NOTES ON FISHES IN THE INDIAN MUSEUM.

XXXVIII. On the Systematic Position of *Bagrus lonah* Sykes, with Descriptions of and Remarks on other Glyptosternoid Fishes from the Deccan.

By Sunder Lal Hora, *D.Sc., F.R.S.E., F.N.I., Assistant Superintendent, Zoological Survey of India, Calcutta.*

(Plate VII.)

In his account of the *Fishes of the Dukhun*, Sykes (1841, p. 371) described a Glyptosternoid fish as *Bagrus lonah* and characterised it as follows :—

"A *Bagrus*, with 8 small *cirri*; flat, granulated head; first dorsal fin of 7 rays, and pectoral of 10 rays, the first ray of which is furnished on the posterior edge with long sharp teeth; anal fin of 10 rays."

As the above synopsis and even Sykes's detailed description of the species are, as judged by modern standards, too generalised, it is not possible to define the precise specific limits of the species. It may, however, be noted that in Sykes's species the head is stated to be "granulated" Fortunately, Sykes preserved some fishes and along with his account presented them to the Court of Directors of the East India Company in June 1831. For a time, the specimens remained in the Museum at the India House, but were later transferred to the British Museum. In his *Catalogue*, Günther (1864, p. 187) records two Glyptosternoid fishes "From the collection of Colonel Sykes," 6 inches and $3\frac{1}{2}$ inches long respectively. The former is described as *Glyptosternum lonah* (Sykes) and the latter as a new species *G. dekkanense*. As judged from their descriptions the two species differ from each other in the following characters.

G. lonah (Sykes).	*G. dekkanense* (Günther).
1. Head as long as broad.	Head rather longer than broad.
2. Free portion of tail twice as high as long.	Free portion of tail two-thirds as high as long.
3. Dorsal fin higher than body.	Dorsal fin as high as body.
4. Dorsal spine not quite half as long as head.	Dorsal spine half as long as head.
5. Pectoral spine moderately broad, with a fine outer and strong inner serrature.	Pectoral spine very broad and strongly serrated interiorly.

Dr. Trewavas, who very kindly compared the types of the two species for me, noted that "The condition of the outer edge of the spine is similar in both, but in *G. lonah* the skin has been removed, leaving the serrations visible" The differences in the proportions of the various parts, noted by Günther, seem to fall within the range of individual variation, especially as the two types are of very different sizes and are also in different states of preservation. In view of the above it appeared to me that the two species may be identical, and on this point also Dr. Trewavas agreed and wrote "my conclusion is that *G. dekkanense* may be

identical with *G. lonah*"[1]. A thorough examination of the Glyptosternoid specimens from Peninsular India in the collection of the Zoological Survey of India has also shown that the two forms must be regarded as conspecific.

In 1871, Day (p. 714) extended the range of *G. dekkanense* to the Jumna river " near where it emerges from the Siwalik hills ", but later in his *Fishes of India* he combined the two species from Deccan under *G. lonah*, and noted " I have taken this species at Poona, and also in the head waters of the Jumna " In the collection of the Indian Museum there was no named specimen of either of the species from Deccan when I (1923, pp. 8-30) revised the Indian members of the genus *Glyptothorax*. Day's specimen of *G. lonah* from the Jumna was referred to *G. conirostre* (Steind.) and a specimen from the Satara District identified by Annandale (1919, p. 126) as *Euglyptosternum saisii* was described as *G. dekkanense*. Quite recently, however, the Zoological Survey of India received several examples of *Glyptothorax* from Poona and adjacent hill ranges and doubts arose as to the precise specific limits of *G. lonah* (Sykes) and *G. dekkanense* (Günther). A specimen of a species of *Glyptothorax* with smooth skin from Motha Mola river, Poona, was sent to Mr. J. R. Norman for comparison with the types of *G. lonah* and *G. dekkanense*. Dr. E. Trewavas very kindly attended to this enquiry and replied as follows :—

" Your problem is made more difficult of solution by reason of the poor state of preservation of the type of *Glyptosternum lonah*. But the type of *G. dekkanense* is well preserved, and my conclusion is that *G. dekkanense* may be identical with *G. lonah*, and that in *any* case your Motha Mola R. specimen belongs to neither species for the following reasons :—

(*a*) The skin of the body in *G. dekkanense* is tuberculated, that of the head is finely granular. It is difficult to judge the nature of the skin in the emaciated type of *G. lonah*, but there appear to be signs of tuberculation. The skin of Motha Mola fish is smooth.

(*b*) The adhesive apparatus in *G. lonah* and *G. dekkanense* is longer than broad. In the Motha Mola fish it appears to be broader than long.

(*c*) The caudal, twice as long as deep in the Motha Mola fish is $1\frac{5}{12}$ times as long as deep in the type of *G. dekkanense*. That the ratio is also 2 in *G. lonah* may be partly due to emaciation ;—the ends of both dorsal and haemal spines project.

(*d*) The shape of the supracleithrum, as seen or felt through the skin, is of one sort in *G. lonah* and *G. dekkanense* and of another in the Motha Mola fish, in Day's Jumna R. fish and in three (coll. Day) from Poonah.

The inner limb of the forked supracleithrum is much longer than the outer and as long as the supraoccipital spine in the Motha Mola fish, whereas in *G. dekkanense* it is not much longer than the outer limb and is considerably shorter than the supraoccipital spine. I send herewith sketches drawn to scale to illustrate this.

Three specimens, 39 to 52 mm. in standard length collected by Day at Poonah, seem to agree very well with the Motha Mola fish. They are labelled *G. lonah*. Another labelled *G. dekkanense*, from the Jumna R. (coll. Day) looks to me to be also very much like your fish. It is very much emaciated. The pectoral spine is relatively longer and more coarsely serrated."

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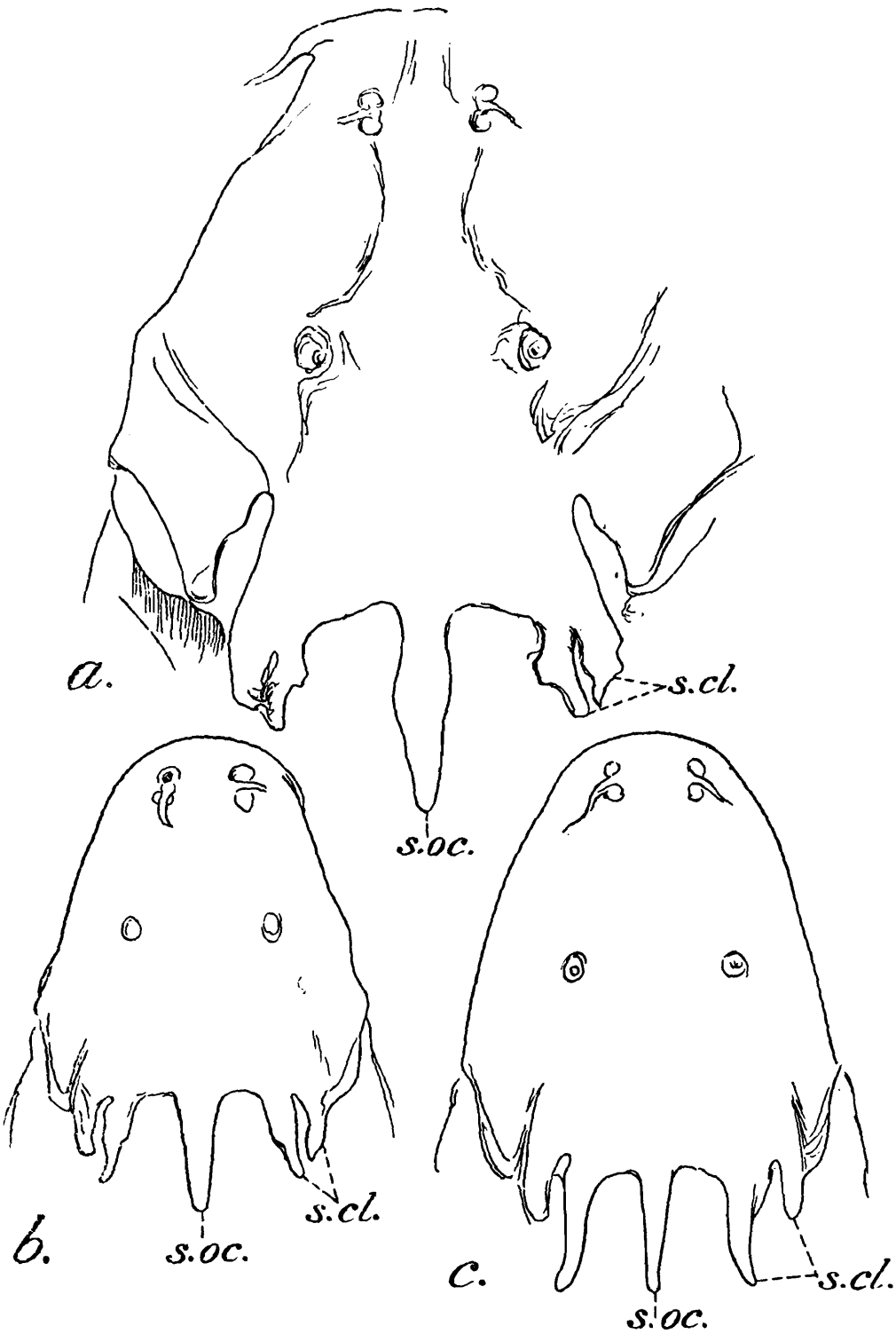
[1] On a request being made to give reasons for her conclusions Dr. Trewavas very kindly supplied the following information :—" The type of *G. lonah* resembles that of *G. dekkanense* in all characters (tuberculation of skin, shape of adhesive apparatus, shape of head and shape and proportions of supracleithrum) except size of fish (*G. lonah* 128 mm., *G. dekkanense* 68 mm. standard length) and proportions of caudal peduncle. The apparent slenderness of *G. lonah* is partly due to extreme emaciation but also the relative length of the caudal peduncle is greater in *G. lonah* than in *G. dekkanense* ($5\frac{1}{3}$ times in standard length in *G. lonah*, $5\frac{2}{3}$ times in *G. dekkanense*, measured from base of anal to end of last vertebra. Whether or not this can be accounted for by the difference in size I cannot say, and I believe that only the examination of large numbers of specimens from the Deccan can really decide whether these represent two species or one."

From Dr. Trewavas's remarks it appears that the smooth-skinned specimens of the Motha Mola river are similar to those which Day (1871,



TEXT-FIG. 1.—View of the dorsal surface of head in three specimens of *Glyptothorax* from Deccan, showing the shape of the surpacleithrum. Only the bases of the nasal barbels are shown. (From sketches supplied by Dr. E. Trewavas.)

a. Type of *G. lonah* (Sykes). ×2⅔ ; *b.* Type of *G. dekkanense* (Günther). ×2⅔ ; *c.* Motha Mola river specimen of *G. conirostre* var. *poonaensis*, nov. ×2⅔ *s. cl.* Supracleithrum ; s.oc. Supraoccipital process.

G. 714 ; 1877, p. 496) had collected in the Jumna river and referred to p. *lonah* and *G. dekkanense.* In my earlier work (1923, p. 30) I indicated

that one of Day's specimens of *G. lonah* from the headwaters of the Jumna river, now preserved in the collection of the Indian Museum, was referrable to *G. conirostre* (Steind.), but as there is a close similarity between the Jumna river form and the smooth-skinned form from Poona, the range of *G. conirostre* must be extended to Deccan. A more detailed comparison of the specimens from the two localities shows that the head is proportionately broader and the dorsal fin shorter in the Deccan examples.

Owing to the inadequacy of the material of *Glyptothorax* from the headwaters of the Jumna in the collection of the Indian Museum, a specimen of the Deccan form of *G. conirostre* was sent to Dr. Trewavas for comparison with Day's material from Poona and the Jumna river. Her report is as follows :—

"Specimen F $\frac{12126}{1}$ labelled 'Deccan form of *Glyptothorax conirostre* (Steind.)' agrees well with Day's '*G. lonah*' from Poonah. Compared with Day's '*Glyptosternum dekkanense*' from Jumna R. (which I think you are right in referring to *G. conirostre*) it has, as you point out, a somewhat broader head and lower dorsal fin. These two fishes are of approximately the same size. If now Day's '*Glyptosternum lonah*' from Poonah are compared with specimens of *G. conirostre* of their size from Simla the same difference in width of head is observed. The difference in height of dorsal seems less constant. Therefore, it seems certain that the Motha Mola fish and Day's '*G. lonah*' from Poonah are conspecific, and are distinct from *G. conirostre*; whether specifically or subspecifically only more material can show."

The Poona specimens of *G. conirostre* would thus seem to represent a geographical race of the Jumna form, and to indicate the differences between the two types I propose to describe the Poona race as a distinct variety (*vide infra*, p. 368).

The extension of the range of *G. conirostre* from the headwaters of the Jumna river to the Western Ghats is of considerable interest. In one of my (1938, p. 169) recent contributions the probable route along which the species from the Eastern Himalayas seem to have migrated to the Western Ghats and thence to the hills of Peninsular India was indicated. *G. lonah* (=*G. dekkanense*), which has recently been obtained from the Bastar State[1], Central Provinces, (Hora 1938 *b*, p. 241) would thus appear to have migrated along the Satpuras to the Western Ghats.

The Western Ghats had also a connection with the Western Himalayas in the direction from Gujrat to Delhi through the intermediation of the Aravalli Mountains (Heron 1938, p. 119). The distribution of *G. conirostre* to the Deccan may thus have been effected along the Aravalli range.

It is probably due to these two routes of migrations of the hill-stream fauna from the north to the south that in the South Indian fish-fauna both the Eastern and the Western Himalayan forms are represented.

The specimen of Annandale's (1919, p. 126) *Euglyptosternum saisii* from the Satara District, as indicated above, was referred by me (1923,

[1] A specimen, about 3·5 inches in length, from the Bastar State was sent to Dr. Trewavas, under the title *Glyptothorax dekkanense*, for comparing it with the type of Günther's species. She found the two specimens identical in every respect.

p. 24) to *Glyptothorax dekkanense*, and later another specimen from the Tunga river at Shimoga (No. F 12435/1), owing to its strong resemblance to the Satara specimen, was assigned to the same species (Hora 1937, p. 14). The latter example, under the title *G. lonah*, was sent to Dr. Trewavas for comparison with the types of *G. lonah* and *G. dekkanense* and she has kindly favoured me with the following report :—

" Comparison of the type of *G. lonah* and your specimen so labelled is less satisfactory as both are in a poor state. What strikes me is that although your fish (F $\frac{12435}{1}$) is shorter than the type it has a longer head, and also stronger inner serrae on the pectoral spine. The depth of its caudal peduncle is only $\frac{2}{3}$ of that of the type, which is less than one would expect even if the type were not emaciated. The maxillary barbel in your fish barely reaches the base of the pectoral, in the type it extends beyond it. I am satisfied that F $\frac{12435}{1}$ is distinct from *G. lonah* but not that it is identical with *G. dekkanense*."

These specimens are quite different from the other species found in India, and in view of the above opinion it seems necessary to separate them as a new species.

Misra and I (1938, p. 36) referred a specimen of *Glyptothorax* from the headwaters of the Godavari river to *G. annandalei* Hora, but I am of opinion that it should be referred to *G. lonah*. As Günther had included both *G. lonah* and *G. dekkanense* under the division characterised by " Ventral and pectoral rays not plaited below ", the close association of *G. annandalei*, in which the outer pectoral and ventral rays are plaited on the ventral surface, with *G. lonah* never occurred to me. I now find that the plaited condition of the rays of the paired fins may be an ecological character depending upon the rapidity of the water in which the fish may be living. Similar ecological races were indicated by me in the case of *Garra mullya* (Hora 1921, p. 659) and by Day (1871, p. 714) in the case of *Glyptothorax*. I think, however, that one should recognise local races based on geographical or ecological considerations. In view of the above, I am of the opinion that *G. annandalei* Hora, with a much longer and narrower caudal peduncle, probably represents a torrential race of *G. lonah* (Sykes), but in the present state of our knowledge it may be retained, for the time being at least, as a separate species. In *G. annandalei* the outer border of the pectoral spine is finely serrated and the caudal peduncle is at least twice as long as high. In all the fresh specimens of *G. lonah* that I have examined the outer rays of the paired fins are faintly or distinctly plaited below.

Besides the species referred to above, *G. madraspatanus* (Day) is the only other species of *Glyptothorax* found in South India. It agrees with *G. lonah*, the new species from Satara, and *G. annandalei* in possessing a tuberculated body, but differs in having relatively longer fins and stronger spines. In *G. madraspatanus* the pectorals are as long as or slightly longer than the head and the dorsal spine is serrated along both the borders near the apex ; the serrae are, however, more pronounced along the posterior border.

From the above it is clear that at present five species of *Glyptothorax* can be recognised from Peninsular India, *viz.*, *G. lonah* (Sykes), *G. madraspatanus* (Day), *G. annandalei* Hora, *G. conirostre* (Steind.) var.

poonaensis nov. and *G. trewavasae*, sp. nov. They may be distinguished by the following key :—

1. Skin smooth	*G. conirostre* var. *poonaensis*, nov.
2. Skin tuberculated	
I. Pectoral spine almost as long as head, or somewhat longer; dorsal spine strong and serrated near the apex	*G. madraspatanus* (Day).
II. Pectoral spine not as long as head, generally considerably shorter; dorsal spine moderately developed and smooth throughout	
A. Maxillary barbels extending considerably beyond commencement of pectoral	
i. Caudal peduncle about 1½ times as long as deep	*G. lonah* (Sykes).
ii. Caudal peduncle at least 2 times as long as deep	*G. annandalei* Hora.
B. Maxillary barbels barely reaching base of pectoral	*G. trewavasae*, sp. nov.

An analysis of the geographical distribution of the above mentioned 5 species is of some interest. *G. conirostre* var. *poonaensis* has so far been recorded only from the waterways near Poona, but as its closely allied form is found in the Jumna river, it is likely to be met with in the intermediate regions. *G. lonah* is known from the Godavari watershed (Nasik and Bailadila range) and the Kistna watershed (Poona). *G. trewavasae* is found only in the Kistna watershed, while the remaining two species, *G. madraspatanus* and *G. annandalei*, occur in the Cauvery watershed. So far, *G. lonah* is the only species that is known to occur in the two adjacent watersheds and over a much wider area.

Glyptothorax conirostre var. **poonaensis**, nov.

(Plate VII, figs. 5 and 6.)

1877. *Glyptosternum lonah*, Day (in part, *nec* Sykes), *Fish. Ind.*, p. 496, pl cxiii, fig. 5.

D. 1/6|0 ; A. 10 ; P. 10 ; V 6 ; C. 17.

The head and the anterior part of the body are moderately depressed, and the tail region is compressed from side to side. The skin, both on the head and the body, is smooth. The snout tapers broadly towards the anterior end. The head is distinctly longer than broad ; its length is contained from 4·2 to 4·3 times in the standard length. The eyes are small, dorso-lateral in position, and situated in the posterior half of the head. The occipital process is long and narrow ; it is almost twice as long as broad at its base ; it is separated from the basal bone of the dorsal fin by a short distance. The nasal openings are situated slightly behind the tip of the snout and are separated by small barbels, which do not extend as far as the eyes. The mouth is ventral, transverse and crescentic ; its gape is almost equal to half the width of the head. The lips are thin, slightly papillated and continuous at the angles of the

mouth. The labial groove is widely interrupted. The posterior jaw is almost truncate in the middle. A portion of the upper jaw and dentition are bare. The teeth are small and villiform. The gill-openings are wide, and the gill-membranes meet the isthmus in the mid-ventral line. The thoracic adhesive apparatus is considerably longer than broad, but the ridges are only developed in the peripheral region. The maxillary barbels possess broad bases, and extend considerably beyond the commencement of the pectoral fins. The two pairs of mandibular barbels are considerably shorter.

The height of the body varies considerably : it is contained from 5·8 to 7·0 times in the standard length. In the case of mature females (Pl. VII, fig. 5) the body is considerably distended with gonads. The caudal peduncle is short, but narrow ; its least height is contained about 2 times in its length. The rayed dorsal fin commences above the pectorals ; its commencement is almost equidistant between the tip of the snout and the adipose dorsal. The dorsal fin is slightly higher than the depth of the body, but in fully mature females the body is somewhat deeper ; its spine is strong, smooth, and almost half as long as the length of the head. The pectoral fin is shorter than the head ; its spine is strong and pectinated internally ; it is somewhat roughened along the outer edge. The pectoral fin is separated from the ventral fin by a considerable distance. The ventrals are considerably shorter than the pectorals and extend as far as or slightly beyond the anal opening, but are separated from the anal fin by a considerable distance. In the specimens examined by me the paired fins are devoid of the usual adhesive pads on the ventral surface of their outer rays. The anal fin is short and situated below the adipose dorsal. The caudal fin is deeply forked and both the lobes are of equal length.

In the material before me the general colour is light dusky above and dirty white below. The whole of the dorsal surface of the head and body is studded with minute, black dots. In some specimens there are three, saddle-shaped bands across the dorsal surface ; the first across the occipital process and the basal bone of the dorsal fin, the second at the base of the dorsal fin and the third across the base of the adipose dorsal. There is generally a band at the base of the caudal fin. The distal part of the caudal fin is infuscated with black, as also the distal portion of the anal fin.

Locality.—Poona and its environs.

Type-specimen.—Holotype No. F 12126/1 Zoological Survey of India (*Ind. Mus.*), Calcutta.

Remarks.—I have examined 5 specimens of the new variety, 4 from Motha Mola river near Poona collected by Mr. C. V Kulkarni, Department of Fisheries, Bombay and 1 from the Motha Molla R. near Kharadigaon, Poona, collected by Mr. A. G. L. Fraser. According to Mr. Fraser this species is locally known as *Phather Chatoo*, in which reference is made to the stone-licking habits of these fishes.

Reference has been made above (*vide supra*, p. 366) to the great resemblance of this fish to *G. conirostre* from the Jumna river, and the characters by which it may be distinguished from the typical form.

To facilitate reference, measurements of the two specimens from the Jumna river are also included in the table given below.

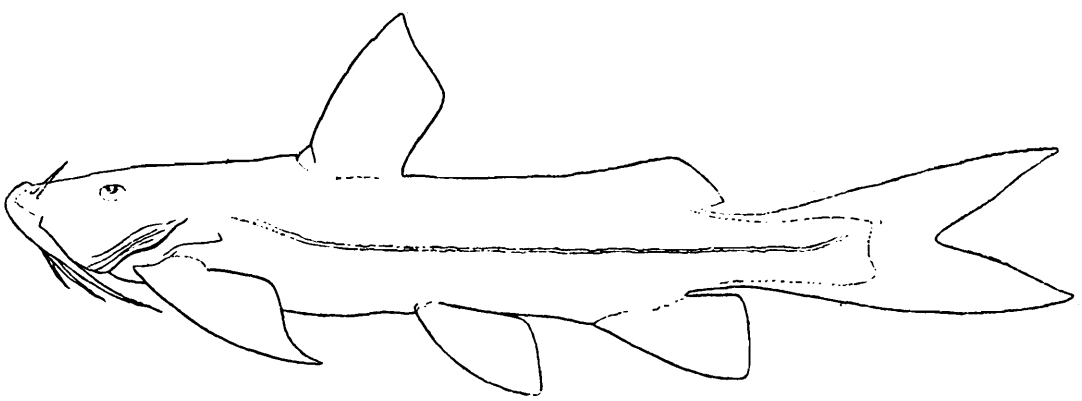
Measurements in millimetres.

	G. conirostre var. *poonaensis.*			*G. conirostre.*	
Total length excluding caudal	81·0	79·5	79·0	107·0	74·5
Length of caudal	17·3	21·5	18·2	28·0	
Length of head	19·0	18·6	19·0	24·8	16·5
Width of head	15·0	16·6	16·7	18·0	12·3
Height of head	9·8	11·2	10·0	13·0	9·0
Length of snout	10·2	8·3	9·0	12·0	8·9
Interorbital width	5·0	5·4	5·0	5·0	4·5
Depth of body ..	12·0	14·0	11·2	17·0	10·6
Height of dorsal fin	13·5	14·2	12·6	21·0	15·0
Length of pectoral fin	18·5	17·3	16·0	26·0	18·0
Length of ventral fin	13·0	13·6	11·2	18·0	14·0
Longest ray of anal fin	10·4	13·0	10·5	20·0	14·2
Length of dorsal spine ..	10·0	10·0	10·0	14·5	11·0
Length of caudal peduncle	14·0	13·2	13·8	21·8	16·5
Least height of caudal peduncle ..	6·8	6·7	6·2	9·8	6·8

Glyptothorax madraspatanus (Day).

1867. *Glyptosternum lonah*, Day (*nec* Sykes), *Proc. Zool. Soc. London*, p. 285.
1873. *Glyptosternum madraspatanum*, Day, *Journ. Linn. Soc. London* XI, p. 526.
1877. *Glyptosternum madraspatanum*, Day, *Fish. India*, p. 498, pl. cxvi, fig. 4.
1889. *Glyptosternum madraspatanum*, Day, *Faun. Brit. Ind., Fish.* I, p. 200.
1923. *Glyptothorax madraspatanus*, Hora, *Rec. Ind. Mus.* XXV, p. 29.
1937. *Glyptothorax madraspatanus*, Hora, *Rec. Ind. Mus.* XXXIX, p. 19.

Since 1923, when I made some remarks on *Glyptothorax madraspatanus*, the species has also been reported from the Cauvery river in the



TEXT-FIG. 2.—Lateral view of a specimen of *Glyptothorax madraspatanus* (Day) from the Cauvery river, Coorg State. × ⅔.

Coorg State. The skin is coarsely tuberculated in all the 8 specimens now represented in the collection of the Zoological Survey of India and the pectoral and the dorsal fins are proportionately much longer in this species. The dorsal and the pectoral spines are also longer and stronger. Further, the dorsal spine is serrated near the apex along both the borders.

Glyptothorax lonah (Sykes).

(Plate VII, figs. 1 and 2.)

D. 1/610 ; A. 11 ; P. 9 ; V 6 ; C. 16.

1841. *Bagrus lonah*, Sykes, *Trans. Zool. Soc. London* II, p. 371.
1864. *Glyptosternum lonah*, Günther, *Cat. Fish. Brit. Mus.* V, p. 187.
1864. *Glyptosternum dekkanense*, Günther, *Cat. Fish. Brit. Mus.* V, p. 187.
1937. *Glyptothorax lonah*, Hora & Misra, *Journ. Bombay Nat. Hist. Soc.* XXXIX, p. 513.
1938. *Glyptothorax annandalei*, Hora & Misra (*nec* Hora), *Journ. Bombay Nat. Hist. Soc.* XL, p. 36, pl. iii, figs. 3, 3a.
1938. *Glyptothorax dekkanensis*, Hora, *Rec. Ind. Mus.* XL, p. 241.

Glyptothorax lonah is a stoutly-built species, in which both the dorsal and the ventral profiles are slightly arched. The head and the anterior part of the body are somewhat depressed and the ventral surface is flattened ; the body is compressed in the tail region. The skin, particularly on the head, is distinctly granulated. The head is somewhat longer than broad ; its length is contained from 4·1 to 4·4 times in the standard length. The eyes are small, dorso-lateral, and situated in the posterior half of the head. The snout is broad and rounded ; it is equal to half the length of the head. The inter-orbital width is equal to one-third the length of the head. The occipital spine is long and narrow ; it almost extends to the basal bone of the dorsal fin. The nasal openings are well-marked and situated slightly behind the tip of the snout ; they are separated by the nasal barbels which do not extend to the eyes. The mouth is ventral, transverse and crescentic ; its gape is almost equal to half the width of the head. The anterior lip is thickly beset with papillae, which are indistinctly marked on the posterior lip. The two lips are continuous at the angles of the mouth. The labial groove is narrow and widely interrupted in the middle. A portion of the anterior jaw and dentition is not covered by the posterior jaw. The teeth are small and villiform. The gill-openings are wide and the gill-membranes are united to the isthmus which is half as wide as the gape of the mouth. The adhesive apparatus on the chest and the ventral surface of the outer rays of the paired fins is fully developed ; the thoracic apparatus is longer than broad and is almost filled with ridges to the mid-ventral line. The maxillary barbels possess broad bases, and extend considerably beyond the commencement of the pectoral fins. The two pairs of mandibular barbels are considerably shorter.

The height of the body is contained from 5·1 to 5·8 times in the standard length. The least height of the caudal peduncle is contained from 1·5 to 1·7 times in its length.

The dorsal fin commences above the pectorals and considerably in advance of the ventrals ; it is almost equidistant between the tip of the snout and the origin of the second anal ray. It is as high as the length of the head behind the nostrils, and is either equal to or slightly shorter or longer than half the length of the head and is usually clothed in thick skin. The pectoral fin is almost as long as the head ; its spine is strongly pectinated internally and finely serrated along the outer border. Usually the spine is covered by thick skin and the outer serrations cannot be made out without dissection. The pectoral fin is separated

from the ventral by a distance equal to the distance between the eye and the nostrils. The ventrals are considerably shorter than the pectorals, but extend beyond the anal opening and miss the anal fin by a very short distance. The anal fin is short and a part of it is situated below the adipose dorsal. The caudal fin is deeply forked ; the upper lobe being somewhat more developed than the lower.

The general colour of the spirit specimens is greyish above and dirty-white below. There is a white streak along the lateral line, and the bases of the fins are generally of a dark colour. The ventrals, anal and caudal fins are provided with black patches in their distal portions. In the smaller individuals, the general colouration is somewhat lighter, but the dark markings are better pronounced.

Localities.—The precise locality of Sykes's specimens is not known, but in the British Museum Catalogue they are noted to have been collected in " Dekkan" The above description is based on the 4 specimens collected by Mr. H. Crookshank from the Galli Nalah near Loa, Bailadila range, Bastar State, Central Provinces. One of these specimens was compared by Dr. Trewavas with the type of *G. dekkanense* and found to be identical with it. Besides these example, 6 more, somewhat smaller, specimens were collected by Mr. Crookshank from another part of the Bailadila range. There are three more specimens of *G. lonah*, collected by Mr. A. G. J. Fraser, one from the Godavari river near Nasik and two from the section below Fitzgerald Bridge, Poona ; these specimens are of small size.

Remarks.—The precise systematic position of the species has been fully discussed above (*vide* p. 367). It can be readily distinguished by its broad caudal peduncle.

Measurements in millimetres.

Total length excluding caudal	83·0	78·0	71·0	70·0
Length of caudal	21·0	21·0	Damaged	20·6
Length of head	19·0	18·5	17·1	17·1
Width of head	16·7	16·0	14·0	14·0
Height of head ..	12·0	11·5	10·5	9·5
Length of snout ..	10·0	8·2	8·6	8·7
Interorbital width ..	6·2	5·8	6·3	5·6
Depth of body ..	15·0	13·9	12·3	13·8
Height of dorsal fin	15·0	16·1	12·5	12·5
Length of pectoral fin	20·0	18·0	17·0	16·1
Length of ventral fin	15·5	14·5	13·5	13·9
Longest ray of anal fin	14·0	14·5	13·0	14·2
Length of dorsal spine ..	11·2	10·8	9·5	8·2
Length of caudal peduncle ..	15·0	14·6	12·2	11·4
Least height of caudal peduncle	10·0	8·7	7·5	7·3

Glyptothorax annandalei Hora.

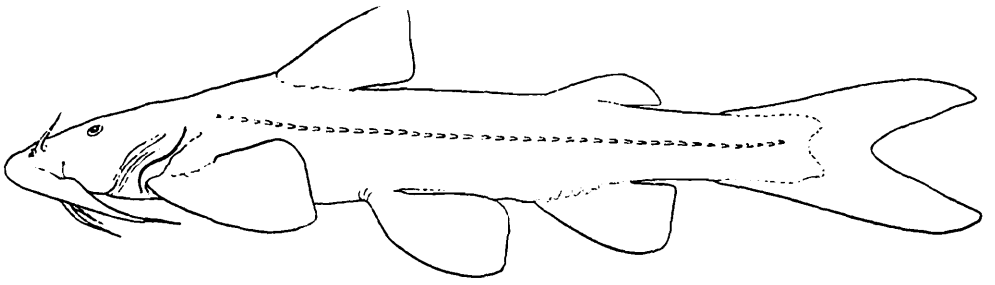
1923. *Glyptothorax annandalei*, Hora, *Rec. Ind. Mus.* XXV, p. 14, pl. i, fig. 3.

In 1923, I included a reference by Day[1] to *Glyptosternum lonah* from the Bhavani river in the synonymy of *Glyptothorax annandalei*,

[1] Day, F., *Proc. Zool. Soc. London*, p. 285 (1867).

but now it seems that the record may refer to *G. madraspatanus* which was described later by Day[1] from the same locality.

G. annandalei is closely allied to *G. lonah*. Its pectoral and the dorsal spines are enveloped in skin, but on dissection the outer border



TEXT-FIG. 3.—Lateral view of a specimen of *Glyptothorax annandalei* Hora. Nat. size.

of the pectoral spine was found to be finely serrated. The head and body distinctly tuberculated, and the skin in the region of the lateral line is raised as a ridge.

In the depressed form of its body, the development of the adhesive pads on the chest and the ventral surface of the outer rays of the paired fins, and the form of the caudal peduncle *G. annandalei* appears to be the most highly specialised torrential species of *Glyptothorax* in Peninsular India.

Glyptothorax trewavasae, sp. nov.

(Plate VII, figs. 3 and 4.)

1919. *Euglytosternum saisii*, Annandale (*nec* Jenkins), *Rec. Ind. Mus.* XVI, p. 126.
1923. *Glyptothorax dekkanensis*, Hora (*nec* Günther), *Rec. Ind. Mus.* XXV, p. 24, fig. 3.
1937. *Glyptothorax dekkanensis*, Hora (*nec* Günther), *Rec. Ind. Mus.* XXXIX, p. 14.

In *Glyptothorax trewavasae* the dorsal profile is almost straight and horizontal and the ventral profile is slightly arched. The head and the anterior part of the body are depressed, and the ventral surface is somewhat flattened. The tail region is only compressed. The skin is finely granulated. The head broadly tapers anteriorly, and the snout is rounded. The head is considerably longer than broad ; its length is contained from 3·8 to 4·0 times in the standard length. The eyes are small, dorso-lateral, and situated in the posterior half of the head. The interorbital space is somewhat greater than half the length of the snout. The occipital process is rectangular ; it is almost 3 times as long as broad at its base and does not extend to the basal bone of the dorsal fin. The nostrils are well-marked and are situated slightly behind the tip of the snout. The nasal barbels are small and do not reach the anterior margins of the eyes. The mouth is ventral, transverse and horizontal ; its gape is equal to half the width of the head. The lips are thin and slightly tuberculated. They are continuous at the angles of the mouth. The

[1] Day, F., *Journ. Linn. Soc. London* XI, p. 526 (1873).

labial groove is quite extensive and is only interrupted for a short distance in the middle. A portion of the anterior jaw and dentition are not covered by the posterior lip. The teeth are small and villiform. There are sharp, horny tubercles on the palate but no teeth. The gill-openings are wide and the isthmus is very narrow. The adhesive apparatus on the chest is almost as wide as long, and extends forwards to a point in between the union of the gill-membranes to the isthmus. The ventral surface of the head is ridged, grooved and papillated, and probably helps in adhesion. The outer rays of the paired fins in the preserved material before me are not provided with adhesive pads. The maxillary barbels barely extend to the roots of the pectoral fins, while the two pairs of the mandibular barbels are considerably shorter.

The height of the body is contained from 6 to 7 times in the standard length. The least height of the caudal peduncle is contained from 1·7 to 2·6 times in its length ; the caudal peduncle becomes narrower with growth.

The dorsal fin commences above the termination of the pectorals ; its commencement is almost equidistant between the tip of the snout and the base of the adipose fin. The dorsal fin is longer than the depth of the body below it ; its spine forms a strong, smooth prickle, which is almost equal to the length of the snout. Except in a young specimen, the pectoral fin is shorter than the head ; it possesses a broad, strong spine which is strongly pectinated internally and is distinctly serrated along the outer border. The pectorals are separated from the ventrals by a distance almost equal to half of their lengths. The ventrals extend beyond the anal opening but are separated from the anal fin by a considerable distance. The anal fin is short and commences slightly in advance of the adipose dorsal. The caudal fin is deeply forked.

The colouration is uniformly light grey with the bases of the pectoral, dorsal, adipose and caudal fins dark. Portions of certain rays in the dorsal, anal and ventral fins are infuscated with black. The distal portion of the caudal fin is dark, it is tipped with a lighter colour.

Localities.—Yenna and Koyna valleys in the Satara District, Bombay Presidency ; and the Tunga river at Shimoga in the Mysore State. The waters from these regions drain into the Kistna river.

Type-specimen.—Holotype No. F 9723/1, Zoological Survey of India (*Ind. Mus.*), Calcutta.

Remarks.—The above description is based mainly on the type-specimen from the Yenna Valley collected by the late Dr. N. Annandale. In a smaller specimen from the Koyna Valley the proportions of the various parts are different, as is also their structure, but in all essential features it seems to represent the species described above. The thoracic adhesive apparatus is considerably longer than broad and the labial grooves are not so extensive. The isthmus is also fairly wide, and the barbels are proportionately longer. The tuberculation on the skin is very faintly marked.

The Tunga river specimen, which I refer to *G. trewavasae*, is partly damaged as Mr. Bhimachar took out the brain of the fish for his studies.

Measurements in millimetres.

	Koyna Valley.	Yenna Valley, Type.	Tunga River, Shimoga.
Total length excluding caudal	44·1	97·0	113·0
Length of caudal	13·9	24·0	27·0
Length of head	11·0	25·0	29·7
Width of head	9·0	20·0	24·0
Height of head	6·0	13·0	13·0
Length of snout	5·7	12·0	17·2
Interorbital width	3·5	6·7	8·4
Depth of body	6·2	15·1	19·1
Height of dorsal fin	9·5	16·8	22·0
Length of pectoral fin	11·2	18·1	25·0
Length of ventral fin	7·9	15·5	19·0
Longest ray of anal fin	9·1	15·5	18·1
Length of dorsal spine	5·7	12·4	16·2
Length of caudal peduncle	7·7	16·7	21·2
Least height of caudal peduncle	4·5	8·2	8·1

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