

XIV THE DESCRIPTION AND LIFE-HISTORY OF A NEW SPECIES OF *ANOPHELES* THAT BREEDS IN HOLES IN TREES.

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(Plate XVII.)

Though it may not be considered right to describe a species of mosquito from a single specimen and that specimen a male one, yet the specimen on which I base the following description possesses some very distinctive features. It is these features together with its breeding habitat and the presence of well preserved larval and pupal stages which have decided me to describe the form in question.

I have very great pleasure in naming it *Anopheles annandalei*, after Dr. N. Annandale, Director of the Zoological Survey of India, as a mark of regard and gratitude which I always feel for him.

THE IMAGO.

Detailed description of the male specimen : A medium sized mosquito ; wing measured 2.9 mm. General colouration light.

The *antennae* have the basal joint of a light brown colour ; in the succeeding joints the proximal portion from which the hairs arise is dirty yellow, and the distal portion is of a creamy colour ; the hairs themselves are pale yellowish ; the last joint is densely covered with small hairs, there being no definite terminal hair. *Palpi* (fig. 1) 1.7 of length of thorax, .6 of that of wing, distinctly smaller than the proboscis ; they have a distinctly banded appearance. Basal segment with large black scales on the outer and smaller ones on the inner side ; the penultimate segment has the base and the apex creamy white, the rest of the segment being dark brown ; the terminal segment has the base, the outer and upper surfaces brownish, the rest being yellowish white ; the club has the inner and lower surfaces of a much lighter tinge, appearing creamy white. The club is well developed, having a swollen terminal portion, and is covered by large scales with a few hairs. *Proboscis* dark-scaled : *labellae* whitish. *Clypeus* not covered by scales ; *vertex* with long hair-like scales of a whitish colour ; further back these hair-like scales are much darker in colour ; besides the hair-like scales there are broad truncated squames of a snow-white colour on the posterior portion of the vertex ; the *nape* is covered by black scales of the usual anopheline type.

Prothoracic lobes pointed anteriorly with a tuft of dark brown scales on their anterior edge, and with a few yellow chaetae. *Mesonotum* ashy grey all over except for a black line in the middle of the posterior third ; but for a few white spatulate scales on its anterior edge it is covered by long golden yellow bristles arranged in a median and two dorso-lateral areas, the rest of the surface being without any scales or

hairs; each of the areas mentioned above has three to four distinct rows of bristles arising from black rounded spots. A few bristles also arise from the dorso-pleural suture. *Scutellum* whitish except for a black band in the middle. *Postscutellum* with alternating bands of grey and brown in a longitudinal direction. Laterally the thorax is dark brown except at the sutures, which are light yellow.

Wing (fig. 2) 2·7 the length of thorax, base to subcostal junction ·61, anterior forked cell ·23, posterior forked cell ·15 of the whole wing. Wing veins densely covered with spatulate scales. Costa dark-scaled all along except at the base near the junction of the humeral cross-vein, where there is a yellow-scaled spot involving the base of the first longitudinal also. The second yellow spot is a large one at the apex of the wing opposite the termination of the first longitudinal and extending more than half the length of the anterior forked cell. All the veins clothed with dark yellow scales except for the following five patches of black scales: (1) at the base of the second longitudinal vein, (2) at the forking of the second longitudinal vein, (3) at the base of the third longitudinal and at the same position on the second and fourth longitudinal veins covering the cross-veins as well, (4) at the origin of the fourth longitudinal vein and (5) at the forking of the fourth longitudinal vein. The wing-fringe is of a darkish hue with jet black patches at the tips of the posterior branch of the second longitudinal and the anterior branch of the fourth longitudinal veins; between these two dark patches the fringe is of a yellow colour. The arrangement of large and small scales in the fringe is quite normal.

Halteres with the capitellum of a dark brown colour, the scape and scabellum being yellowish.

Coxae scaleless, of a creamy colour with a few hairs; *trochanters* also with a few hairs and of the same colour as coxae. Fore legs uniformly brown except for the white spots at the femoro-tibial and the tibio-tarsal joints. The femur of the middle legs has a three-coloured band owing to the arrangement of the scales; it is formed of white scales in the middle, black above and brownish at the tip of the femur. In the hind legs the femur (fig. 3) has, just below the middle, a large tuft of black scales surrounding it entirely; below this tuft there is a very prominent tuft of snow-white scales reaching to the knee-joint, the condition appears to be simply a much more exaggerated one than that found in the femur of the mid-legs, except that the brown band at the tip of the femora of the middle pair of legs is absent. The tibial and tarsal portions of the mid and hind pairs of legs are uniformly brown except for a whitish band at the tibio-tarsal joints. *Ungues* simple.

Abdomen dark brown, without any scales except a few black ones on the last segment and on the genitalia; it is covered by a large number of golden yellow bristles.

The structure and form of the egg is not known.

THE LARVA (fig. 4.)

The *head* is of a dark brownish colour with three pairs of branched hairs on its dorsal surface. The *clypeal hairs* are rather small, the inner

pair being unbranched and lying close together; the distance between them being about half that between each external and the corresponding internal hair of the side; the inner hair is more than one and a half times the length of the outer branched hair. The *antennae* are long (little less than half the length of the head) cylindrical structures broader at the base, with minute spines on the shaft, with the processes at the apex well developed with a branched terminal hair arising from amidst them. From close to the base of the antenna there arises on the outer side a much branched *basal hair* of the type described for *A. culiciformis* by Christophers and Khazan Chand (6). *Mandibles* (fig. 5) with a single pointed and slightly curved, and three comb-like spines at the apex externally, a well developed anterior and a much smaller internal buccal fan of setae; four main teeth and seven accessory small ones; a brush-like large spine external to these and a prominent row of small tooth-like structures on the inner side; on the main lobe near the outer side a large number of small setae are present on the upper surface, and a number of hairs arising from near the base probably representing the branched basal hair. *Maxillae* of the ordinary pattern, with large curved hairs on their anterior margins, the inner edge ending on the top in a curved hook-like structure; on the main plates two minute papillae are present and the upper surface is covered by a large number of hairs. The maxillary palp is a prominent structure with five spines at its upper end, and a large much branched hair external to the processes a little below the tip. The *submental plate* shows nine well developed teeth.

Thoracic hairs as in other anopheline larvae. The *submedian* hairs consist of two branched hairs on each side, an external and an internal one. There are no palmate hairs on the thorax.

The first and second abdominal segments carry on each side two large and a small feathered hair; the third segment has one large and a single small feathered hair laterally and two small simple hairs dorso-laterally; the fourth and the fifth segments have one large and three small feathered hairs on each side besides two simple hairs as in the third segment; the sixth segment has a single large and two small feathered hairs and two unbranched ones as on the fifth segment; the seventh and the eighth have only two small feathered hairs on each side.

Palmate hairs are present on the abdominal segments 2—7 only. Each palmate hair (fig. 6) consists of 15—18 leaflets; the leaflets are long and pointed with one or two serrations on each side. The *pecten* (fig. 7) is short and broad with teeth of different lengths irregularly alternate, and with a few hairy projections on the basal parts only.

THE NYMPH.

The nymphal trumpets (fig. 8) are rather elongated structures somewhat triangular in shape, and with a broad opening. The dorsal plumose hairs of the ordinary shape are present on the first abdominal segment. There is a lateral spine on segments 2—8; the one on the last segment being plumose. Besides the spines mentioned above there is a long plumose seta, about the length of the segment bearing it, on the segments 5—7; the one on the fifth segment is a little smaller than the others. The tail-fins (fig. 9) are much longer than broad; they have

a well marked fringe of fine hairs, and a long terminal hair which is $\frac{1}{3}$ of the tail-fins in length.

HABITS.

The only adult specimen was hatched from larvae collected by Dr. N. Annandale and Dr. F. H. Gravely from a tree hole at Sureil (altitude about 5,000 ft.) in the Darjeeling district, Eastern Himalayas on October 28th, 1917. The tree was in dense jungle close to the source of the water supply of the Sureil bungalow. The water, which was of a brownish colour, contained a large number of dead leaves, and besides the anopheline larvae there were in it some culicine larvae as well. Only two other Indian anopheline mosquitoes have been described as breeding in tree-holes, these are *A. plumbeus*, Haliday (5) and *A. culiciformis*, Cogil (6).

REMARKS.

The present species belongs to the group of anophelines in which Alcock (1) included *A. asiatica*, Leicester, *A. barbirostris*, Van der Wulp, and *A. wellingtonianus*, Alcock (2); Christophers, however, in his admirable revision of the anophelines (3) includes in this group *A. asiatica*, *A. lindesayi*, Giles, *A. wellingtonianus*, and doubtfully *A. atratipes*, Skuse, and thinks that *A. barbirostris* has no relations with this group. *A. annandalei* though closely related to *A. asiatica* (6), differs from it in the following important characters among many others:—

1. Wing markings.
2. Palpi being banded.
3. Markings of the legs.
4. General colouration.

The larva is quite different from that of *A. asiatica* as described by Strickland (*Parasitology*, Vol. VII, pp. 12—17, 1914).

Type specimen in the collection of the Zoological Survey of India, No. 8061/H. I. Larvae and pupa No. 8062/H. I.

I would here call attention to a paper by F. W. Edwards of the British Museum on "Tipulidae and Culicidae from the lake of Tiberias and Damascus" published in the *Journal of the Asiatic Society of Bengal*, new series, Vol. IX, pp. 47—51, in which he has, after careful comparison of the types come to the conclusion that *Anopheles nursei*, Theob. is only a synonym of *Anopheles (Pyretophorus) palestinensis*, Theob., and not a valid species. The paper has unfortunately been overlooked by all workers on Indian Culicidae.

LITERATURE.

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