ON A REMARKABLE BLIND SILUROID FISH OF THE FAMILY CLARIIDAE FROM KERALA (INDIA)

(Plate I)

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INTRODUCTION.

In August, 1949, Dr. S. L. Hora, Director, Zoological Survey of India, received a letter from Mr. K. Gopinath of the Marine Biological Laboratory, Trivandrum, informing him of the despatch of a registered packet containing two specimens of a blind fish, collected from a well at Kottayam by his colleague, Mr. N. Krishna Pillay, for favour of identification. Before the fish were actually received, Dr. Hora left for the U. S. A. to attend the U. N. Scientific Conference on the conservation and utilization of Resources. During his absence, a preliminary study of the fish was carried out and relevant literature on records of blind fishes was looked up. On his return from the U. S. A., Dr. Hora very kindly examined the fish and confirmed my view that the Indian blind fish approximates to another totally blind Clariid fish of Africa, *Uegitglanis zammaranoi* Gianferrai. Further, he remarked that he had not so far come across such a fish and that the occurrence in India of a totally blind fish allied to an African form would be of great zoogeographical interest and might yield results of great value when detailed studies on it are completed. Mr. Gopinath was also informed of the importance of this discovery, and requested to send a good series of specimens, if available. In reply, he wrote back to say that only four specimens were obtained from the well when it was drained during the last summer (July 1948), of which two kept behind had been accidently lost. He, however, promised that he would make every effort to procure a few more specimens.

With the two specimens in hand, I pursued my studies under the day-to-day advice and guidance of Dr. Hora. As there were only two specimens it was at first thought that they should not be dissected. Accordingly, in order to study the osteology, the fish were X-rayed in different positions, many times, but the results obtained were not satisfactory. Finally, it was decided that one of them should be carefully dissected under a high power binocular with a view to study the branchial chamber, the air-bladder, the nature of the pectoral fin and the disposition of the various organs inside the body cavity. These studies have revealed that the fish was referrable only to the family *Clariidae*, even though the fish differed from all the other genera of the family in certain striking features. In fact, the differences noted (*vide infra*, p. 61) are of such a nature that when more material becomes available a new family may have to be erected for the accommodation of this genus.

The specimens are preserved in the collection of the Zoological Survey of India, the holotype intact, while the other specimen with the dissected out parts is kept separately in a tube.

Pending further detailed studies of the fish it is proposed to describe it here under a new genus *Horaglanis*, after Dr. S. L. Hora, under whose inspiring guidance and kind help this work was conducted. Though Dr. Hora, I am also greatly indebted to Mr. Gopinath and to Mr. N. Krishna Pillay, the former for having brought the fish to the notice of Dr. Hora and the latter for collecting the same. The new species is christened as *Horaglanis krishnai*, gen. *et* sp. nov., in recognition of the find made by Mr. N. Krishna Pillay. My sincere thanks are also due to Babu R. Bagchi and Babu A. Mondal, who made the drawings with their usual skill and scientific accuracy under Dr. Hora's and my supervision.

Genus **Horaglanis** nov.

The body is elongated, with long dorsal and anal fins extending to the base of the caudal. The pectorals are vestigial, the eyes absent and the gill membranes united with the isthmus. The air-bladder is a bag-like structure which is laterally broader than long and is not even partially enclosed in a bony sheath. The dendritic apparatus is vestigial. (For further details, the description of the single species known may be referred to.)

Genotype.—**Horaglanis krishnai** sp. nov.

Relationships.—The relationships of *Horaglanis* can be found only among the blind Clariid fishes described from Africa.[1] In the elongated nature of the body and in the disposition of the unpaired fins, the new fish shows a close resemblance to the only other totally blind Clariid *Uegitglanis zammaranoi*[2] from the Italian Somaliland. The resemblance in vertical fins to *Uegitglanis* is most striking in that in all the other anguilliform genera of blind Clariid fishes from Africa, namely *Clariallabes*, *Gymnallabes*, *Channallabes* and *Dolichallabes*,[3] the dorsal and anal fins are confluent with the caudal whereas in *Uegitglanis* and *Horaglanis* they terminate at the base of the caudal. In *Tanganikallabes*[4] and *Clarias cavernicola*,[5] the two other blind Clariids of Africa, the dorsal and anal fins are not confluent with the caudal but the form of the body in them is stouter and in this respect approaches more to the genus *Clarias* than to *Allabenchelys*[6] which had given rise to the rest of the genera of blind Clariid fishes. *Tanganikallabes*, in certain respects, agrees with the *Allabenchelys*-stock, especially in the fact that in this, as in the case of all the other anguilliform blind Clariids, the sides of the head are unprotected by a bony sheath.

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[1]Boulenger, G. A., *Catalogue of Fresh Water Fishes of Africa* II, pp. 268-71 (1911).
Hubs, C. L., *Carnegie Inst. Wash.*, No. 491, p. 264 (1938).
[2]Gianferrai, D. L., *Atti Soc. Ital. Milano* LXII, pp. 1-3 (1923).
[3]Polls, M., *Rev. Zool. Bot. Afr.* XXXVI pp. 94-100 (1942).
[4]Polls, M., *ibid.* XXXVII, pp. 126-133 (1943).
[5]Trevawas, E., *Nov. Zool.* XL, pp. 70-71 (1936).
[6]David, V. L., *Rev. Zool. Bot. Afr.* XXVIII, pp. 108-117 (1935-36).

In the presence of a much reduced pectoral fin, devoid of spine, *Horaglanis*, however, differs very much from *Uegitglanis* which has a well developed pectoral, provided with a strong spine. In the vestigial pectoral fin, *Horaglanis* approaches more to *Channallabes* and *Dolichallabes*, but in the latter two genera the pelvics are completely absent. The reduced dendritic accessory respiratory organs, the greater number of branchiostegal rays, the anguilliform nature of the body and the absence of free orbital margin or total absence of eyes are characters shared by all the above genera of blind fishes.

When examined in greater detail, we find certain striking characters in which *Horaglanis* differs from all other genera of blind Clariids including *Uegitglanis*. These are :

(i) the greater length of the body cavity ; (ii) the lesser number, of rays in the dorsal and anal fins ; (iii) the air-bladder devoid of any bony sheath ; (iv) the broad, deeply-curved nature of the tooth-band on the upper jaw (probably due to the coalescence of the pre-maxillary and the vomerine teeth) and (v) the gill membranes being united with the isthmus.

The above noted differences are suggestive of the independent origin of *Horaglanis* on the Indian subcontinent, and same to be sufficiently diagnostic for the creation of a family for it.

According to David[1], anatomically *Uegitglanis* should be looked upon as an intermediate form between *Clarias* and *Bagrus*. But Gianferri[2] argues that the air-bladder in *Uegitglanis* is bilobed, transversely placed and partially enclosed in a bony capsule, and in this important character it is fundamentally a Clariid. In the form of the air-bladder, *Horaglanis* resembles *Uegitglanis* though the air-bladder in the former is not enclosed by a bony sheath. The disposition of the liver and kidneys in the new genus is more or less normal and not peculiar as in *Clarias*,[3] which probably implies reversal to an ancestral condition with the increase in the size of the body cavity. The detailed anatomy of the fish will, however, be dealt with in a separate paper. It seems almost certain that this Indian blind fish has no genetic affinities with similar fishes found in Africa and that their relationships are the results of convergence in evolution under similar environmental conditions.

The line of evolution and the relationships of *Horaglanis* to the other genera of the *Clariidae* may be represented as follows :—

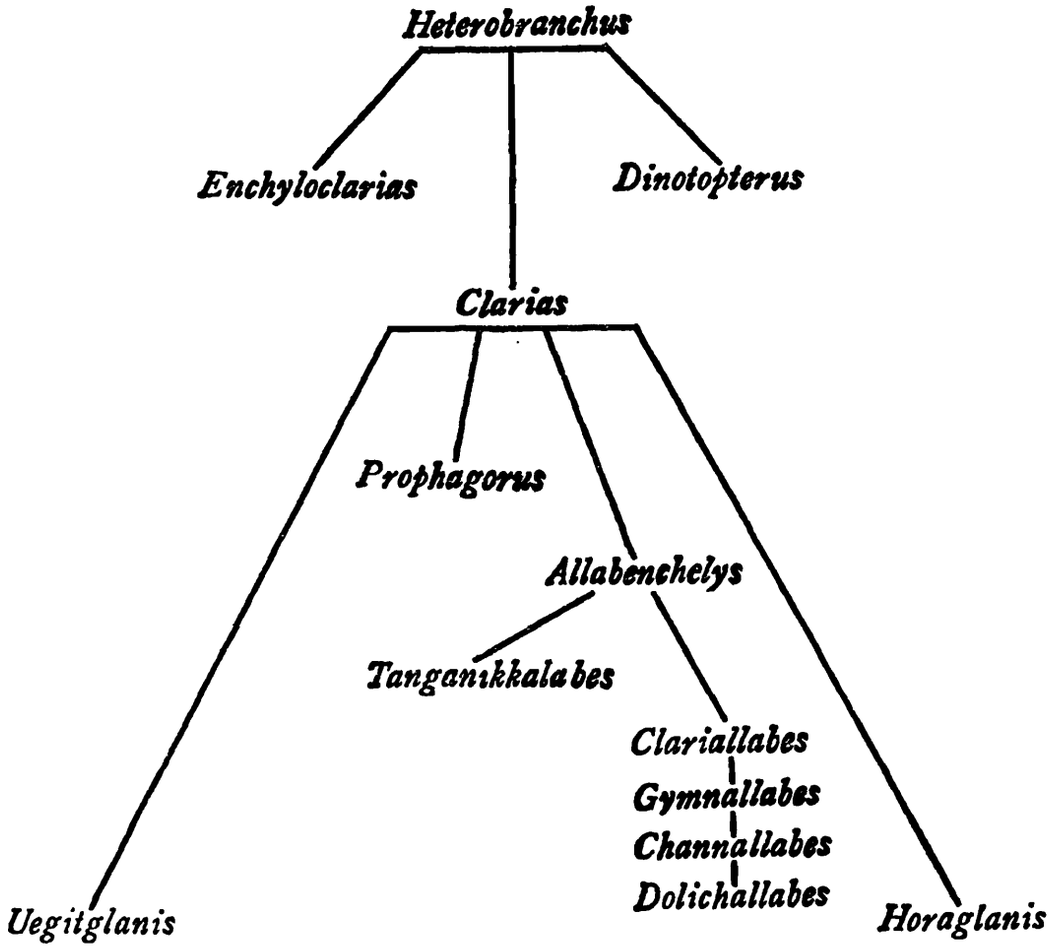
KEY TO THE GENERA OF THE FAMILY CLARIIDAE.

I. Eyes present.
  A. Eye well developed with free orbital margin (Pectorals and Pelvics normal).
  1. Dorsal fin undivided and consisting of articulated rays.
    (*a*) Sides of the head protected by bony shields.
      (i) Dorsal and anal fins not united with the caudal — *Clarias.*
      (ii) Dorsal and anal fins united with the caudal — *Prophagorus.*

[1] David, V. L., *Rev. Zool. Bot. Afr.* XXVIII, p. 67 (1935-36).
[2] Gianferrai, D. L., *Atti. Soc. Ital. Milano* LXXVI, pp. 195-97 (1937).
[3] Bridge, T. W. and Haddon, A. C., *Phil. Trans. Roy. Soc. London* (B), CLXXXIV, pp. 226, 238, 296 (1893); Dutta, S. K., *Journ. Proc. As. Soc. Bengal* XIX, pp. 111-120 (1924); Hora, S. L., *Proc. Nat. Inst. Sci. India* III, pp. 31-43 (1937).

(*b*) Sides of head not fully protected by bony shields, only post-orbital shields present .. .. .. *Allabenchelys.*

2. Dorsal fin divided into a rayed portion and an adipose portion.
   (*a*) Sides of the head protected by bony shields (Adipose fin large, supported by extensions of neural spine).
      (i) Dorsal and anal united with caudal. (Caudal portion of body much longer than head and trunk) . *Encheloclarias.*
      (ii) Dorsal and anal not united with caudal (Caudal portion of body much shorter than head and trunk) .. *Heterobranchus.*
   (*b*) Sides of head not protected by bony shield (Adipose fin small) .. .. *Dinotopterus.*



TEXT-FIG. 1.—Chart showing the phylogenetic relationships of the blind Clariids.

B. Eye poorly developed, without a free orbital margin. (Sides of head not protected by bony shields).
   1. Dorsal and anal not united with caudal. (Body not anguilliform) .. .. *Tanganikallabes.*
   2. Dorsal and anal united with caudal. (Body anguilliform).
      (*a*) Pelvics present.
         (i) Post-orbital shield present (Pectorals well developed, Pelvics small) .. .. *Clariallabes.*
         (ii) Post-orbital shield absent. (Pectorals and Pelvics small) .. .. *Gymnallabes.*
      (*b*) Pelvics totally absent.
         (i) Post-orbital shield present. (Pectoral vestigial or absent) .. .. *Channallabes.*
         (ii) Post-orbital shield absent. (Pectorals, small, without spine) .. .. *Dolichallabes.*

II. Eyes completely absent.
(Head devoid of bony shield).
   A. Gill membranes free from isthmus. (Pectorals and pelvics normal) .. .. .. *Uegitglanis.*
   B. Gill membranes united with isthmus. (Pectorals vestigial, pelvics well developed) .. .. *Horaglanis.*

Table showing the Relationships of the Indian Blind Fish Horaglanis *with other known Blind Clariid Fishes.*

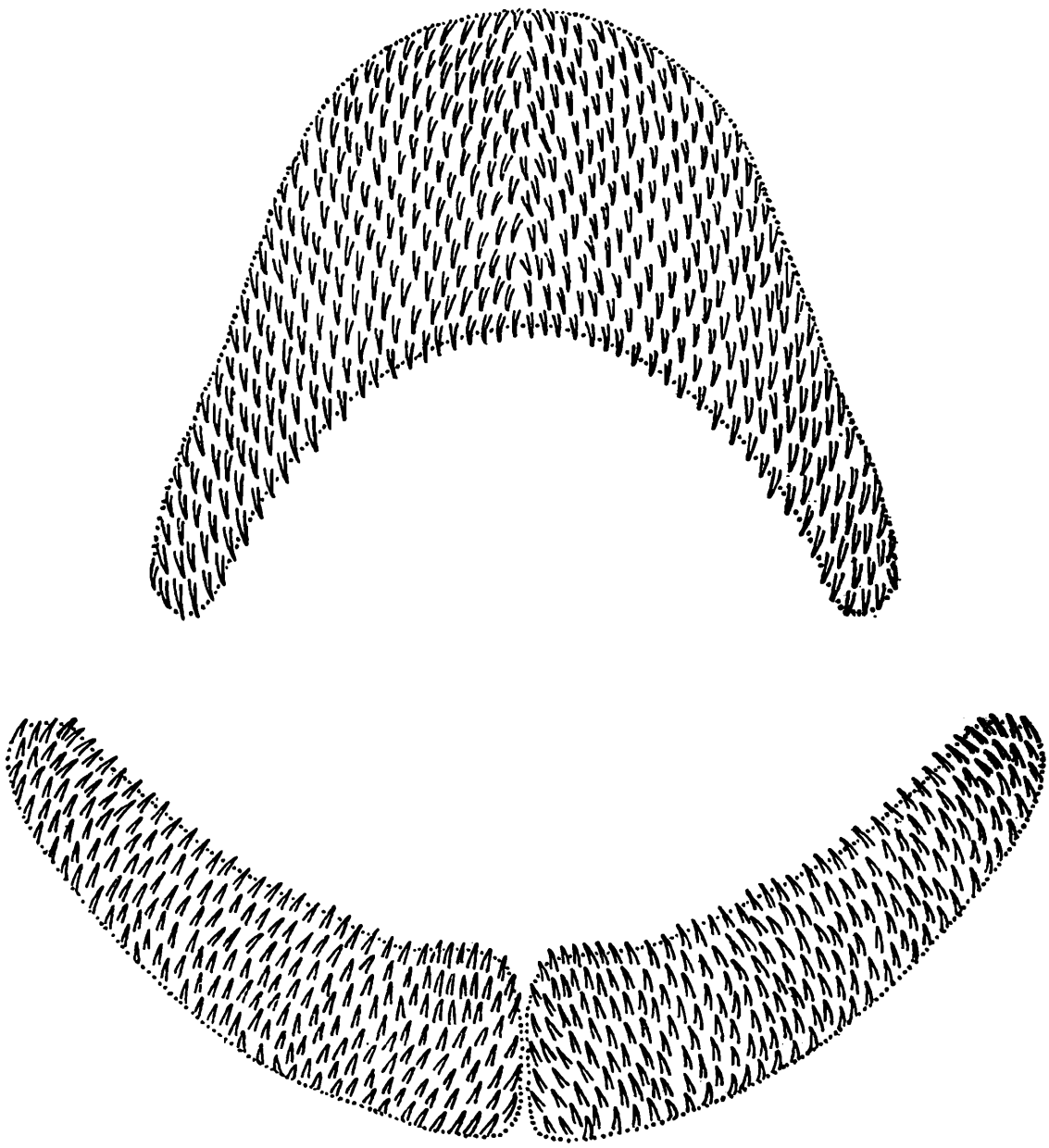
Characters.	*Clarias cavernicola.*	*Tanganikallabes.*	*Clariallabes.*	*Gymnallabes.*	*Channallabes.*	*Dolichallabes.*	*Uegitglanis.*	*Horaglanis.*
Nature of Eye	Small, no free orbital margin.	Small, no free orbital margin.	Small, no free orbital margin.	Small, no free orbital margin.	Small, no free orbital margin.	Small, no free orbital margin.	Eyes completely absent.	Eyes completely absent.
Height of body in the total length.	About 8—8½ times	About 7—7½ times.	About 10 times.	About 10 times.	About 20 times.	About 20 times.	About 9 times.	About 10 times.
Length of the body cavity calculated to specimens of 100 mm. in total length.	About 21·25 mm.	About 26·5 mm.	About 27·5 mm.	About 20·8 mm.	About 24 mm.	About 15 mm.	About 22·8 mm.	About 38·1 mm.
Pectorals	Small, with spine	Normal, with spine.	Normal, with spine.	Normal, with spine.	Vestigial absent.	Small, without spine.	Small with spine.	Vestigial.
Pelvics	Small	Normal	Small	Small	Absent	Absent	Normal	Normal.
Nature of the ending of the dorsal and anal.	Terminate at the base of caudal.	Terminate at the base of caudal.	Confluent with caudal.	Confluent with caudal.	Confluent with caudal.	Confluent with caudal.	Terminate at the base of caudal.	Terminate at the base of caudal.
Number of rays in the dorsal	72—76	70	75—115	98—100	140—162	156	55	23
Number of rays in the anal	60—73	50	67—92	82—88	125—138	136	42	17
Number of branchial rays		15	9—15	10	8—10	10	9	11
Accessory respiratory organ	?	?	Dendritic, reduced.	Dendritic, reduced.	Dendritic reduced.	Absent	Dendritic	Vestigial.
Air bladder	Enclosed in bony sheath	?	?	?	Enclosed in bony sheath.	?	Enclosed partially in bony sheath.	Free, not enclosed.
Teeth	Pre-max. teeth in a band, vomerine in a curved band with a median posterior process.	Normal	Normal	Normal	Normal	Normal	Normal	A single broad deeply curved,, tooth-band on the upper jaw.
Colouration	Uniformly blackish	Uniformly blackish.	Uniformly blackish.	Uniformly blackish brown.	No pigmentation.	Uniformly blackish.	No pigmentation.	No pigmentation.
Habitat	Cave	Lake	?	?	?	?	Well	Well
Locality	Otavi S.W. Africa	Tanganika	Lower Congo	Lower Niger and Old Calabar.	Congo and Angola.	Kunungu, B. Congo.	Italian Somaliland.	Kottayam (Travancore).

Horaglanis krishnai, gen. *et.* sp. nov.

(Plate I, figs. 1, 2, 3.)

D. 23, V.6, A.17, C.22.

The body is elongate, narrow and somewhat compressed. The dorsal profile is slightly arched and the ventral almost horizontal. The head is globular and the snout truncated by the subvertical mouth. The length of the head is contained 5·6 times, the depth of the body near the origin of the dorsal fin 7·7 times and the length of the caudal 6·25 times in the standard length. The height of the head is almost equal to its width which is slightly less than that of its length. The eyes

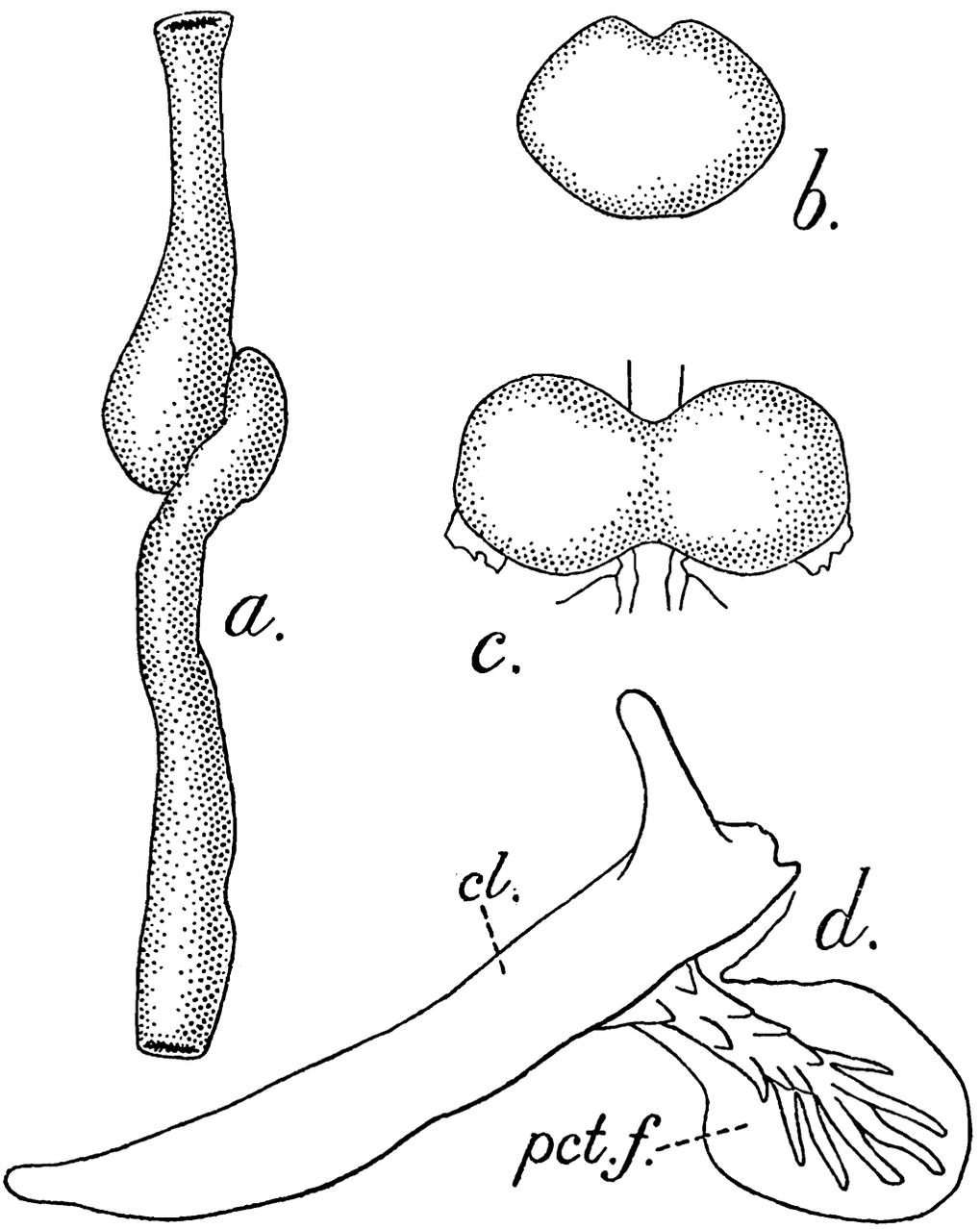


TEXT-FIG. 2.—Dentition of *Horaglanis krishnai*, gen. *et.* sp. nov.: X 30.

are completely absent. The nostrils are minute and are situated dorsally almost close to the tip of the snout. There are four pairs of long barbels; the nasal and the inner mandibular are shorter than the maxillary and the outer mandibular which extend a little beyond the pectorals.

The mouth is wide, extending across the entire width of the snout, slightly upturned and crescentic. There are villiform closely set teeth in the jaws, those of the upper jaw are in the form of a broad, deeply curved band, those of the lower jaw are grouped in two contiguous patches which are produced backwards at the sides.

The gill openings are of moderate size and extend slightly above the bases of the pectorals. The gill membranes are united with the isthmus. The branchiostegal rays are eleven in number. Well developed gills are present inside a wide branchial cavity. There are also two small bony structures, corresponding to the 2nd and 4th arch, representing the dendritic apparatus. The alimentary canal is narrow, long and undifferentiated. The air-bladder is a bag-like structure which is laterally broader than long; it is slightly notched at the anterior end and is not even partially enclosed in a bony sheath.



TEXT-FIG. 3.—Alimentary canal, air bladder and pectoral fin of *Horaglanis krishnai* gen. *et* sp. nov., and air bladder of *Uegitglanis zammaranoi* Gianferrai.
a. Alimentary canal : X 8 ; *b.* Air bladder : X 7 ; *c.* Air bladder of *Uegitglanis zammaranoi* (after Gianferrai), *d.* Pectoral fin : X 29 (showing Claviclel. and pectoral fin, *pct. f.*).

The dorsal fin originates considerably in advance of the pelvics and extends to the base of the caudal ; it contains 23 rays, of which the last but one ray is divided at its end, the rest being unbranched. The commencement of the dorsal is almost in the beginning of the third of the distance between the tip of the snout and the base of the caudal fin, its longest rays are slightly shorter than the greatest depth of the body which is at the commencement of the dorsal. The pelvics commence almost below the fifth ray of the dorsal fin and when pressed extend slightly beyond the commencement of the anal fin ; they contain 6 rays each, of which the 3rd, 4th and 5th are divided at their ends while the 1st, 2nd and the 6th are unbranched. The pectorals are vestigial ; they contain a central axial ray which bears 6 small rays at the distal end and 9 smaller rays on the sides. The anal fin is long, commences below the 10th ray of the dorsal fin and extends up to the base of the caudal ; it contains 17 rays of which 16th is divided at its end, the others being unbranched. The caudal fin is large and rounded ; it contains 24 rays of which the eight central ones are divided at their ends, the remaining sixteen, eight on either side, being unbranched rays.

The colour, in spirit, is uniformly yellowish white all over the body and devoid of any pigmentation.

Type specimen.—No. F. 313/2, Zoological Survey of India.

Locality.—Well at Kottayam, Kerala (United States of Cochin and Travancore), S. India.

Measurements in Millimetres.

	Holotype.	
Total length including caudal	38·850	42·0
Length of the caudal	5·550	5·60
Length of the head	6·0	6·50
Width of the head	5·80	6·0
Height of the head	5·380	5·75
Depth of the body	4·250	4·75
Height of the dorsal fin	3·75	3·75
Length of the ventral fin	4·0	4·25
Longest ray of the anal fin	3·0	3·25
Length of the dorsal fin	19·5	22·0
Length of the anal fin	12·5	13·50
Distance between the tip of the snout and the commencement of the dorsal	11·0	13·0
Distance between the tip of the snout and the commencement of the anal	18·0	19·50
Length of the nasal barbel	5·5	5·50
Length of the maxillary barbel	7·5	7·750
Length of the inner mandibular	5·5	6·0
Length of the outer mandibular	7·5	7·50