

Notes on Vector Mosquitoes of Malaria and Dengue Fever in Papua New Guinea

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abstract: Collections of vector mosquitoes were made in three areas of Papua New Guinea. Mosquitoes collected were of the following 6 species: *Anopheles farauti*, *An. koliensis*, *An. punctulatus*, *Aedes aegypti*, *Ae. scutellaris*, *Culex pipiens quinquefasciatus*. Three species of Anopheline mosquitoes were commonly found in muddy pools such as wheel ruts at the roadsides, and among them *An. punctulatus* was assumed to be the primary vector of malaria in the area of Danfu, where also *Ae. aegypti* and *Ae. scutellaris*, the major vectors of dengue fever, were collected. The main breeding places for *Ae. aegypti* were artificial containers such as flower vases indoors and discarded tires outdoors, the latter being the main breeding place for *Ae. scutellaris*.

Key words: Mosquito, Vector, *Anopheles punctulatus*, Malaria, Dengue fever, Papua New Guinea

Malaria and dengue fever have been reported to be serious diseases for the inhabitants of Papua New Guinea. The former is transmitted by mosquitoes of the *Anopheles punctulatus* complex, and the latter by the mosquitoes *Ae. aegypti* and *Ae. scutellaris* (Mackerras, 1946; Belkin, 1962; Ewers and Jeffrey, 1977). When we visited Papua New Guinea in 1981, we were asked about the ecology and in particular about the breeding places of these vector mosquitoes, in relation to mosquito control. In order to answer some of these questions, a mosquito collection was briefly conducted in this country in 1982, and the results are reported in the present paper.

PLACES AND METHODS

Mosquitoes were collected on September 2-5, 1982 from inside and outside of houses in which Japanese had been living in 3 separate regions (Danfu and Kavieng in New Ireland and Rabaul in New Britain) (Fig.1). Rabaul and Kavieng were modern cities

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with crowded houses and shops, and with completely paved roads. On the other hand, Danfu was an agricultural village in the coastal area, consisting of about 50 scattered houses connected by large unpaved roads and interspaced with many trees and thick grass.

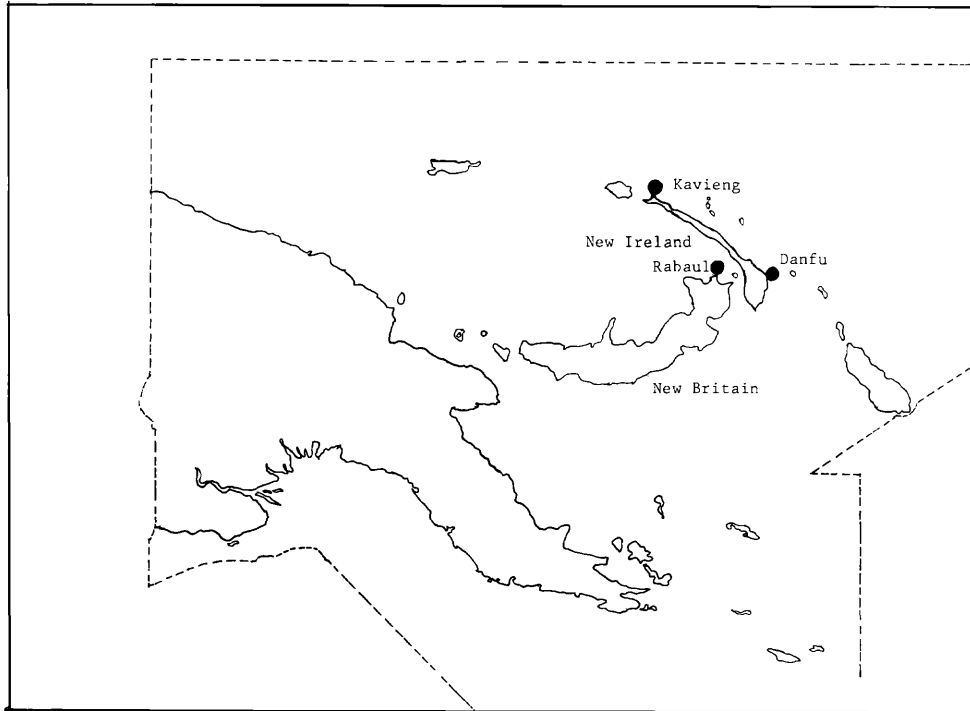


Fig. 1. Map of Papua New Guinea and places of collections.
Remarks. Black circles show areas for mosquito collection.

Outdoor larval collections were conducted only in Kavieng and Rabaul; however, in Danfu larval and adult mosquitoes were caught both indoors and outdoors. For larval collections, dipper and pipette were used, the collected larvae being reared to adults in the house for identification. Hand net and aspirator were used for catching female mosquitoes resting in the house.

RESULTS

1. *Species of mosquito larvae collected in the 3 areas*

The mosquitoes collected were of the following 6 species: *Anopheles farauti*, *An. koliensis*, *An. punctulatus*, *Aedes aegypti*, *Ae. scutellaris*, and *Culex pipiens quinquefasciatus*. *Cx. p. quinquefasciatus* is a potential vector of bancroftian filaria in this country (Ewers and Jeffrey, 1977).

2. Results on larval and adult collections in Danfu

Larval collections within 2 km range from the houses in Danfu village showed many larvae of *Anopheles punctulatus* complex to be present in muddy pools, such as wheel ruts, at the sides of the unpaved roads (Fig. 3). Of the *punctulatus* complex, *An. punctulatus* were most abundant, and *An. farauti* and *An. koliensis* to a lesser extent (Table 1).

Night time indoor collections of Anopheline females revealed three specimens of *Anopheles punctulatus* (Fig. 2) which had come to bite man 1 to 2 hours after sunset (18:30). Based on these data, *An. punctulatus* is estimated to be, at least in September the primary vector in Danfu.

Larvae and adults of *Ae. aegypti* and *Ae. scutellaris* were found both indoors and outdoors. Several *Ae. aegypti* larvae were found in artificial containers such as flower vases indoors and discarded tires outdoors. Female *Ae. aegypti* were found both inside and outside the dwellings (Table 3). A few females and larvae of *Ae. scutellaris* were caught only outdoors. The important breeding places of this mosquito



Fig. 2. Female of *An. punctulatus*, the primary vector of malaria in Danfu.

Table 1. Species and number of malaria vectors reared to adults from wild-caught larvae in Danfu.

| Mosquito species | Breeding places | |
|------------------------|-----------------|-------|
| | Muddy pools | Ponds |
| <i>An. punctulatus</i> | 42(56) | 0 |
| <i>An. farauti</i> | 2(1) | 3 |
| <i>An. koliensis</i> | 1(0) | 0 |

Figures with or without a parenthesis show the number of females or males.

Table 2. Species and number of dengue vectors attracted to man in Danfu.

| Mosquito species | Indoor | Outdoor |
|------------------------|--------------------|---------|
| | <i>Ae. aegypti</i> | 6 |
| <i>Ae. scutellaris</i> | 0 | 2 |



Fig. 3. The main breeding places for *An. punctulatus* in Danfu.

were discarded tires.

3. Results on larval collections in Kavieng and Rabaul

In Kavieng and Rabaul, no larvae of malaria vectors were collected. This may be due to the absence of breeding places such as muddy pools (wheel ruts) in the survey areas. *Ae. scutellaris* larvae were collected in discarded tires in Kavieng, but they were not found in Rabaul. *Cx. p. quinquefasciatus* larvae occurred usually in the drains, both in Kavieng and Rabaul.

DISCUSSION

From the present data *An. punctulatus* mosquitoes are speculated to be the primary vector of malaria in Danfu, their main breeding places being muddy pools at the sides of unpaved road. The number of the breeding places is considered to vary with the climate. Thus, it is very difficult for local inhabitants to discover the number of breeding sites by themselves and to control the larvae by spraying with insecticides. In Papua New Guinea, residual spraying has been done with DDT indoors to eradicate malaria. This has reduced the number of malaria patients yearly, as many of the vectors have been killed by the DDT (Ewers and Jeffrey, 1977). If the malaria vector, *An. punctulatus* in Danfu is not resistant to DDT, this insecticide can be used to control the vector in Danfu.

In Danfu and Kavieng, the important breeding places for *Ae. aegypti* and *Ae. scutellaris* were the containers such as flower vases indoors and/or the discarded tires

outdoors. Accordingly, in these areas it is considered possible to considerably decrease by such preventative methods as frequent water exchange in flower vases and removal of tires.

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パプアニューギニアのマラリアとデング熱の伝搬蚊について

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パプアニューギニアのダンフ、ケビエン及びラバウルの3地域でマラリアとデング熱の伝搬蚊について調査した。採集された蚊は *Anopheles farauti*, *An. koliensis*, *An. punctulatus*, *Aedes aegypti*, *Ae. scutellaris*, 及び *Culex pipiens quinquefasciatus* の6種類であった。これら3種のハマダラカはわだちに水がたまって出来た泥水に発生していた。ダンフにおいては *An. punctulatus* がマラリアの主要伝搬蚊と考えられる。また、この地域ではデング熱の主要伝搬蚊である *Aedes aegypti* と *Ae. scutellaris* も採集された。前者の主要発生源は屋内では花びんのような人工的容器で、屋外では水のたまった古タイヤであった。後者の発生源も屋外の古タイヤであった。

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