species group was found to be infected with filarial larvae. One was in the 3rd stage with a body length of 1,615 microns, and 2 were in the 2nd stage on the 7th day after collection.

DISCUSSION. The village was not only an endemic of "Timor filaria" but also malaria (Carney et al. in press), and the *An. barbirostris* species group is one of the important vectors of human filariae and malaria in Indonesia (Lie et al. 1960; Raghavan 1961). The identifications of the species of the mosquitoes collected followed the key of Soemalan and Oerip (1970) and Reid (1968) for *Anopheles;* and Bram (1967), Sirivanakarn (1975) and Lien et al. (1975) for *Culex* and *Aedes.* The biting activity of the 3 species of mosquitoes mentioned above fitted the nocturnal periodic type of "Timor filaria" reported by David and Edeson (1965). High parous rates of these 3 species suggest that they survived for a relatively long period. However, the 3rd stage filarial larva was found only in a mosquito of the *An. barbirostris* species group. This larva would be considered to belong to the genus *Brugia,* from its morphological characters—lacking of any papillae or processes at the tail or frontal part and also its body length. Although exact identification of this species could not be undertaken, the larva may be considered to be not one of another animal host such as *Setaria* spp. *An. barbirostris* species group could be one of possible vectors of "Timor filaria."

References Cited

Bonne-Wepster, J. and N. H. Swellengrebel. 1953. The *Anopheles* mosquitoes of the Indo-Australian region. J. H. de Bussy Amsterdam 504 p., illus.

Bram, R. A. 1967. Contributions to the mosquito fauna of Southeast Asia. II. The genus *Culex* in Thailand (Diptera: Culicidae). Contr. Amer. Entomol. Inst. 2:1–296.

Carney, W. D., Arbaim Joesoef, Rogers, V. Tibulvaji, N. Scpulta, I. G. and Haedejo. 1975. International and blood parasites of worms in Timor. Bull. Health studies Indonesia. 3 (2): 1–10.

Colless, D. H. 1957. Notes on the culicine mosquitoes of Singapore. II. The *Culex vishnui* group (Diptera, Culicidae), with description of two new species. Ann. Trop. Med. Parasit. 51: 87–101.

David, H. L. and J. F. B. Edeson. 1965. Filariasis in Portuguese Timor, with observations on a new microfilaria found in man. Ann. Trop. Med. Parasit., 59:193–203.

Kanda, T., Arbaim Joesoef, Y. Oguma, T. Tadano, Jurie Suriante Saroso. 1975. A description on "Timor microfilaria." St. Marianna Med. Journ. 3(4):128–131.

Lie, K. J., W. Hudojo and S. Amaliah. 1960. *Wuchereria bancrofti* infection in Djakarta, Indonesia. A study of some factors influencing its transmission. Indian Journ. Malariol. 14:339–352.

Lien, J. C., L. Kosman, F. Partono, Arbaim Joesoef, E. Kosin and J. H. Cross. 1975. A brief survey of mosquitoes in north Sumatra, Indonesia. Journ. Med. Entomol. 12:233–239.

Rhagavan, N. G. S. 1961. The vectors of human infections by *Wuchereria* species in endemic areas and their biology. WHO Bul. 24:177–195.

Reid, J. A. 1968. Anopheline mosquitoes of Malaya and Borneo. Studies from the Institute for Medical Research, Malaysia 31:1–520.

Sirivanakan, S. 1975. The systematics of *Culex vishnui* complex in Southeast Asia with the diagnosis of three common species (Diptera: Culicidae). Mosquito Systematics 7(1):69–85.

Soemalan and Oerip. 1970. Key to common anopheline adults of Indonesia. Direktorat Djenderal P4M:1–7.

3673 9

SOME MOSQUITOES OF TINIAN, MARIANA ISLANDS [1]

STEPHEN M. VALDER, RICHARD L. HOSKINS AND ADELA C. RAMOS

First Medical Service Wing (PACAF), APO San Francisco, CA 96274

This note communicates the findings of a limited mosquito survey of Tinian Island performed during 10–14 December, 1973. CDC miniature light trap and larval collections were made. Resting surveys were negative. It is of interest that although several anthropophilic species were recovered, neither team member was bitten during their 5-day stay on Tinian. Natives characterized island mosquito populations as being extremely light in the past few years.

This survey was performed between the end of the local rainy season and the beginning of agricultural irrigation, so mosquito breeding was probably minimal. The only ground pools evident were those created artificially by leaking pipes, except in the marshy areas surrounding Lake Hagoi. Lack of rain also resulted in most of the numerous artificial containers (primarily beverage cans and snail shells) being empty. No plant axils and few tree holes containing water

[1] The views expressed herein are those of the authors and do not necessarily reflect the views of the United States Air Force or the Department of Defense. The authors gratefully acknowledge the assistance of Dr. Wesley R. Nowell in the preparation of this manuscript.

were found. Survey results are summarized in Table 1.

Table 1. Tinian mosquito collections.

Species	Larvae	Adults [1]
Aedes albopictus	38	0
Aedes saipanensis	0	3
Aedes vexans vexans	90	0
Anopheles indefinitus [2]	0	1
Anopheles subpictus [2]	0	45
Culex fuscanus [2]	2	1
Culex quinquefasciatus	39	104
Culex tritaeniorhynchus [2]	0	161

[1] Only females were identified.
[2] New Tinian records.

Bohart (1957) recorded 8 species of mosquitoes from Tinian: *Aedes aegypti* (Linnaeus), *A. albopictus* (Skuse), *A. neopandani* Bohart, *A. saipanensis* Stone, *A. vexans nocturnus* (Theobald), *Culex annulirostris marianae* Bohart and Ingram, and *C. litoralis* Bohart. He observed that *Culex quinquefasciatus* Say was widespread in the Marianas, although its presence on Tinian was implied rather than definitively stated. This paper assumes that *C. quinquefasciatus* was collected on Tinian prior to 1973. Bohart also felt that a female *Aedes* of the *scutellaris* group collected on Tinian might have been *Aedes guamensis* Farner and Bohart, but the presence of this species on Tinian has still not been confirmed.

The team collected *Anopheles indefinitus* (Ludlow), *An. subpictus* Grassi, *Culex fuscanus* Wiedemann, and *C. tritaeniorhynchus* Giles for new Tinian records, as well as *Aedes albopictus, A. saipanensis, A. vexans vexans* Meigen and *C. quinquefasciatus. A. aegypti, A. neopandani, C. annulirostris marianae* and *C. litoralis* reported from earlier surveys were not found. The use of the designation *Aedes vexans vexans* for collections originally described as *A. vexans nocturnus* is based upon Reinert (1973).

Aedes albopictus larvae were found in San Jose village in water impounded in artificial containers and in an indentation in a concrete porch. *A. saipanensis* adults were trapped in a tangen-tangen (*Leucaena leucocephala*) thicket on the north end of the island and in the marshy area surrounding Lake Hagoi. *A. vexans vexans* larvae were present in quantities exceeding 50 per dip in small, shallow, shaded ground pools in tall cane (*Phragmites karka*) thickets adjacent to Lake Hagoi. It is of interest that no adults of this phototropic species were recovered in light traps which were placed within 20 feet of the breeding area, and at the tall cane-plowed field ecotone approximately 20 yards from the ground pools. The single *Anopheles indefinitus* adult was captured in the Lake Hagoi area. *An. subpictus* was recovered from traps emplaced by a cattle lot on the north end of the island and by Lake Hagoi. Two *Culex fuscanus* larvae were taken from water impounded in a rusted out oil drum in the North Field area, and one adult was recovered near Lake Hagoi. *C. quinquefasciatus* larvae were associated with the *C. fuscanus* larvae in the drum in North Field and adults were collected near Lake Hagoi and from the trap emplaced near the cattle lot. All *C. tritaeniorhynchus* adults were recovered from traps set in several locations around Lake Hagoi.

The results of this survey increase the total number of mosquito species reported from Tinian to 12. It is probable that a more comprehensive survey would disclose the presence of additional species.

Literature Cited

Bohart, R. M. 1956. Insects of Micronesia: Culicidae. Insects of Micronesia 12(1):1–83.
Reinert, J. F. 1973. Contributions to the mosquito fauna of Southeast Asia. XVI. Genus *Aedes* Meigen, Subgenus *Aedimorphus* Theobald in Southeast Asia. Amer. Entomol. Soc. Contrib. 9(5):1–218.

3674 9

FAILURE OF *CULEX SALINARIUS* TO TRANSMIT *DIROFILARIA IMMITIS* FROM DOG TO DOG [1, 2]

WILLIAM E. BICKLEY
University of Maryland, College Park 20742

There is abundant circumstantial evidence that mosquitoes are vectors of *Dirofilaria immitis* (Leidy) but there are apparently only 2 reports of observations on the actual transmission of the parasite from dog to dog. Kume and Itagaki (1955) used *Aedes togoi* (Theobald) as the experimental vector in Japan, and Bemrick and Moorhouse (1968) used *Aedes vigilax* (Skuse) in Australia. In the United States there is a need

[1] Grateful acknowledgment is made to Douglas C. Seeley, Jr. and Thomas J. Jankowski, University of Maryland, and Jerry Mallack, Maryland Department of Agriculture, for assistance with mosquitoes and dogs, and to Dr. R. B. Shillinger and Dr. Hernando Pulido, Maryland Department of Agriculture, for performing postmortem examinations of experimental dogs.
[2] Scientific article no. A2185, Contribution no. 5158 of the Maryland Agricultural Experiment Station, Project H-104.