ACTIVITIES

Studies on Uranotaenia at SEAMP

A Plea for Further Material

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The recent note on crab-hole breeding mosquitoes by Charles L. Hogue and Donald B. Bright (Mosquito Systematics Newsletter 1(4):69)was of more than passing interest to SEAMP. We at SEAMP are presently reviewing the mosquito fauna of Southeast Asia and a surprising number of species have been found breeding in crab-holes.

The group of immediate concern to the writer is the genus Uranotaenia. In an attempt to re-evaluate the genus it has been necessary to examine species from all parts of the world and in doing so, have found the crab-hole species to be of great significance. We passed on some of our observations to Hogue and Bright and have since received additional information on their most interesting and impressive project. It is certain that they will make many significant contributions that will surprise a great many culicidologists. Unfortunately, much of this work will be completed long after the Uranotaenia revision.

The object of this note is twofold: (1) to solicit information or specimens (preferably adults with associated larval and pupal skins or whole larvae) of crab-hole breeding Uranotaenia from any part of the world and most especially from Southeast Asia (SEA) (including India) and New Guinea, and (2) to bring out a few observations on Uranotaenia and further stimulate an interest in collection from crab-holes.

At this point it might be well to state SEAMP's policy for the benefit of potential contributors. Any information or specimens provided will be made available to the Hogue and Bright studies. Material gifted to SEAMP automatically goes to the USNM. Material on loan is returned after examination without question. We are not interested in the description of new species per se and will gladly return any we might encounter, if so desired by the contributor.

The crab-hole appears to be one of the last truly unstudied and poorly sampled ecological niches for mosquitoes. (The Hogue and Bright study represents the first of its kind.) There are a number of published records of adults collected resting in crab-holes, but this does not necessarily indicate the breeding site for a particular species. The immature stages of many species remain unknown. Although littoral crab-holes have long been known as breeding sites for a few specially adapted groups, e.g. Deinocerites and Aedes (Skusea, Cancraedes, Geoskusea, Levua), there seems to have been a

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tendency to overlook these inconspicuous but common habitats, at least in SEA. This appears to have been especially true of the smaller and less conspicuous crab-holes of inland freshwater riparian species of SEA and elsewhere.

The difficulty of collecting with special siphoning equipment may have also contributed to this situation. It is also quite easy to occasionally miss immatures that are in the hole because of low density of some species. As an example, in the Philippines we examined 30-40 holes to obtain eight larvae of one Uranotaenia species and were surprised to find each of six holes yielding only a single larva. It is doubtful that the holes contained many more than were collected since we were making a special effort to get this particular species. Other species are known to drop to the bottom and remain for long periods so one should not be satisfied if the first few siphoned samples come up negative. I am informed by Dr. Botha de Meillon that similar difficulties were experienced in collecting U. montana in the Transvaal. It is obvious that much patience and perseverance is required to obtain some species.

Crab-holes along littoral areas of SEA have, thus far, produced very few mosquito species. The holes of small terrestrial crabs along inland streams, bogs and spring seepages in the evergreen forest of SEA, however, are rich in mosquito species. Holes of these small crabs are common in the hills and mountainous areas and from these, adult and immature mosquitoes have been collected at elevations of 100-2700 ft. The holes are often scattered, inconspicuous and easily overlooked. The most common mosquitoes encountered thus far belong to the genus Uranotaenia with at least nine species being recognized. Five of these are presently undescribed and two from the Philippines (U. philippinensis and U. rossi) were described as recently as 1966 by Mercedes Delfinado, though they were not known at that time to be crab-hole breeders. Two of the nine (U. lateralis Ludlow and U. bicolor Leicester) breed in a variety of habitats and have only occasionally been found in crab-holes. The remaining seven apparently breed exclusively in freshwater crab-holes. With the exception of lateralis, bicolor and one unnamed species all appear to belong to the same species group complex, which, for convenience sake, we have temporarily applied the term "recondita group." The immatures of this group are strikingly similar to known crab-hole or cave breeding species of Africa.

The bulk of adult specimens with associated immature skins from crab-holes come from Thailand and Mindoro, P. I., with only Thailand represented by a reasonable number of collections. Other members of the recondita group in SEA have been collected from deep rock crevices, pools inside caves, a tree-hole and a rock-pool. The most notable member of this group is U. recondita Barraud and several of the unornamented species of SEA have been consistently misidentified as this species. Present information indicates that recondita s. str. does not occur outside of India. The larvae of recondita are known from a single tree-hole collection from Karwar, India collected by Barraud, 1921. The adults of U. mattinglyi Qutubuddin (which I consider to be a synonym of recondita unless the discovery of immatures prove otherwise) were collected in India resting in crab-holes by Qutubuddin, but the immatures are unknown as are those of U. husaini Qutubuddin (India), jacksoni Edwards (Hong Kong), luteola Edwards (India), maculipleura Leicester (Malaya). Since the adults of the above species appear to belong to the recondita group it is quite likely that when the immatures are known, most, if not all, will prove to be crab-hole breeders. This being the case, there is every likelihood that as these habitats are more closely examined in other

parts of SEA several additional species will be discovered or at least the unknown immatures of known species will be encountered.

As is well known to those familiar with the Uranotaenia, classification within the genus is in a chaotic state. Examination of immatures of a great number of species, some of which were previously unknown, have added a new dimension to our study of the genus. The immature stages have been indispensable in the attempt to evaluate the probable phylogeny of various groups and to construct a natural classification of the genus. This is not to imply that we have, at long last, unravelled all of the classificatory problems that presently exist, but it appears we are on the right track and there is little doubt that the immatures hold the key to many of these problems. Unfortunately the immature stages of a great many of the world species have been inadequately described and figured to be of much help in this respect and the specimens of a number of these are apparently no longer available for examination. The point to be made here is that if we are ever to get some semblance of order in the genus we must know more about the breeding habits and immature stages.

I would also make an appeal to those who might be contemplating publication of descriptions and illustrations of the immature stages to make these complete along the lines of the treatment by Belkin, 1962 and SEAMP taxonomists. Until we know more about the genus, only describing and illustrating the head and terminal segments of larvae and trumpet and paddles of pupae simply is not adequate. There is a multitude of characters to be found elsewhere.

Edwards (1941)divided the Ethiopian species into four groups, which he designated A, B, C and D. He based this system primarily upon striking ornamentation of the adults and to some extent the male terminalia. Although his system was never proposed as a natural grouping it appears that on the basis of characters given, most adults of the world species could be assigned to one of the four groups. However, attempts to assign all known immatures to these groups have failed, a fact, which to my mind would indicate that the grouping is not a natural one, even though some convergent development of immatures is recognized. There is, however, some evidence that the grouping is potentially valid and somewhat natural but that the definition is too inclusive (especially concerning adult ornamentation) causing some species to be improperly assigned. Further, the question to be answered is: should all four groups be considered of equal rank? I believe not. It is not intended at this time to make specific proposals or to draw any definite conclusions, but merely to bring some of these problems to light, though they are not necessarily new. With many of the immatures still unknown it is too early to go much beyond speculation. It is entirely possible that as more material becomes available for study our present concepts will have to be revised or conceivably they could be reinforced. This interesting possibility brings us back to the crab-hole breeders.

On the basis of examination of limited crab-hole material we can come to the following conclusions. All known adult members of the recondita group are clearly assignable to group "C" of Edwards. The adults of African crab-hole breeders (nivipous Theob. annulata Theobald and montana Ingram and de Meillon) and one cave pool breeder (cavernicola Mattingly) can clearly be assigned to group "B" of Edwards, yet the known immature stages of all these crab-hole and

cave breeders exhibit striking overall similarities, almost as if of the same species group. This similarity can be appreciated even more when it is seen that the immatures of these species are so distinct that they are easily recognized from the other known members of groups B and C. Another intriguing aspect is the similarity of habitat of Southeast Asian and African species with each area having a number of crab-hole breeders and apparently a single cave pool breeder. If one is to assume that close overall similarity generally indicates phylogenetic affinity, then, I would think, both groups B and C would have to be considered together in any subsequent subgeneric division of the genus and a definition embracing both groups would have to be devised.

This all sounds very good but knowing that the immatures of a number of species remain unknown and material from Africa is very limited (especially pupal skins) I hesitate to give formal recognition to groups above the species group level at this time and will await the receipt of additional material for study. I might add in closing that we are nearing the end of time allotted for the Uranotaenia study and may have to leave many problems unsolved unless additional material becomes available in the very near future. I would also welcome comments, suggestions or criticism from knowledgeable parties.

LITERATURE CITED

Edwards, F. W. 1941. Mosquitoes of the Ethiopian Region. III. - Culicine Adults and Pupae. British Museum (Natural History), London. 499 pp.