

DISCUSSION

The operation of a light trap at Bang Phra yielded twenty-five species of Culicoides during a nine month period. The Bang Phra region has a particularly diverse terrain, ranging from coastal beaches, through agricultural land to forested hillsides. There are also many types of breeding sites available in the area, sandy beaches, marshes, streams, tree holes, pond margins, and others. It is suspected that the 25 species total for Bang Phra could be extended considerably if biting collections and sweeping net collections were made there. Almost certainly the number of species would be greater if immature specimens were collected for rearing. Nevertheless, the 25 species collected represent a rather good sample of the species present at night at Bang Phra, and the numbers collected indicate that these blood sucking midges may be present in Thailand in sufficient numbers to pose a problem in disease transmission. No work has been done on this subject in Thailand, other than the single observation of Causey in which a microfilaria was found in Culicoides peregrinus. Little is known about the extent of human filariasis in Thailand, except in some Southern Provinces. The filarial species regularly transmitted by Culicoides generally do not produce obvious pathology, such as elephantiasis, and it is possible that they could exist in Thailand without being detected for some time. The situation with the animal filariae is even less well known. The large number of Culicoides peregrinus and C. annamensis collected from the immediate vicinity of horses at Bang Phra indicated the need for further study

of horses as hosts of these midges, as well as the other midge species. The descriptions and keys to the Bang Phra species presented here should assist such studies.

The general seasonal trend at Bang Phra is difficult to interpret in light of the known environmental variables in the area. It would appear that the population is lowest during the months of December and January, highest during the months of August to October. The latter months mark the highest rainfall of the year in the area, and this may be the factor that most effects the populations. The temperature is lower in the November to February period, but the difference between mean temperatures at various times of the year is not great in the area due to the low latitude, low altitude and proximity of the Gulf of Thailand.

In other parts of Thailand other species of Culicoides were found, although many of the Bang Phra species were also present. The Northeast area was not surveyed at all, nor was the far Southern part of the country. In addition, the various sites were not visited often during the year. It is therefore probable that the total of thirty species for Thailand will be much increased if the whole country is surveyed systematically. The present limited survey added twelve species of Culicoides to the Thailand fauna which had not been taken here previously, as well as three species new to science. The same species did not predominate in the different areas of the country studied. At Bang Phra C. peregrinus and C. amariensis were the dominant species. No C. peregrinus were found at Kanchanaburi, and here the dominant species was C. amariensis. C. arakawai was the most abundant

species at Udornthani and Rajburi. There was no clear-cut predominant species in the material examined from Chiangmai or Bangkok. It should be reemphasized that the observations from places other than Bang Phra were based on a very limited number of light trap or biting collections.

The general impression received from biting collections is that the Culicoides of Thailand are rarely if ever as much of a pest problem as they are in other parts of the world. Collectors of the SEATO Medical Research Laboratory have made biting collections for mosquitoes in many parts of the country, but they have recognized Culicoides biting only in the forests of Doi Sutep in Chiangmai and the forests of Kao Yai. Only the latter specimens were available for the present study and they proved to be : C. namensis, C. actoni and C. humeralis. None of these has been implicated in the transmission of human or animal disease. The midges at Kao Yai were collected at dusk, when they were extremely difficult to see, and it is possible for even experienced collectors to miss them if mosquitoes are biting at the same time.

It was found that the traditional use of wing patterns as almost the only method for identification of Thailand Culicoides was not satisfactory. It is necessary, particularly in the case of the similar species of the subgenus Trithacoides, to use finer anatomical structures. This means that the preparation of microscope slides is necessary for specific determination. This should not hamper research in the transmission of the filariae since the midges must be dissected for such study. It will however, make it difficult

to identify specimens to be used for virus research, if this become necessary.

The keys, illustrations and wing photographs provided in this study should permit the identification of most of the Culicoides of the Bang Phra region. Much additional work will be required to permit ready identification of the Culicoides of the rest of Thailand. Eleven species of Culicoides have been reported from Thailand which were not found in the present study. In addition, Wirth (1964) has provided the writer with slides of one additional species, Culicoides namnangensis Delfinado, collected in Thailand, but not yet reported in the literature. This brings the total species known from the country to forty two. It is believed that intensive collection of various life stages will double or triple this number easily.

While there does not at present appear to be an urgent practical requirement for the study of the biting midges in Thailand as pests or disease vectors, it does seem worthwhile to study them further as interesting parasites in their own right. It should be particularly interesting to determine what role the mosquito feeding species might play in the biology of the Anopheles and other mosquitoes.