		
**Ae. leptolabis* Edwards		×		
**Ae. alboventralis* (Theo.)		×		
Ae lineatopennis (Ludlow)	×			
Eratmapodites chrysogaster grp			×	
Culex tigripes Grandpré & Charmoy		×	×	×
C. rima grp.	×	×	×	
C. rima Theo.		×		
C. nebulosus Theo.				×
**C. inconspicuosus* (Theo.)		×		
**C. poicilipes* (Theo.)	×	×	×	
C. annulioris consimilis Newstead		×	×	
C. duttoni Theo.				×
**C. neavi* Theo.		×	×	
C. pipiens fatigans Wiedemann	×	×	×	
C. perfuscus Edwards			×	
Totals	13	35	20	5

* = Species and subspecies recorded for the first time from Gabon.

A large permanent swamp with extensive growths of papyrus and other emergent vegetation was situated in about the middle of the town, but apart from this there were few larval habitats in the area at the time of the survey, presumably because it was at the end of the dry season. A few larvae of the *An. gambiae* complex were, however, collected from small roadside puddles. Examination of the polytene chromosomes of the salivary glands of 6 fourth instar larvae showed them to be species A. This is the first identification to sibling species of specimens of the *gambiae* complex caught in Lambaréné.

Larvae hatched from eggs recovered from a dry tree-hole were identified as those of *Aedes africanus.* Larvae of *C. nebulosus, Ae. africanus, C. tigripes* and *C. duttoni* were collected from a few clay pots and miscellaneous water containers situated in house compounds. Surprisingly no larvae of *C. pipiens fatigans* were found, and only a few adults were caught at bait and in light-traps. Although Galliard (1931 *a*) recorded

this mosquito in Gabon, it does not appear to be common (Mouchet, 1971). There is evidence to suggest that in West Africa, and probably elsewhere, the species was uncommon before the introduction of organochlorine insecticides in urban mosquito control programmes (Hamon *et al.*, 1967; Mouchet *et al.*, 1960; Service, 1966).

The commonest anthropophilic mosquito in Lambaréné was *Mansonia uniformis*, followed by *M. africana*, *An. moucheti* and *An. paludis*. None of the other species listed in table I was common at bait. The most abundant mosquito caught in the outdoor Monks Wood light-traps was *Malaya taeniarostris*, which breeds in axils of bananas and *Colocasia* plants which were very common in Lambaréné. Despite the abundance of these plants and water filled axils only 2 *Aedes simpsoni* were caught, both in a Monks Wood light-trap. Adults of *Uranotaenia pallidocephala, Hodgesia cutopus and C. poicilipes* were also commonly caught in the light-traps, all are swamp breeding mosquitoes, in fact about two-thirds of the species caught in Lambaréné were essentially swamp breeders.

3. MOSQUITO RECORDS FROM GABON.

There is little information available on the distribution of the mosquito species in Gabon, their ecology, or relation to disease transmission. There are only three papers devoted to the mosquitoes of Gabon, all published about 45 years ago by Galliard (1931 *a, b*, 1932), two unpublished mimeographed documents produced by the World Health Organization (Nguy Van Duong *et al.*, 1962; Mouchet, 1971), and a mimeographed document of ORSTOM de Brazzaville (Lancien *et al.*, 1975). Additional records of species from the country are given in the book of Edwards (1941) and in the papers of Hamon *et al.* (1965) and Lacan (1958). The *Anopheles* species caught in Gabon are listed in the book of Gillies & De Meillon (1968).

The present survey in Lambaréné has added a further 18 species to the Gabonaise fauna. A complete check list of the mosquitoes of Gabon (table II) shows that 83 species, subspecies and named varieties have so far been reported from the country.

3.1. *Anopheles smithii.*

The inclusion of this species by Gillies & De Meillon (1968) is presumably based on the unpublished report of Nguy Van Duong *et al.* (1962) of the capture of a single blood-engorged female in a house in Koulamoutu.

TABLE II — Check list of mosquito species of Gabon, with references to first records.

Species	References
Anopheles coustani	LACAN (1958)
A. ziemanni Grünberg	GALLIARD (1932)
A. tenebrosus	GALLIARD (1932)
A. obscurus	LACAN (1958)
A. paludis	GALLIARD (1932)
A. cinctus (Newstead & Carter)	HAMON *et al.* (1956)
A. smithii Theo.	NGUY VAN DUONG *et al.* (1962)
A. nili Theo.	LACAN (1958)
A. funestus Giles	GALLIARD (1932)
**A. marshallii* (Theo.)	LACAN (1958)
A. moucheti	LACAN (1958)
**A. moucheti nigeriensis* Evans	HAMON *et al.* (1956)
A. hargreavesi	GALLIARD (1932)
A. hancocki Edwards	NGUY VAN DUONG *et al.* (1962)
A. wellcomei Theo.	HAMON *et al.* (1956)
A. wellcomei ugandae Evans	GALLIARD (1932)
A. gambiae s.l.	GALLIARD (1932)
A. gambiae species A.	**SERVICE
A. melas Theo.	LACAN (1958)
A. rufipes (Gough)	GALLIARD (1932)
A. pharoensis Theo.	GALLIARD (1932)
A. pretoriensis	SERVICE
Toxorynchites brevipalpis conradti Grünberg	EDWARDS (1941)
Malaya taeniarostris	SERVICE
Hodgesia cuptopus	SERVICE
Uranotaenia pallidocephala	GALLIARD (1931*a*)
U. balfouri	SERVICE
U. ornata Theo.	MOUCHET (1971)
U. mashonaensis	SERVICE
U. nigromaculata	SERVICE
**U. fusca* Theo.	GALLIARD (1931*a*)
Aedeomyia africana	GALLIARD (1931*a*)
Eratmapodities chrysogaster Graham	MOUCHET (1971)
E. leucopous Graham	LANCIEN *et al.* (1975)
Mimomyia plumosa	SERVICE
M. mimomyiaformis	GALLIARD (1931*a*)
M. mediolineata	SERVICE
Ficalbia malfeyti (Newstead)	GALLIARD (1931*a*)
Mansonia cristata	SERVICE
M. aurites	GALLIARD (1931*a*)
M. africana	GALLIARD (1931*a*)
M. uniformis	GALLIARD (1931*a*)
Aedes mucidus (Karsch)	GALLIARD (1931*a*)
Ae. scatophagoides	SERVICE
**Ae. aegypti* s.l.	GALLIARD (1931*a*)
Ae. aegypti formosus	SERVICE
Ae. simpsoni	GALLIARD (1931*a*)
Ae. simpsoni var. *lilii* Theo.	EDWARDS (1941)
Ae. africanus	MOUCHET (1971)
Ae. unilineatus	SERVICE
Ae. apicoargenteus (Theo.)	MOUCHET (1971)
Ae. domesticus	GALLIARD (1931*a*)
Ae. leptolabis	SERVICE
Ae. nigricephalus (Theo.)	GALLIARD (1931*a*)
Ae. fowleri (Charmoy)	GALLIARD (1931*a*)
Ae. punctothoracis (Theo.)	GALLIARD (1931*a*)
Ae. argenteopunctatus	SERVICE
Ae. alboventralis	SERVICE
Ae. lineatopennis	GALLIARD (1931*a*)

Species	References
**Culiseta fraseri* (Edwards)	MOUCHET (1971)
Culex tigripes	GALLIARD (1931*a*)
C. rima	GALLIARD (1931*a*)
C. rubinotus Theo.	MOUCHET (1971)
**C. galliardi* Edwards	EDWARDS (1941), GALLIARD (1931*a*)
C. sunyaniensis Edwards	LANCIEN *et al.* (1975)
C. nebulosus	GALLIARD (1931*a*)
**C. inconspicuosus*	GALLIARD (1931*b*), SERVICE
C. macfiei Edwards	LANCIEN *et al.* (1975)
C. subaequalis Edwards	LANCIEN *et al.* (1975)
C. poicilipes	SERVICE
C. bitaeniorhynchus Giles	GALLIARD (1931*b*)
C. annulioris consimilis Newstead	GALLIARD (1931*b*)
C. thalassius Theo.	MOUCHET (1971)
C. duttoni	GALLIARD (1931*b*)
**C. univittatus* Theo.	GALLIARD (1931*a*), MOUCHET (1971)
C. neavei	SERVICE
C. pipiens fatigans	GALLIARD (1931*a*)
**C. invidiosus* Theo.	GALLIARD (1931*a*)
C. perfuscus	GALLIARD (1931*a*)
C. perfidiosus Edwards	GALLIARD (1931*b*)
C. guiarti Blanchard	GALLIARD (1931*b*)
**C. ingrami* Edwards	GALLIARD (1932)
C. pruina Theo.	GALLIARD (1931*b*)
C. pruina var. *eschirasi* Galliard	GALLIARD (1931*b*)
Culex decens grp.	MOUCHET (1971)
C. trifilatus Edwards	LANCIEN *et al.* (1975)

* These are doubful records, see notes in paper on these species.

** Records listed against Service refer to the first records of these species from Gabon, as presented in this paper.

3.2. *An. hargreavesi* and *An. marshalli.*

Adults of these two species are taxonomically close. Identification is based on the presence of broad mesonotal scales, some of which are truncated in *An. hargreavesi*, and moderately broad to narrow scales in *An. marshalli*, none of which are truncated. Both species have been recorded from Gabon, but past records of *An. marshalli* may have been misidentifications. There was no evidence of the mosquito in Lambaréné during the present survey.

3.3. *An. moucheti nigeriensis.*

This subspecies is cited by Hamon *et al.* (1956) in their review of the distribution of mosquitoes in francophone West and Central Africa, but no details are given concerning its capture from Gabon. Adults are separated only with difficulty from the type form by the structure of the pharyngeal armature, and possibly by the presence of a pale fringe spot opposite vein 6. None of the specimens caught in the Lambaréné survey had this pale fringe spot, neither was the pharyngeal armature in the 10 specimens dissected of the subspecific form. According to Gillies & De Meillon (1968) *nigeriensis* is known for certainty only from southern Nigeria.

3.4. *An. wellcomei* and *An. wellcomei ugandae.*

Galliard (1932) recorded *An. wellcomei* from Gabon, but his description shows that in fact he had collected *An. wellcomei ugandae.* The type form, however, has been recorded in Gabon by others (Hamon *et al.*, 1956; Nguy Van Duong *et al.*, 1962).

3.5. *Uranotaenia fusca.*

This species was identified from Gabon only as larvae (Galliard, 1931 *a*) hence other *Uranotaenia* species, such as *U. nigripes* Theo., whose larvae resemble those of *U. fusca* could have been the species involved.

3.6. *Culiseta fraseri.*

Mouchet (1971) incorrectly states that the species is listed by Edwards (1941) as occurring in Gabon. Although *C. fraseri* probably exists in Gabon, since its distribution ranges from West Africa through Central to East Africa, there are no published records of it from the country.

3.7. *Culex galliardi.*

According to Edwards (1941) the male terminalia figured by Gaillard (1931 *a*) and referred to as a variety of *C. rima* is probably *C. galliardi.*

3.8. *Culex inconspicuosus.*

Larvae collected by Galliard (1931 *b*) and named as a new species, *C. nyangae*, are conspecific with *C. inconspicuosus.* Galliard (1931 *b*) did not give a very detailed description of the larvae, and it is possible that they belonged to other mosquitoes within the subgenus *Mochthogenes* such as *C. fimbriforceps* Edwards or *C. inconspicuosus.* The presence in Gabon of *C. inconspicuosus* is established, however, by the collection of both male and female adults during the Lambaréné survey.

3.9. *C. univittatus.*

Although both Galliard (1931 *a*) and Mouchet (1971) have recorded this species from Gabon their specimens may have been *C. neavei*, a species closely resembling *C. univittatus* but which is commoner in coastal areas of tropical Africa (Jupp, 1971, 1972; White, 1975). All specimens caught in Lambaréné were *C. neavei*, not *C. univittatus.*

3.10. *C. invidiosus.*

Because of the close similarity of adult males and females with those of *C. decens* Theo. Galliard (1931 *a*) may have collected this latter species and not *C. invi-*

diosus. There are no other records of the species from Gabon.

3.11. *C. ingrami.*

The presence of this species in Gabon is based only on larvae (Galliard, 1932). The description and figure given by Galliard (1932) show the siphonal subventral tufts to be longer than those of typical *C. ingrami*, there is therefore some doubt as to the existence of this species in Gabon.

3.12. *Aedes aegypti.*

Mouchet (personal communication, 1976) informs me that although he recorded this species from the Gabon as just *Ae. aegypti* (Mouchet, 1971), the specimens in fact were of the dark form, which I have in this paper referred to as *Ae. aegypti formosus* (Walker). As only dark forms have been recorded from Gabon it seems likely that this was the form collected by Galliard (1931 *a*).

ACKNOWLEDGEMENTS.

I am grateful to the Wellcome Foundation, England, for inviting me to participate in the insecticidal trials in Gabon. I would like to thank the Ministry of Health of Gabon for providing accommodation and transport during the survey and for their cooperation, and also Dr. Lamine Diop for generously providing laboratory facilities in Lambaréné.

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