

STUDY REPORTS

1. Title Mosquito Fauna of Thailand

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Objective To collect, identify, catalog and redescribe all of the mosquito species of Thailand. Information is also assembled on the distribution, larval habitats and other aspects of the bionomics of the various species. The eventual goal is the production of a monograph on the mosquitoes of the area, together with keys, handbooks and other identification aids for use of workers in public health and associated fields and the later inclusion of this material into a larger monographic work on the mosquitoes of Southeast Asia. Since the final monographs will not be completed for several years, periodic papers with keys, descriptions and distribution of important groups will be made available as soon as practical. The immediate objective is to make available as much information as possible on the Anopheles and species of other genera which are known or suspected to be vectors of disease. The training of competent Thai personnel and, more recently, U.S. military personnel in Southeast Asia in the identification and bionomics of the mosquito fauna of Thailand is also a major concern. Another objective is the building of a reference collection at SMRL of all the mosquitoes known to occur in Thailand to provide readily accessible study material to newly assigned and other personnel who may have the need for rapid familiarization with the mosquitoes in this area.

Description Mosquitoes are collected from many areas of Thailand in connection with various studies on arthropod-borne viruses and malaria. Additional collections of a specialized nature are made to obtain correlated series of larvae, pupae and adults for illustration and other detailed studies. These consist mainly of collections of the immature stages from forested or undeveloped areas; these immature stages are reared individually, as far as is possible, in order to recover a correlated series of cast skins and adults. All of the reared material is later identified and processed at SMRL in Bangkok. After processing, the material is transferred to the Southeast Asia Mosquito Project, U.S. National Museum, for confirmation, description and eventual inclusion in the final monograph.

Progress During the year 743 collections of larval mosquitoes were made in six provinces of Thailand. From these collections 7712 adults were individually reared, and 10184 slide mounts of larvae and pupal skins, and 231 slide mounts of male terminalia were prepared.

Anopheles Morphological characters previously considered reliable in distinguishing the adults of Anopheles aconitus Donitz, 1902; An. culicifacies Giles; 1901; An. filipinae Manalang, 1930; An. fluviatilis James, 1902; An. minimus Theobald, 1901; An. pampanai Buttiker and Beales, 1949; and An. varuna Iyengar, 1923, have been shown to be variable, with considerable overlapping of these characters existing between the species. Since An. minimus and An. aconitus (to a lesser extent) are both malaria vectors in Thailand, it is essential to establish the range of morphological variation for each of the species and to gather additional

information on the behavior and ecology of these species so they can be critically examined for the existence of sibling species and/or synonyms.

Since members of the An. minimus complex basically feed on man and large vertebrates, biting collections on man and cattle were selected as the primary means of collecting adult females. From November to March, 44 man biting collections and 20 cattle biting collections were made at 7 localities in the provinces of Nakhon Nayok, Phatum Thani and Saraburi. Anopheles filipinae, An. fluviatilis, An. minimus flavirostris and An. varuna, all species of doubtful occurrence in Thailand, were all collected as adults in Saraburi. Anopheles minimus flavirostris was collected at one locality, An. filipinae and An. fluviatilis were both collected at two localities and An. varuna was collected at all three localities. Adults of An. aconitus, a proven malaria vector in the central plains of Thailand, were found to be extremely abundant in Phatum Thani and Saraburi; whereas adults of An. minimus, the most prevalent malaria vector in Thailand were collected only in Saraburi. To supplement adult collections, 18 larval collections were made during this period in 9 localities of Nakhon Nayok and Saraburi provinces.

Adults reared from larvae belonging to the minimus group, but having a variable range of characters, were collected in Nakhon Nayok; although they undoubtedly belong to this group it is presently impossible to assign them to any of the presently recognized species.

An additional approach to the solution of this problem is being made through the preparation of larval salivary glands from reared specimens of known origin for examination and mapping of the chromosomes. It is hoped that chromosomal preparations from larvae of indeterminate characters can eventually be compared with chromosome maps prepared from larvae of known species.

Anopheles (Cellia) culicifacies was first recorded by SMRL from Ayudhaya during the previous report period. Larvae of this species were collected from holes in logs and from rice fields during the rainy season. This year an additional 18 collections were made from Ngao, Lampang province from rain pools, the margins of slow running and shallow streams and from pools at the margins of streams. These collections were made both in villages and in the forest between 150 to 1500 meter elevations. Associated species taken with Anopheles culicifacies included An. annularis, An. philippinensis, members of the An. hyrcanus complex, Culex (Culex) fuscocephala, Culex (Lophoceraomyia) sp. and Uranotaenia sp.

As the results of studies made in Malaya on Anopheles (Cellia) philippinensis it was recognized (Reid, 1967)* that this species actually consists of two sibling species—the nominate species and An. nivipes. Examination of SMRL collections indicate that the latter species also occurs in Thailand.

Anopheles (Anopheles) tiggerti Scanlon and Peyton, 1967, a new member of the aikeni group was discovered in Prachinburi province breeding in fresh water crab holes.

Aedes: The subgenus Stegomyia contains the most important vector species in this genus, such as Aedes aegypti, the vector of classical yellow fever. During this period a member of the subgenus, not previously recorded from Thailand, Aedes scutellaris, was collected from Ko Chang, Trad Province. This species is a vector of dengue in New Guinea, and its presence in Thailand brings to three (including A. aegypti and A. albopictus) the number of potential dengue vectors present in this country. Pupae of A. scutellaris were collected together with immature stages of A. aegypti and A. albopictus from a water storage jar. Subsequent to this discovery, A. scutellaris has been recognized in collections from other islands in the Gulf of Thailand off the coast of Surat Thani province.

Aedes (Finlaya) jugraensis is the most common species of that subgenus reported from Malaya. The first collections of this species from Thailand were made during this year in Ranong province, in

* J. Med. Ent. 4: 175

Southern Thailand. Larvae of this species were found in primary forest, in bamboo stumps and internodes, together with Anopheles asiaticus, Tripteroides aranoi, Orthopodomyia albipes, Uranotaenia sp., Aedes (Finlaya) chrysolineatus and Culex (Lophoceraomyia) minor.

Aedes (Paraedes) ostentatio is known only from the female adult. During this period a single specimen was reared from a pupa collected in a crab-hole at 1000-1500 meters elevation in Nakhon Ratchasima province.

Mansonia and Coquillettidia: Mosquitoes of the genera Mansonia and Coquillettidia have been the subject of little taxonomic research in Thailand, even though several species of Mansonia serve as primary vectors for Wuchereria bancrofti, Brugia malaya and B. pahangi. The larvae of these two genera, which often occur together, are always found in association with particular species of aquatic vegetation. Because the larvae attach themselves to plant roots and/or stems for their air supply, they are difficult to collect; therefore, past collections in Thailand relied mainly on light traps and bait traps which attract adults. The number of species present in Thailand and their prevalence and distributions are uncertain.

During this period a total of 21 collections of Mansonia larvae were made in Thailand by SMRL personnel. Eighteen of these were in Bangkok and in the vicinity of Phra Phutthabat. A total of 1,225 Mansonia larvae were collected and reared individually. A total of 144 male and 157 female M. indiana, 13 male and 28 female M. uniformis and 4 male and 3 female M. annulifera, were reared and pinned from these larvae. Most of the pinned specimens have associated larval and pupal skins preserved.

Mansonia uniformis was utilized in colonization attempts during this period; females were isolated singly or placed together in groups in oviposition containers, of several sizes. All chambers contained water with a food mixture and floating aquatic plants of the genus Pistia. Three separate chambers yielded eggs on the under side of Pistia leaves.