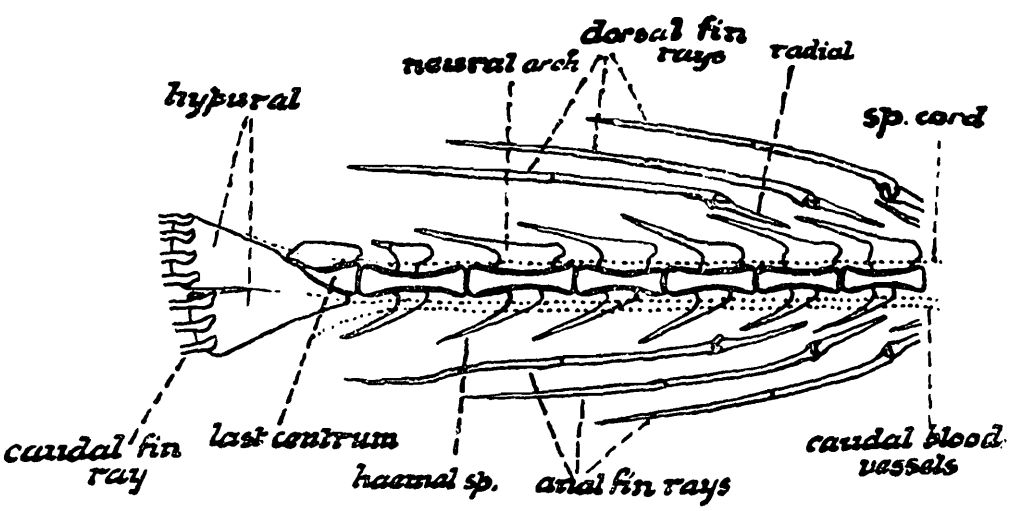
THE CAUDAL FIN OF THE EEL *CHAUDHURIA*.

(With text-figure.)

By R. H. WHITEHOUSE, *M.Sc., Professor of Zoology, Government College, Lahore.*

A special interest attaches to the caudal fin of this peculiar eel [1] since it is discontinuous ; in all other known eels the caudal fin is continuous with the dorsal and anal fins, in which the fin-rays are supported by radials or interspinous bones alternating with the neural and hæmal spines. In *Chaudhuria*, the last fin-rays of the dorsal and anal fins are attached to radials situated between the sixth and seventh vertebral arches counted from the posterior end ; there is thus a considerable space devoid of fin-rays separating the dorsal and anal from the caudal fin. However the fin fold is practically continuous and the last dermotrichia of the dorsal and anal fins reach backward as far as the last centrum.



The neural and hæmal arches of the terminal centra are typical of the Apodes, the neural arch having an extended base with a long backwardly directed spine. The penultimate centrum has a somewhat reduced neural arch ; this is a feature common not only to the eels but to the majority of the Teleostean fishes, and is probably due to suppression consequent on the upturning of the extremity during the heterocercal stage. As regards the spine of this neural arch, I cannot say with certainty whether it is present or not ; the anterior dorsal edge is certainly truncated, which suggests the absence of the spine ; at the same time, there *appears* to be a very small spine attached to this angle of the arch, but determination by dissection of such a small structure is almost impossible ; the point however is of minor importance. The neural arch of the last centrum is typically elongated, extending some

[1] The genus and its only known species (*C. caudata*) are described by Annandale on pp. 27-28 of this volume.

short distance along the upper edge of the hypural bone, and is devoid of a spine.

Two large hypural bones are present, fused at their bases and firmly attached to, or even fused with, the last centrum ; the last (*i.e.*, the upper) hypural is the larger and bears four jointed fin-rays, while the ventral hypural bears three. None of the fin-rays bifurcate, but extend as simple rays to the edge of the fin fold.

The courses of the spinal cord and the caudal blood vessels are indicated in the figure by dotted lines.

It will be seen that this caudal fin is a wholly ventral structure, since all the supports are ventral to the spinal cord. In the majority of Teleosts, a few dorsal elements enter into the caudal fin, but in *Chaudhuria* all such elements have been eliminated ; this is a definitely specialized character. The separate caudal fin itself also suggests a specialization above the average eel, and it is probable that the tail is a more definitely propulsive organ than in other Apodes where progression is by a wriggling motion after the fashion of the primitive fishes.

CHELONIA AND BATRACHIA OF THE INLE LAKE.

By N. ANNANDALE, *D.Sc., F.A.S.B., Director,*
Zoological Survey of India.

With Plate XX.

CHELONIA.

The fishermen of the Inlé Lake recognize two species of Chelonia ; to one they give the name *Leik Pu*, to the other *Leik Kambar*. The latter is evidently a species of *Trionyx* ; it is said to be round and flat, to have no scales on its back, to grow to a large size and to have round black spots on its back when young. It may be *Trionyx phayrei*, which seems to be found at higher altitudes than any other species in Burma, but we did not see a specimen. The *Leik Pu* is a local race of the widely distributed terrapin *Cyclemys dhor* (Gray). I describe it here as :—

Cyclemys dhor shanensis, subsp. nov.

The shell of both sexes is somewhat elongate, but that of the female is relatively broader than that of the male. The shields are also broader, specially those of the dorsal row. The dorsal surface of the male shell is flattened, while that of the female is convex. The whole of the margin of the carapace is a little retroverted ; in front of and behind the bridge of the plastron it is distinctly concave above. The growth-lines are strongly developed on the shields. In a young adult female the suture running across the outer part of the abdominal shield and representing the plastral hinge is almost obliterated, being represented merely by a faint superficial groove[1] ; but the suture between this shield and the pectoral is strongly marked. In a slightly older male the suture between the shields is very nearly straight and practically all external trace of the hinge has disappeared. The whole of the shell is very dark brown or black with fine radiating yellowish lines on each shield. These lines tend to disappear with age. The head and neck are greenish black and are uniformally marbled with dull olivaceous. The limbs and tail are blackish. The skull resembles that of the typical form but the snout is perhaps a little broader and blunter.

Measurements of shells with callipers (in millimetres).

	Male.	Female.
Total length	225	184
Breadth	138	137
Depth	78	72
Length of plastron	198	174
Length of bridge	70	65

[1] This groove shows more clearly in the photograph (plate xx, fig. 2*a*) than it does on the actual specimen.

Type-specimens.—Male No. 18594 ; female No. 18593, ***Zoological Survey of India*** (*Ind. Mus.*).

The male type is from Fort Stedman on the Inlé Lake, altitude 3,000 feet ; the female from a small stream from the He-Ho plain 800 feet higher.

This tortoise is largely aquatic in habits, sitting at the edge of canals and other bodies of water and diving to the bottom when disturbed.

I have examined a large series of adults of the typical form of *Cyclemys dhor* from different parts of Burma and from the Khasi and Garo Hills in Assam. In none of them is the hinge of the plastron obliterated in the way in which it is in the Shan specimens, although some of the shells are evidently those of aged individuals in which the growth-lines on the shields have been entirely worn away. In an old living specimen from the Garo Hills recently examined, the hinge, though still represented on the shields by an open suture, was quite immovable. The typical form shows the same sexual difference in shape of shell, but its colour seems to be invariably paler than in the Shan form.

BATRACHIA.

The season of our visit was a very bad one so far as the collection of Batrachia was concerned. The frogs and toads of the Shan Plateau undergo a longer period of hibernation than the mildness of the climate would seem to justify were it not that most of them are tropical species. They were only beginning to arouse themselves from their winter sleep in March and as a matter of fact we did not see a single adult batrachian in the Inlé basin. Several tadpoles were, however, found in small hill-streams running into the lake and we obtained specimens of one frog, a common and widely distributed form, both at He-Ho and some four hundred feet higher at Thamakan.

Rana kuhlii, D. and B.

1917. *Rana kuhlii*, Smith, *Journ. Nat. Hist. Soc. Siam* II, p. 262, pl.—, figs. 1, 1*a*, 1*b* (larva).

Tadpoles of this species were abundant in streams at Hsing-Dawng and near Fort Stedman. I have identified them by comparison with specimens sent me from Siam by Dr. Malcolm Smith, who has just described the larva in the *Journal of the Natural History Society of Siam.* It is clear from his investigations that the tadpole[1] I assigned provisionally to this frog recently was incorrectly identified.

The species is widely distributed in southern Asia east of the Bay of Bengal.

Rana limnocharis, Wiegm.

Frogs from the Shan States belong to the typical form of the species but are rather small ; I saw none more than 45 mm. in length from snout to vent. The specimens we found at Thamakan were in a well and seemed to be in a half torpid condition. I believe that I heard frogs

[1] Annandale, *Mem. As. Soc. Bengal* VI, p. 147 (1917).

of the species croaking in the swamp at the north end of the Inlé Lake at the beginning of March.

Bufo melanostictus, Schneid.

Dr. Gravely collected a number of tadpoles in the old valley of the Kawlaw river east of Ngot at an altitude of about 3,500 feet. They are all young and had probably spent the winter in a larval state.

Megalophrys montana, Kuhl.

We obtained in a small stream above Fort Stedman a tadpole of the genus *Megalophrys* that agrees precisely with those from Penang[1] and differs in the same characters from those of the Himalayan species.

M. montana is widely distributed in the Malay Peninsula and Archipelago and Smith [2] states that it is found on most of the hill ranges throughout Siam, but it has not been recorded hitherto from Burma.

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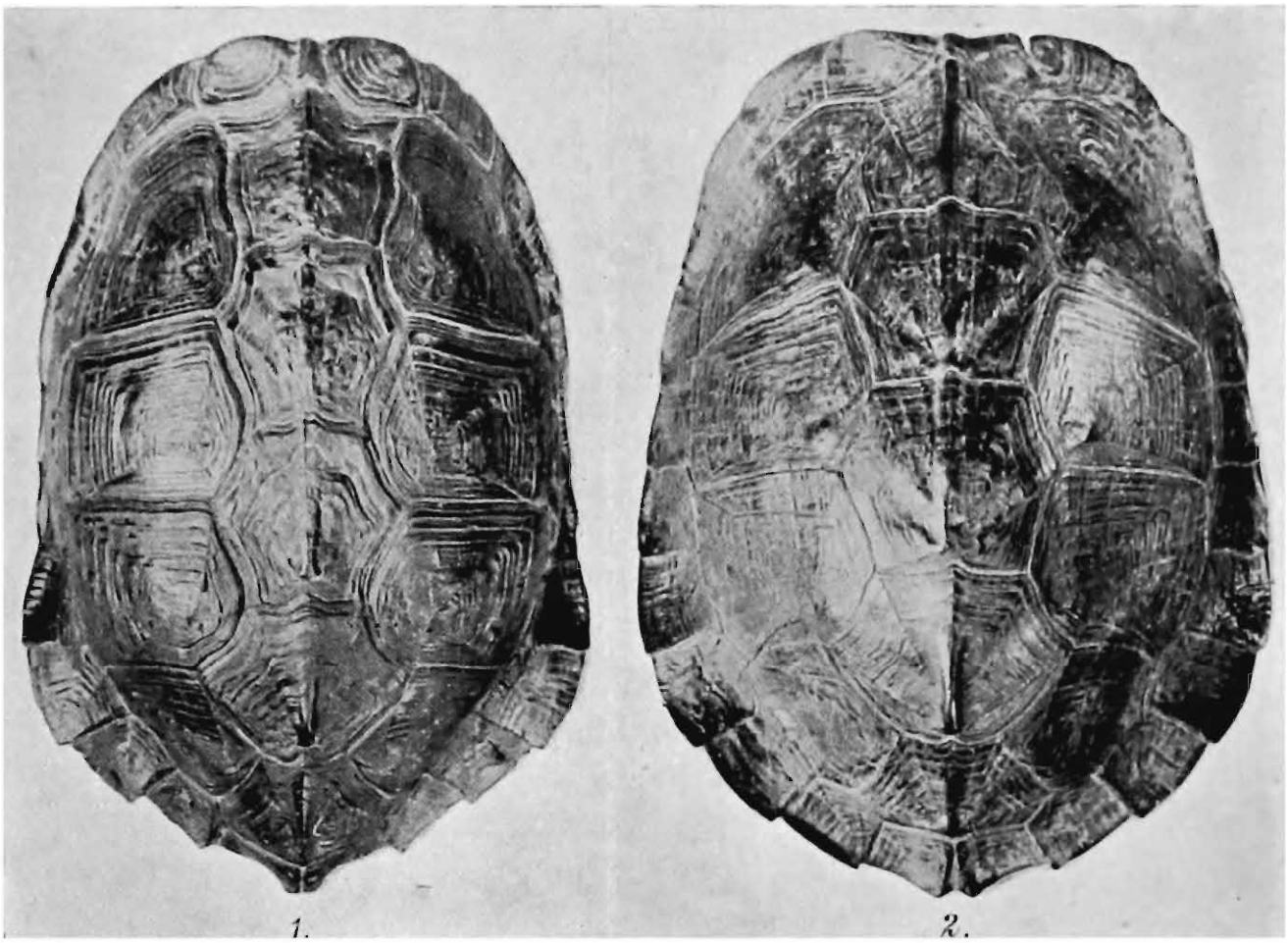
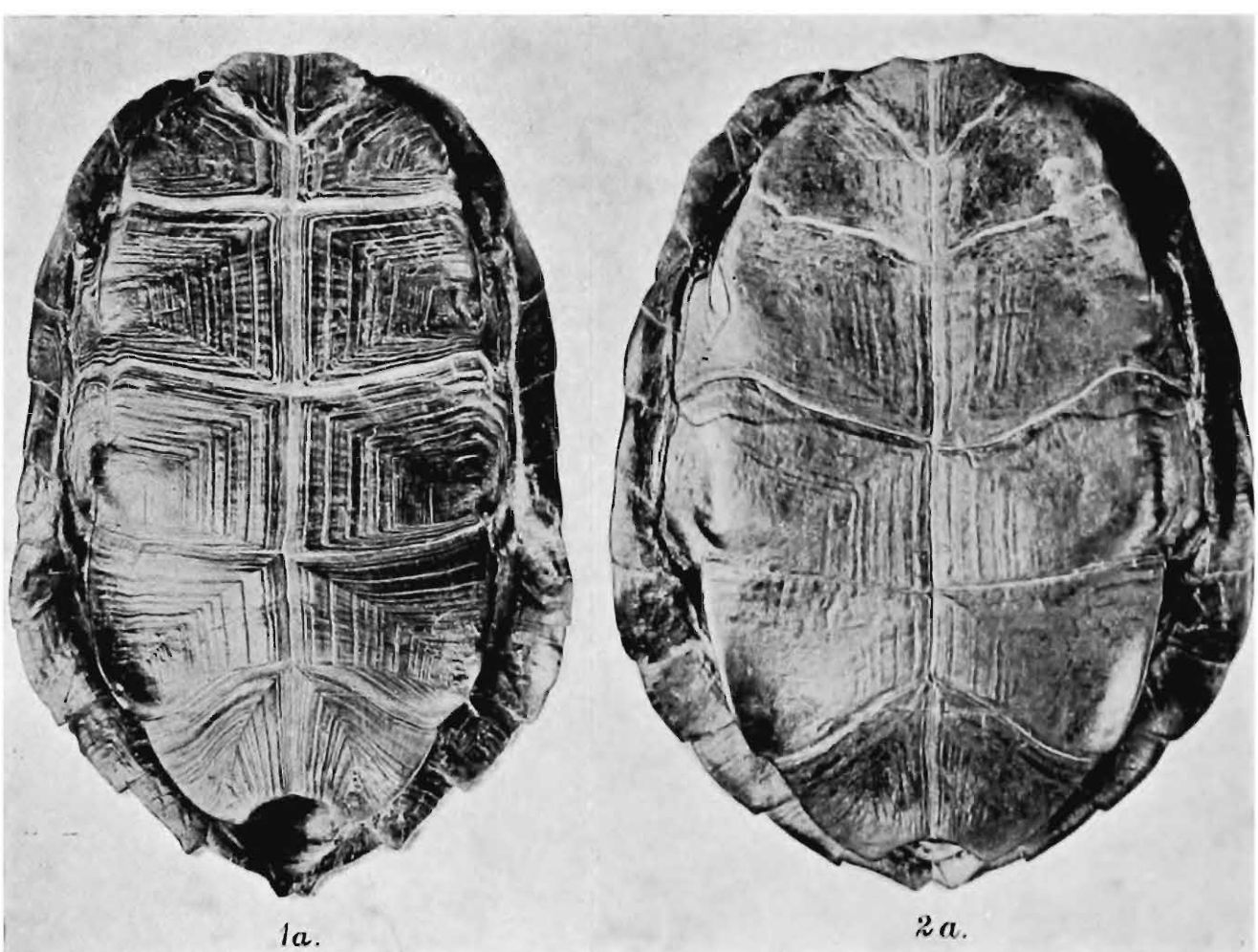
[1] *Id., ibid.*, p. 154, pl. vi, fig. 10.
[2] *Journ. Nat. Hist. Soc., Siam,* II, p. 231 (1917).

EXPLANATION OF PLATE XX.

FIGS. 1, 1*a*.—Shell of male type of *Cyclemys dhor shanensis*, subsp. nov.

FIGS. 2. 2*a*.—Shell of female type of *Cyclemys dhor shanensis*, subsp. nov.





S. C. Mondul, Photo.

CYCLEMYS DHOR SHANENSIS.

Photo.-engraved & printed at the Offices of the Survey of India, Calcutta, 1918.

THE ANATOMY OF A CHIRONOMID LARVA OF THE GENUS *POLYPEDILUM.*

By BAINI PRASHAD, *M.Sc., Superintendent of Fisheries, Bengal Fisheries Laboratory, Indian Museum, Calcutta.*

(Plate XXIII).

There has been an unfortunate confusion as to the generic name of the larva here described. The adult fly reared from a similar larva was originally named by Kieffer *Chironomus fasciatipennis* (4), and is referred to under this name by Annandale (2), and also by Gravely (3). Kieffer in a later paper (5) assigned the species to the genus *Polypedilum* Keiff., and it must therefore be known as *Polypedilum fasciatipennis* (Kieff.). It is impossible to be certain with our present knowledge of the Chironomid larvæ whether the form that I am about to discuss is specifically identical with the one from Calcutta, but no difference has been discovered either in structure or in habits, and there is no doubt of the generic identity.

The specimens on which I have based my observations were taken in the Inlé Lake, Southern Shan States, by Dr. N. Annandale and Dr. F. H. Gravely in February 1917. They were living among dense masses of weed (*Ceratophyllum*) in clear water. The habits of the Calcutta form as described by Annandale (1, 2) are as follows :—" In the early stages of its larval life this insect wanders free among communities of protozoa (*Vorticella, Epistylis*, etc.) and rotifers on which it feeds, but as maturity approaches begins to build for itself a temporary shelter of one of two kinds, either a delicate silken tunnel the bottom of which is formed by some smooth natural surface, or a regular tube
The tubuler shelters occasionally found are very much stouter structures than the tunnels, but are apparently made fundamentally of the same materials ; and structures intermediate between them and the tunnels are sometimes produced. The larva as a rule fastens to them branches detached from living colonies of Vorticellid protozoa such as *Epistylis*." In the Inlé form the tube[1] is made of a silky material and is closed at both ends, the larva however can come out of it at any point as the whole structure forms a loose net work. The tube is covered by a thick growth of a protozoan which has been identified as *Epistylis flavicans* by Dr. Ekendranath Ghosh.

The larvæ in their cases on being taken from the lake were put into a bowl of water, and it was observed that they began to devour the *Epistylis*. The protozoa on this broke off from their stalks and swam away. A small caddis-fly, of which vast swarms arose from the lake every evening at the period at which the larvæ were collected, dropped its eggs into the bowl in which the larvæ were living. These eggs were

[1] An enlarged photograph of the tube with its covering of protozoa is reproduced by Dr. Annandale on pl. XXI of this volume.

enclosed in a globule of jelly about the size of a small shot. The globule adhered to the case of a larvæ, which tried to eat them, but was prevented by the jelly from doing so.

The larva preserved in spirit is of a creamy colour when taken out of its tube ; when alive it was semi-transparent without any tinge of red. It is 6·5 mm. in length, and like the ordinary Chironomid larvæ is worm-like in appearance. It differs from the common blood-worms in having no ventral blood-gills on the eleventh segment, and in that the blood lacks red pigment. In one specimen, which was ready for pupation when preserved, the nymphal characters are well developed and can be easily seen in a Canada balsam preparation. It shows that in the nymph, instead of the two groups of respiratory filaments on the pro-thorax, two nymphal trumpets are developed for respiration. The larva is thus of Meinert's *Motitor* group of Chironomus larvæ (6), but differs from other described larvæ of this group in having a small head, and in that the brain lies in the pro thorax instead of the head.

In the body of a young larva the head and the twelve segments of the thorax and abdomen can be easily distinguished (fig. 1). In advanced larvæ, however, fusion takes place in the thoracic region and the segments are not easy to distinguish.

Head.—The head is a very small structure with a chitinous covering much thicker than that of the rest of the body. It is of a yellowish colour. In front of the antennæ it is much narrower than behind. The dorsal surface is very convex, descending rapidly to the nearly straight posterior surface, gradually at the outwardly bulging sides, and with a very steep forward slope on the anterior surface (fig. 3). The ventral surface is nearly flat. The dorso-lateral sides of the head are formed by three chitinous pieces, *viz.*, a median process (the clypeus), and two lateral plates. The lateral plates are designated the epicranial plates by Miall and Hammond (7). This, however, is an inappropriate name when applied to the head of this larva, because in it the brain does not lie in the head, and so this part of the head is not the cranium in a strict sense. The lateral plates besides forming the sides also form a little of the dorsal surface, and are continued ventrally to meet each other in the middle line, where a faint suture can be distinguished (fig. 4). From the anterior margin of the pre-antennal portion of the head a shelf-like fold hangs forwards. Its dorsal surface is convex and highly chitinized. The ventral surface slopes sharply inwards and slightly upwards towards the entrance to the buccal cavity. The ventral surface of this pre-antennal shelf is termed the *labrum* (*la*) by Miall and Hammond. It overhangs the mouth-parts, is mobile and can be bent backwards and inwards. On the dorsal surface the shelf bears two setæ, one on either side, while on the ventral surface (*i.e.*, the labrum) there are two simple setæ in the middle line, and two groups of thick setæ ; besides these the chitin on this surface is thickened along two crescentic lines on the sides and a central triangular area. The margins of this triangular area are raised into tooth-like processes.

Ventrally the pre-antennal portion of the head is marked off from the post-antennal by a narrow linear band of thickened chitin arising from

the sides of the labium. Immediately in front of the labium lies the opening of the buccal cavity. Ventrally in the post-antennal region the chitin is thickened to form the *labium* (*lb*) or the lower lip in the middle and two striated flaps (*f*) on its two sides. The flaps bear a large number of setæ, and are brush-like structures which help in closing the mouth opening on the sides.

On the lateral sides of the head two pairs of pigment spots or simple eyes (*e*) are present. The antennæ (*an*) lie in front of the eyes. Each antenna consists of a large basal joint arising out of a cup-shaped depression on the head. No sensory spot can be distinguished on the basal joint of the antennæ. To this basal joint two ramii are attached, the outer one is five-jointed and the inner is a long unjointed hair-like structure.

The mouth-parts consist of a pair of large *mandibles* (*md.*) and two pairs of *maxillae*. The mandibles (fig. 5) are large heavily chitinized structures without any setæ. They are attached by a broad base and have a curved pointed tip ; their inner cutting margin bears a number of teeth. The first pair of maxillæ (*mx.* fig. 6) are two-jointed structures, one on each side of the buccal opening and arising near the base of the mandibles (fig. 4) ; the upper joint is small and setose. The second pair of maxillæ are fused to form the *labium* (*lb.* fig. 4) which forms the lower margin of the funnel shaped buccal cavity. The labium has a toothed anterior margin with the teeth pointing forwards. Above it lies another thin plate. Miall and Hammond call the upper the *mentum* and the lower the *submentum*.

Thorax.—In a young larva the first three segments following the head are the pro-, meso-, and metathoracic (*t* 1, *t* 2, *t* 3, fig. 1). These three segments are quite distinct, but in a fully grown adult larva the line separating the mesothoracic from the metathoracic segment is not seen, the two forming a single structure. The notch separating the prothoracic from the mesothoracic segment, however, persists (fig. 2).

The prothoracic segment has a pair of club-shaped feet (*t. f.*) armed with two types of hooks. Both types of hooks are simple without serrations or teeth. One type (fig. 7) is curved like a scythe, whilst the other (fig. 7*a.*) is nearly straight. The curved hooks are arranged on the margins of the knob at the end of the foot, and the straight ones are in the centre. Both types of hooks, especially the curved ones, are of use to the animal in collecting and planting the colonies of *Epistylis* on its tube. The other two thoracic segments do not have any appendages.

Abdomen.—The abdomen is formed of nine segments (1-9, fig. 1), all of which are alike except the last one, which bears appendages and other outgrowths. It has a pair of large anal feet (*a.f.* fig. 1) ; these like the thoracic feet bear hooks. The hooks are arranged in concentric circles. The outermost ones have a very broad base and a much bent upper surface (fig. 8*c*), in the inner ones the curve is not so marked (figs. 8*a*, *b*), whilst the centre ones have a much less curved upper portion (fig. 8). Besides the anal feet described above, this segment bears two bunches of five setæ each (fig. 1), arising from conical papillæ on the dorsal

side ; these anchor the larva to the tube. Near the anus two pairs of blood-gills are also present (*b.g.*, fig. 1) ; from the base of each of the upper pair of gills a stout seta is also seen to arise.

Internal Anatomy.—No attempt is made to describe the internal anatomy in detail, which would be impossible with the very limited material available ; a few differences, from the form described in detail by Miall and Hammond are, however, noted.

The supra-oesophageal and the sub-oesophageal nerve ganglia lie in the prothoracic segment and not in the head, which as noted above is very small. The rest of the nervous system is essentially the same.

In the alimentary canal the cardiac portion of the stomach (*ca.* fig. 9) and the dilated chamber at the beginning of the small intestine (*ch.*) are poorly developed. The salivary glands (*s. g.*) also lie much more anteriorly, the ducts being relatively small.

The tracheal system has two well developed longitudinal tracheæ one on either side.

In conclusion I have to express my sincere thanks to Dr. N. Annandale for the material and kind help ungrudgingly given at all times. I am also deeply indebted to Mr. T. Southwell, A.R.C.S., F.Z.S., Director of Fisheries, Bengal, and Bihar and Orissa, for permission to undertake and publish this work.

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EXPLANATION OF PLATE XXIII.

FIG. 1.—Side view of young larva showing the nervous system as seen in a Canada balsam preparation.

FIG. 2.—Head and thoracic region of a full grown larva showing the nymphal trumpets, the imaginal wings, the halteres and the three pairs of legs.

FIG. 3.—Side view of the head.

FIG. 4.—Ventral view of the head.

FIG. 5.—Left mandible seen from below.

FIG. 6.—Right first maxilla seen from the ventral surface.

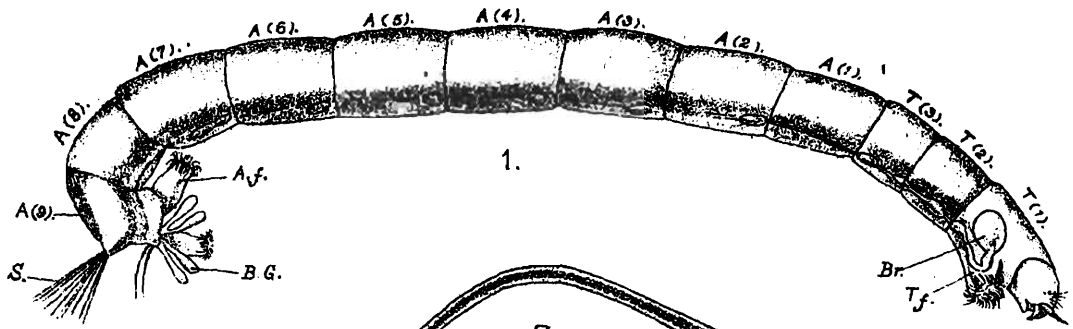
FIGS. 7, 7*a*.—Types of hooks found on thoracic feet.

FIGS. 8, 8*a*, 8*b*, 8*c*.—Types of hooks found on the abdominal feet.

FIG. 9.—Alimentary System of the larva.

REFERENCES TO LETTERING.

A (*1*)—*A* (*9*). Abdominal segments. *A. f.* Abdominal feet. *An.* Antennæ. *B. G.* Blood gills. *Br.* Supra-œsophageal nerve ganglion (brain). *Ca.* Cardiac portion of the stomach. *Ch.* Chamber at the beginning of the small intestine. *Col.* Colon. *E.* Eye. *F.* Flaps on the sides of the labium. *H.* Haltere. *La.* Labrum. *Lb.* Labium. *lg.* (i), *lg.* (ii), *lg.* (iii). Thoracic legs. *Md.* Mandibles. *mx.* (*i*). First maxilla. *N.T.* Nymphall respiratory trumpets. *œs.* Oesophagus. *S.* Setæ. *S.G.* Salivary gland. *S. i.* Small intestine. *St.* Stomach. *T* (*1*)—*T* (*3*) i—iii thoracic segments. *T. f.* Thoracic feet. *U. T.* Urinary or malpighian tubules. *W.* Wings.



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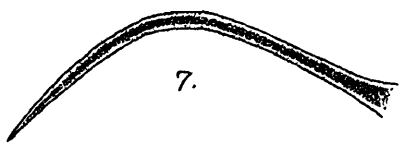

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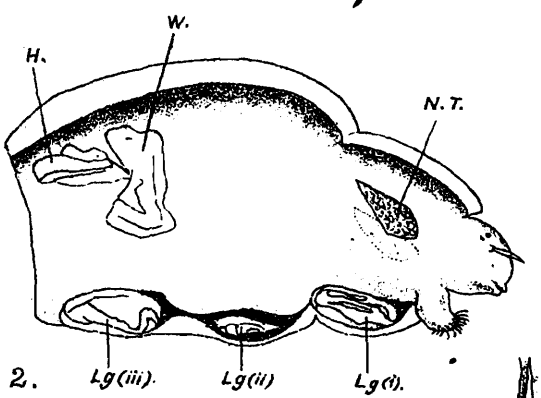

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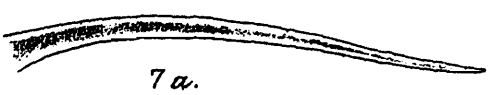

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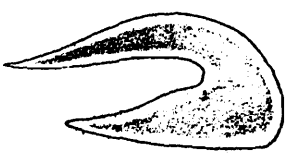

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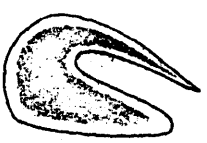

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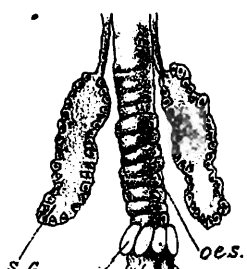

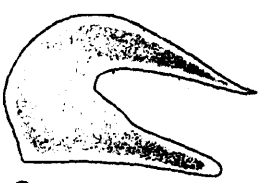

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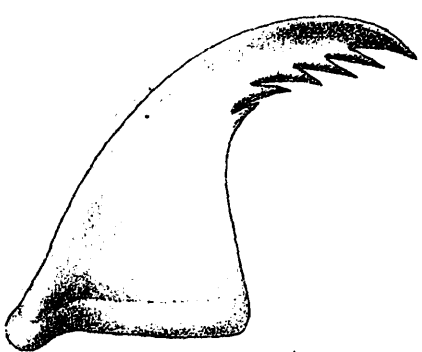

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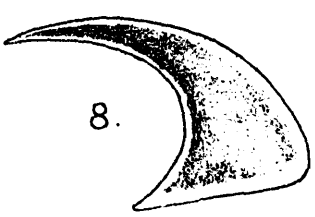

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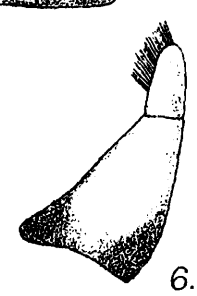

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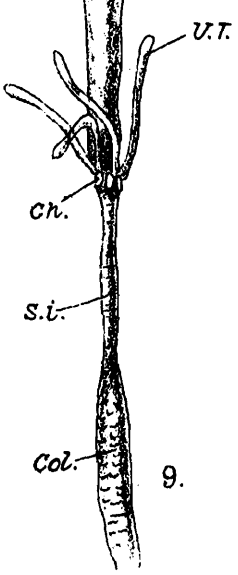

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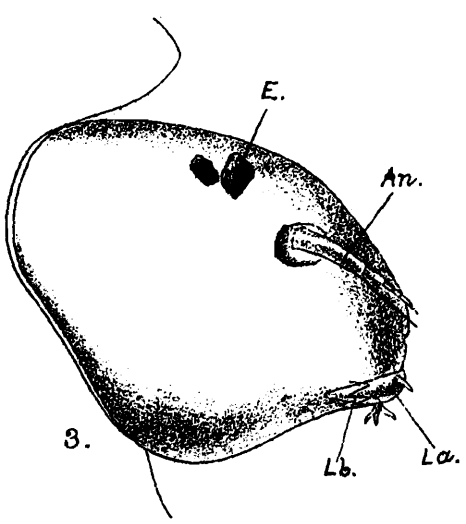

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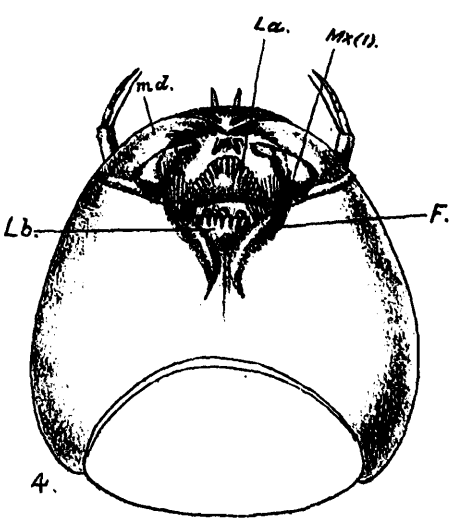

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B. Prashad, & D. Bagchi, del.

ANATOMY OF A CHIRONOMID LARVA.

D. Bagchi, lith.

SPONGES, HYDROZOA AND POLYZOA OF THE INLE LAKE.

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With Plate XXI.

The Porifera, Hydrozoa and Polyzoa of the Inlé Lake belong without exception to species also found in India proper and only in one instance, that of the cosmopolitan *Ephydatia fluviatilis*, can differences be found even sufficiently great for varietal separation. The most remarkable feature of the fauna so far as these groups are concerned lies in its deficiencies, above all in the apparently complete absence of Phylactolaematous Polyzoa. The three groups, therefore, cast no light on the origin of the fauna and are of less interest than was perhaps anticipated.

PORIFERA.

Only three species of sponges, all of them cosmopolitan as species, are represented in our collection. They are *Spongilla lacustris*, *Spongilla fragilis* and *Ephydatia fluviatilis*, perhaps the three commonest species in the Holarctic Zone. The first two, however, occur as varieties only known from the Oriental Region, while the last differs somewhat both from the *forma typica* and from the Indian race *himalayensis*. I have, therefore, recognized it as a new variety under the name *intha* (*i.e.*, literally, " son of the lake " in Burmese).

Spongilla lacustris var. **proliferens,** Annandale.

1911. *Spongilla proliferens*, Annandale, *Faun. Brit. Ind., Freshw. Sponges, etc.*, p. 72, fig. 9.
1915. *Spongilla lacustris* var. *proliferens*, *id.*, *Mem. Ind. Mus.* V, p. 28.

This sponge was found in abundance in February and March in a pond a few miles east of the town of Yawnghwe. Specimens were also taken near the western shore of the Inlé Lake and in rice-fields west of that shore. They agree with specimens from Calcutta and have the characteristic buds well developed. Gemmules were also present in most specimens.

This form of the cosmopolitan *Spongilla lacustris* has been found at many places in the Indo-Gangetic Plain, Peninsular India and Burma.

Spongilla fragilis var. **calcuttana,** Annandale.

(Plate XXI, fig. 1).

1911. Annandale, *op. cit.*, p. 96, fig. 15.

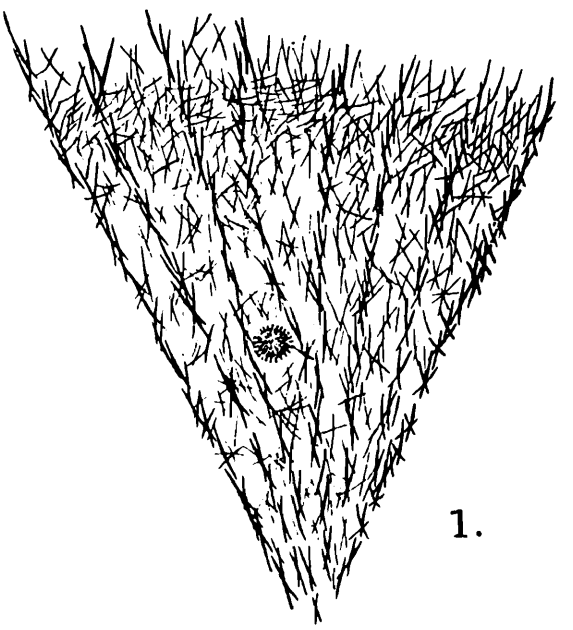
Dried specimens of this sponge were found coating the house-posts of the monastery guest-house at Thalé-u on the eastern side of the lake.

They covered the wood for some inches above the water-level of the time (the end of February) in a uniform layer 3·5 to 4 mm. thick. The variety has been found hitherto only in the Museum tank in Calcutta.

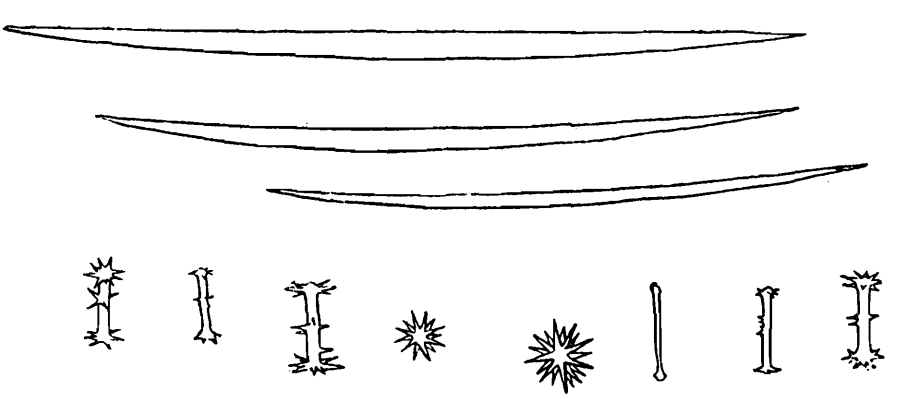
Ephydatia fluviatilis var. **intha,** var. nov.

(Plate XXI, figs. 2, 3).

The sponge forms spherical or irregular masses not more than 5 cm. in diameter attached to lax water-plants such as *Ceratophyllum*, and occasionally flat, somewhat mound-shaped growths on bamboo posts. In each mass there is as a rule a single large circular depression or a



1.



2.

Ephydatia fluviatilis var. *intha*, nov.

Fig. 1.—Part of a transverse section through a small sponge (× 8), showing the regular and well defined radiating spicule-fibres and a single gemmule *in situ*.

Fig. 2.—Spicules, × 250. Several young gemmule-spicules not yet fully developed are shown as well as fully developed spicules of the same order and skeleton-spicules.

group of such depressions into which several wide exhalent channels open. Smaller exhalent channels, however, open directly on the surface. The consistency of the sponges is always very soft, often quite unusually

so. The surface is fairly smooth but minutely hispid. The colour is usually bright green, but sometimes, without apparent cause, the chlorophyl bodies that produce this colour are absent and it is not uncommon for the upper half of a sponge to be green and the lower half yellowish white. Sponges on bamboo posts are brownish yellow.

The skeleton, as might be expected from the softness of the sponge, is very sparse and the number of spicules smaller than usual in the Spongillidae. Slender spicule-fibres can, however, be detected forming an open and fairly even network in the parenchyma. The radiating fibres are more clearly defined than the connecting fibres and can be traced from near the centre of the sponge to the surface. They bifurcate at fairly regular intervals. On the surface they support the epidermal membrane over a fairly extensive subdermal space and project through it as microscopic spines.

There are no " bubble-cells."

The skeleton-spicules are slender and sharply pointed. Though often a little irregular in outline, they never appear, even under the highest powers of the microscope, granular or spiny. Abnormal macroscleres of cruciform or bifid outline are not uncommon.

There are no free microscleres.

The gemmule-spicules are of the type normal in the species, with shafts considerably longer than a single rotule. They bear few but often very stout and long spines, which project at a right angle. These spines are often arranged in a circle round the middle of the shaft. The rotules are unevenly and deeply denticulate but well-developed and normal.

The gemmules are very small, spherical and of a bright yellow colour. Their pneumatic layer is relatively thin and they are surrounded by a single row of gemmule-spicules. The microphyle is crateriform viewed from outside but contains a small tubule that projects at right angles.

Measurements (in millimetres).

Length of skeleton spicule	0·238—0·357
Diameter of skeleton spicule	0·012
Length of gemmule spicule	0·028—0·032
Diameter of rotule	0·02
Diameter of gemmule	0·6

Type-specimen.—No. P. 30/1, Zoological Survey of India (*Indian Museum*).

The most noteworthy features of this variety are the extreme softness of the sponge, which often collapses in drying into a mere slimy layer, and the regularity of the arrangement of the radiating fibres of the skeleton. The first of these characters, though always well marked, is variable in degree. All the sponges from any one spot as a rule are similar in respect to it, but I was unable to correlate extreme softness with any factor in the environment.

The skeleton-spicules differ from those of the Himalayan form[1] of the species in that they are not at all granular or spiny.

[1] *Ephydatia fluviatilis* subsp. *himalayensis*, Annandale, *Rec. Ind. Mus.* VII, p. 138, fig. 1 (1912). See also *Journ. As. Soc., Bengal*, XI, p. 445 (1915).

Habitat.—Intermediate zone of the Inlé Lake and canals of clear water in the neighbourhood.

Sponges were often extremely abundant among thickets of *Ceratophyllum* not far removed from the edge of the lake. None were, however, found in similar thickets in the central region. They appeared to have become more abundant at the beginning of March than they were in February and to have grown considerably in size.

The canals of this sponge shelter quite a little fauna of annelids and insects. No less than three species of the genus *Chaetogaster* (Oligochaeta)[1] were found in them, namely *Ch. bengalensis*, Annandale, *Ch. annandalei*, Stephenson, and ? *Ch. limnaei*, Baer, the identity of the last, a common European species, being a little doubtful. All the insects found in the canals were in a larval state. They included at least two species of Chironomidae (Diptera) a *Sisyra* (Neuroptera) and a Trichopteron. The last lived free without constructing a case to protect itself. The worms were living in young and flourishing sponges, as was the case with the type-specimens of *Ch. annandalei*[2] in Japan. The original examples of *Ch. bengalensis*[3] were, on the other hand, attached to the bodies of molluscs of the genus *Limnaea*, on which also *Ch. limnaei*[4] has been found both in Europe and in the Kumaon lakes in the Himalayas.

HYDROZOA.

The only Hydrozoon found in the Inlé Lake was *Hydra vulgaris*, Pallas. Numerous specimens were collected from a bamboo house-post in the intermediate zone near Fort Stedman. The post were overgrown with sponges and Polyzoa. The specimens of *Hydra* were moderately small and of a yellowish brown colour. They had five tentacles and not more than two buds. None were sexually mature.

POLYZOA.

The only specimens of Polyzoa of which I was able to find any trace belonged to the Ctenostomatous genus *Hislopia*. The weed-thickets so characteristic of the central region and the intermediate zone seemed to provide ideal quarters for *Fredericella* and certain species of *Plumatella*, but a very careful and prolonged search at a number of places failed to reveal even a single statoblast.

Hislopia lacustris, Carter.

(Plate XXI, fig. 4).

1858. *Hislopia lacustris*, Carter, *Ann. Mag. Nat. Hist.*, III, p. 170, pl. vii, figs. 1—3.
1911. *Hislopia lacustris*, Annandale, *Faun. Brit. Ind., Freshw.-Sponges, etc.*, p. 202.
1917. *Hislopia lacustris, id., Mem. As. Soc., Bengal*, VI, pt. 1, p. 34.

Hislopia lacustris occurs in very great abundance in all parts of the Inlé Lake except in foul water in the marginal zone. It grows in uniform

[1] Stephenson, *Rec. Ind. Mus.*, XIV, pp. 9—11 (1918).
[2] Stephenson, *Mem. As. Soc., Bengal*, VI, p. 88 (1917).
[3] Annandale, *Journ. As. Soc., Bengal* (n. s.) I, p. 117 (1905).
[4] Michaelson, *Mem. Ind. Mus.*, I, p. 113 (1909).

layers of great extent over house-posts and fishing-poles. I figure a young colony just starting to spread over a bamboo. In this condition the zooecia are regular in shape and uniform in size, but as the colony becomes congested many of them are distorted or dwarfed. This is the case to a still greater extent on the shells of Gastropod molluscs (*Hydrobioides nassa*, *H. physcus*, *Taia intha*, *T elitoralis* and *T shanensis*), a considerable proportion of which are completely covered by its growth. The four spines at the corner of the aperture are usually well developed and the aperture more or less quadrate. In this respect the colonies from the Inlé Lake are more like those of the specimens figured by Carter in his original description than any I have seen elsewhere.

The species has probably a wide range in northern India and Burma.

Hislopia malayensis, Annandale.

1917. *Hislopia malayensis*, Annandale, *op. cit.*, p. 35, pl. i, fig. 9 ; pl. ii, figs. 1, 1*a*.

A single colony of this species, easily recognized by its fan-shaped buds, was found on the stem of a reed in the intermediate zone of the lake near Fort Stedman. I have recently found it growing in abundance on the lower surface of bricks and tiles at the edge of the river Hughli near Calcutta. It was originally described from a small lake at Jalor in the Siamese Malay States.

EXPLANATION OF PLATE XXI.

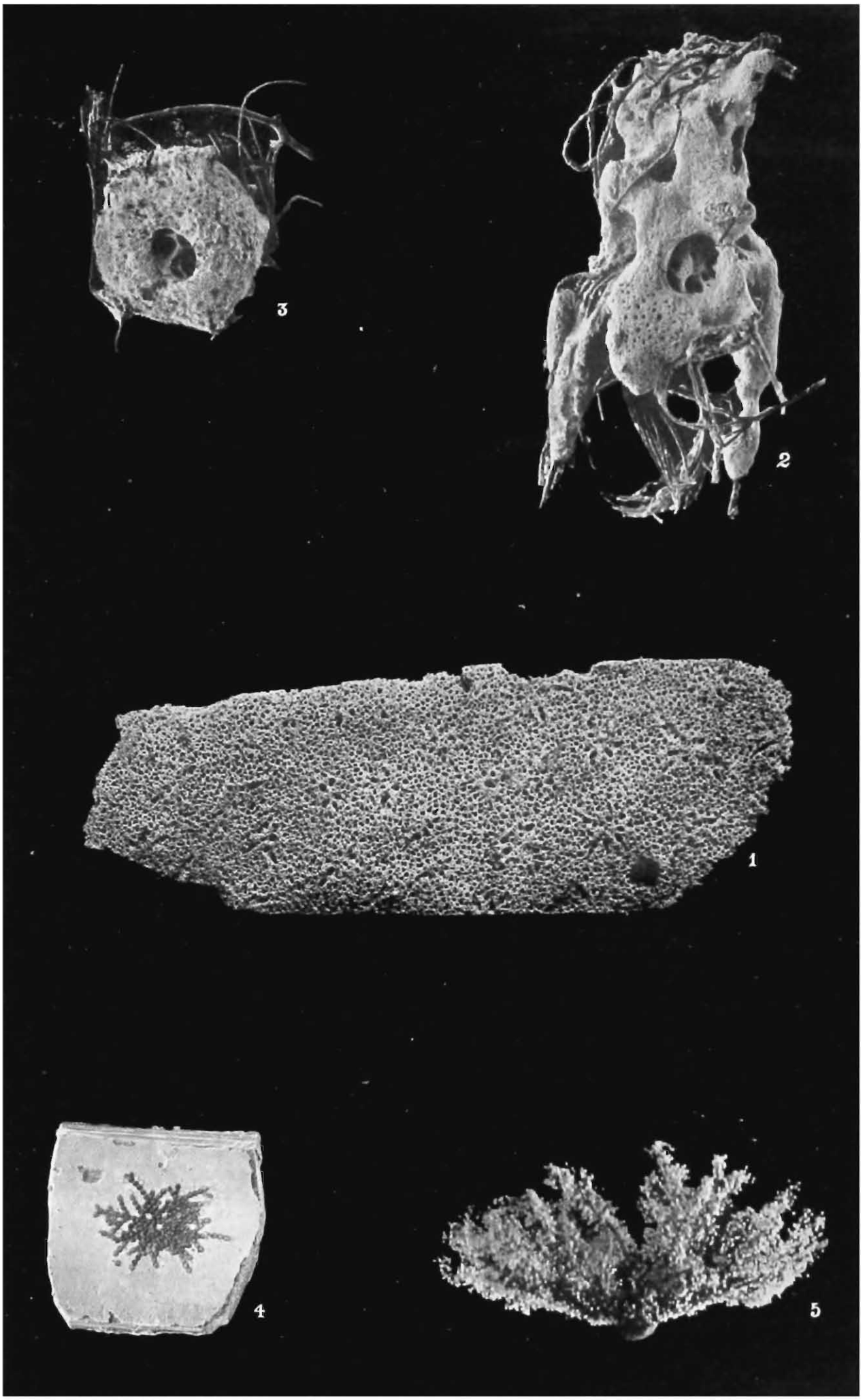
FIG. 1.—*Spongilla fragilis* var. *calcuttana*, Annandale. Dried specimen from the Inlé Lake. × 1.

FIGS. 2, 3.—*Ephydatia fluviatilis* var. *intha*, var. nov. Specimens preserved in alcohol. × 1.

FIG. 4.—*Hislopia lacustris*, Carter. A young colony on the inner surface of a bamboo house-post. From a specimen preserved in alcohol. × 1.

FIG. 5.—Protective case of the larva of a *Polypedilum* (Chironomid Diptera) covered with the Protozoan *Epistylis flavicans*, Ehr. From a specimen from the Inlé Lake fixed in hot formalin. × 10.

The case of the Dipterous larva is figured to show its resemblance to certain species of Phylactolaematous Polyzoa. When seen living it was mistaken for a colony of this group until a microscopic examination had been made. The larva is described by Mr. Baini Prashad in a separate paper included in this volume.



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