

*Aedes*, Subgenus *Diceromyia* (Diptera: Culicidae)  
in Madagascar

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ABSTRACT: A general survey of *Aedes*, subgenus *Diceromyia*, in Madagascar was conducted. Four species were obtained as follows: *Aedes madagascarensis* Van Someren, *Ae. grassei* Doucet, *Ae. tiptoni* Grjebine, and *Ae. coulangesi* Rodhain et Boutonnier.

The morphological and biological characters of the subgenus, as well as those of each Madagascarian species, are reviewed and discussed. A key for identification of males and females is given.

#### INTRODUCTION

The subgenus *Diceromyia* of the genus *Aedes* is known from afrotropical and oriental regions only; they are mainly distributed in savannah areas, forest fringes (Reinert 1970a) and in forest galleries. This subgenus shows variable chaetotaxic characters according to the geographical origin of the species. The more constant characters of adult *Diceromyia* as given by Edwards 1941, Mattingly 1959, Reinert 1970b, 1973, Ferrara 1974, Huang 1978, are: torus covered with scales or delicate short bristles, paratergite with scales, one lower mesepimeral bristle present in most species, scutellum with broad scales (except in *flavicollis* Edwards, *furcifer* Edwards, *taylori* Edwards and *mefouensis* Ferrara in which some narrow scales are also present, scutellum of *bananea* Wolfs not described), propleuron with less than 10 setae, prosternum bare, pleurae very scally (patches of broad white scales on subspiracular, propleural, sternopleural and mesepimeral areas), and wing scales often broad.

The adult males usually show the following characters: apical and sub-apical palpal segments short and hairy, coxite with a tuft of setae or scales apically and style habitually bifid.

#### *Diceromyia* Species of Madagascar

The following four species belonging to this subgenus are known from Madagascar: *Ae. madagascarensis* Van Someren, *Ae. grassei* Doucet, *Ae. tiptoni* Grjebine and *Ae. coulangesi* Rodhain and Boutonnier.

The most significant characters of these malagasy *Diceromyia* are: (1) in the females: torus covered with broad white scales, scutellum and vertex with broad scales, scutum with narrow scales, no acrostichal bristle and one lower

mesepimeral bristle, and (2) in the males\*: style bifid, one spine at the apex of the inner branch of the style, claspette well defined and lack of tuft of scales on the coxite.

Preimaginal stages are known only for *Ae. tiptoni*; so we will restrict this work to the adults.

*Ae. madagascarensis* Van Someren

The female was described as belonging to the subgenus *Finlaya* by Van Someren; then Rodhain and Boutonnier (1982a) included it in the subgenus *Diceromyia*, and described the adult male.

The adult is characterized by the scutal ornamentation and by tibiae and segment 2 of fore tarsus entirely dark; the male shows, on the coxite, a small but well defined basal lobe, a falciform apex of the claspette, and a short and dilated spine of the style.

The single specimen (holotype) recorded by Van Someren was collected in Sakaramy; several specimens (16 females, 3 males) were subsequently collected by us in April, 1980, in the Ambre Mountain (Fig. 1). This species seems to be restricted to the dense hygrophilic mountain forests of the northern part of Madagascar.

Recently, Brunhes (1982) described under the name *Ae. (D.) sylvaticus*, the male of a species which seems to be closely related, if not identical, with *madagascarensis*.

*Ae. grassei* Doucet

Adult male and female were described by Doucet (1951) who included a drawing of the male genitalia. The adult is characterized by fore tarsus dark with, on each segment except the first one, a basal white spot and by abdominal tergites with a small white spot of broad scales on the posterior margin. The male has a button-ended claspette with long and flexible setae, a strong and thick spine on the style, and a phallosome with two curved spines on each side.

This species was described by Doucet (1951) from Perinet. Ravaonjanahary (1978) records specimens collected by Brunhes in Moramanga and Manakara. Thus, *Ae. grassei* seems located in the Eastern bioclimatic area, to the east coast and the Oriental slope of the plateau, in a tropical rain forest environment (Fig. 1). It does not seem to be anthropophilic.

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\* Males of *Ae. coulangesi* are not known.

To our opinion, the complementary description published by Brunhes (1982) does not seem to correspond perfectly with the Doucet's original one (particularly concerning the morphology of abdomen, male genitalia, and fore leg). Therefore, this male described by Brunhes could perhaps be a distinct species.

*Ae. tiptoni* Grjebine

The larva was described as belonging to subgenus *Aedimorphus* by Grjebine (1953). Other stages were secondly described by Ravaonjanahary (1978), who included this species in *Diceromyia*. Significant adult characters are a white narrow scaled area covering the anterior two thirds of the scutum (except two remarkable dark antero-lateral spots) and a white ring on the proximal half of the third segment of hind tarsus. Moreover, the male shows a slender claspette with 3 to 6 filaments, and a cylindrical, round-ended spine of the style.

The species is collected frequently, particularly all along the west and south coasts, from Diego Suarez to Fort Dauphin. We collected it, in large numbers, in the Tulear area, and near Majunga, Marovoay, Ampijoroa. Furthermore, Ravaonjanahary (1978) recorded isolated specimens in the central plateau and in Manakara (east coast), where we also collected some specimens (Fig. 1).

*Ae. coulangesi* Rodhain and Boutonnier

Only the female is described. It can be easily differentiated from the females of other *Diceromyia* species by lateral scutellar lobes with latero-internal broad white scales and all dark tarsi.

This species seems very rare, known only from Ampijoroa, Maravoay area (Rodhain and Boutonnier 1982b) (Fig. 1).

KEYS FOR ADULT *DICEROMYIA* OF MADAGASCAR

Adult Males and Females

1. Tarsi entirely black . . . . . *Ae. coulangesi*
  - . Tarsi with at least one white-ringed segment . . . . . 2
2. A white basal ring on the third hind tarsal segment . . . . . *Ae. tiptoni*
  - . Third hind tarsal segment entirely black . . . . . 3
3. Fore tarsus with a basal white spot on all segments except the first one . . . . . *Ae. grassei*
  - . Fore tarsus with a basal white ring on the first segment only . . . . . *Ae. madagascarensis*

## Male Genitalia

- |   |                            |
|---|----------------------------|
| 1. Coxite with a small basal lobe . . . . . | 2                          |
| . Coxite without basal lobe . . . . .       | <i>Ae. tiptoni</i>         |
| 2. Button ended claspette . . . . .         | <i>Ae. grassei</i>         |
| . Falciform ended claspette . . . . .       | <i>Ae. madagascarensis</i> |

## DISCUSSION

The Oriental origin of these *Aedes*, endemic of Madagascar, is proved in 3 species by the lack of an accessory tooth on the claws of the female fore legs and of acrostichal bristles (except *grassei*) (Reinert 1970b), and in the 4 species, by the presence of erect scales of the vertex confined on the occiput (Reinert 1973). These *Diceromyia*, at least for those of which male genitalia are known, possess a well defined claspette.

If we exclude *Ae. grassei*, which we never collected in spite of large surveys, we noted a marked anthropophily in the Malagasy *Diceromyia*, since most of our specimens were collected biting man. One of us was vigorously attacked in March 1978 at dusk, near Tulear, by a population of several hundred females of *Ae. tiptoni*.

Until, now, no virus has been isolated from numerous pools of *Ae. tiptoni* but it seems useful to try to predict the eventual role of these endemic *Diceromyia* in the transmission of arboviruses between human populations in Madagascar, taking in consideration that two afrotropical species at least are proved to be good arbovirus vectors and that several arboviruses were recently shown to be active in the island.

## ACKNOWLEDGMENTS

We wish to express our sincere appreciation to Dr. Coulanges, Director of the Institute Pasteur in Madagascar, and his team, for the irreplaceable help during field surveys.

## LITERATURE CITED

- Brunhes, J. 1982. Culicides de Madagascar. IX. Compléments à la description d'*Aedes (Diceromyia) grassei* Doucet, 1951 et description d'*Aedes (Diceromyia) sylvaticus* n. sp. (Dipteres Nématocères). Cah. ORSTOM Sér. Ent. Méd. et Parasitol. 20:313-318.
- Doucet, J. 1951. Les moustiques de la région de Périnet. Mém. Inst. Scient. Madagascar, Sér. A, 6(1):63-82.
- Edwards, F. W. 1941. Mosquitoes of the Ethiopian Region. III. Culicine adult and pupae. Brit. Mus. (Nat. Hist.) London. 499 pp.
- Ferrara, L. 1974. Description d'un nouvel *Aedes* du sous-genre *Diceromyia* (Diptera: Culicidae) découvert au Cameroun: *Aedes (Diceromyia) mefouensis* n. sp. Cah. ORSTOM. Sér. Ent. Méd. et Parasitol. 12(1):3-5.
- Grjebine, A. 1953. Observations sur les Nématocères vulnérants de Madagascar. Régions de Majunga et de Mandraka. Mem. Inst. Scient. Madagascar. Sér. E. 4:443-502.
- Huang, Y. M. 1978. Redescription and subgeneric position of *Aedes meronephada* (Dyar and Shannon), with notes on the subgenus *Diceromyia* (Diptera: Culicidae). Mosq. Syst. 10(3):334-350.
- Mattingly, P. F. 1959. The culicine mosquitoes of the Indomalayan area. IV: genus *Aedes* Meigen, subgenera *Skusea* Theobald, *Diceromyia* Theobald, *Geoskusea* Edwards and *Christophersiomyia* Barraud. Brit. Mus. (Nat. Hist.). London. 61 pp.
- Ravaonjanahary, C. 1978a. Description complémentaire d'*Aedes (Diceromyia) tiptoni* Grjebine, 1953. Cah. ORSTOM. Sér. Ent. Méd. et Parasitol. 16(2): 99-104.
- \_\_\_\_\_. 1978b. Les *Aedes* de Madagascar (Diptera: Culicidae), Travaux et documents de l'ORSTOM, n° 87, Paris. 210 pp.
- Reinert, J. F. 1970a. The zoogeography of *Aedes (Diceromyia)* Theobald (Diptera: Culicidae). J. Ent. Soc. Sth. Afr. 33(1):129-141.
- \_\_\_\_\_. 1970b. Contributions to the mosquito fauna of Southeast Asia. V. Genus *Aedes*, subgenus *Diceromyia* Theobald in Southeast Asia. Contrib. Am. Entomol. Inst. (Ann Arbor) 5(4):1-43.
- \_\_\_\_\_. 1973. Contributions to the mosquito fauna of Southeast Asia. XVIII. A reconsideration of *Diceromyia* Theobald with the inclusion of *Aedes nummatus* Edwards and *Aedes pseudonummatus* new species (Diptera: Culicidae). Contrib. Am. Entomol. Inst. (Ann Arbor) 10(1):22-40.

Rodhain, F. and A. Boutonnier. 1982a. Description complémentaire d'*Aedes madagascarensis* Van Someren 1949. Arch. Inst. Pasteur Madagascar 49(1): 197-203.

\_\_\_\_\_. 1982b. Description d'un nouvel *Aedes* endémique de Madagascar: *Ae. (Diceromyia) coulangesi* nova species. Arch. Inst. Pasteur Madagascar 49(1):193-196.

Van Someren, E. E. C. 1949. Ethiopian *Culicidae*. Descriptions of four new mosquitoes from Madagascar. Proc. R. Ent. Soc. London (B). 18:3-8.

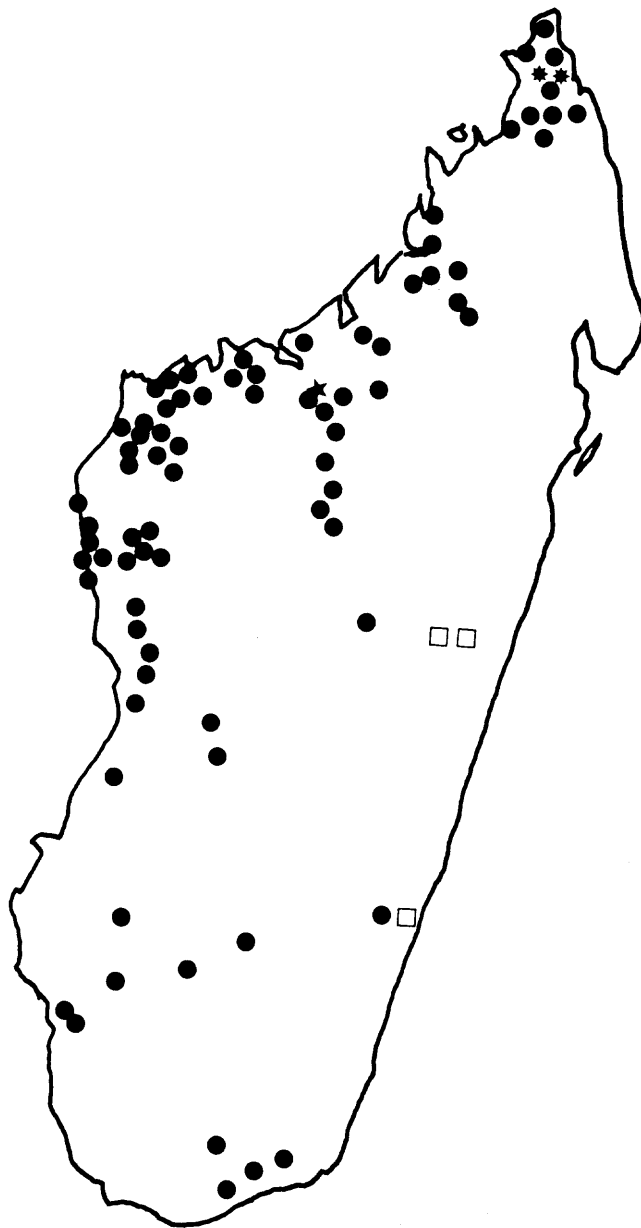


Fig. 1. Known distribution of *Aedes coulangesi* (★), *Ae. grassei* (□), *Ae. madagascarensis* (\*) & *Ae. tiptoni* (●) (Adapted from Ravaonjanahary 1978, completed by our collects).