FISH OF THE SALT RANGE, PUNJAB.

By SUNDER LAL HORA, *D.Sc., Assistant Superintendent, Zoological Survey of India.*

(Plate VIII.)

Theobald, who made a valuable collection of molluscs and reptiles in the Salt Range in 1851-52, appears to have paid no attention to its fish-fauna. The earliest record of fishes from this district is found in part VI of Day's[1] Monograph of Indian Cyprinidae, wherein he described a new species of *Barbus* from " Chua Saidar Shah " and recorded " *Discognathus lamta* " from " Nilwan ravine " and " *Scaphiodan irregularis* " from " Marri." In a footnote on page 325 he made references to six other species and observed that " besides the fishes alluded to in this paper, the collection contained the following from Marri in the Punjab: *Macrones Lamarrii*, Val., *Labeo ricnorhynchus*, McClell., *Barbus tor*, H. B. Likewise *Barilius piscatorius*, McClell., from a fresh water stream near Wallus. Also one small specimen of *Cirrhina gohama*, H. B., and several young of *Nemacheilus corica*, H. B." The collection referred to above was made by Dr. W. Waagen of the Geological Survey of India. The only addition to our knowledge of the ichthyology of the range since Day's monograph is the description of a new species of *Garra*[2] based on a specimen from Waagen's collection. Dr. Waagen collected fish from widely separated places in the Salt Range, while the recent collection on which these notes are based was made in the Pind Dadan Khan Tehsil of the Jhelum District. I give below a list of the species which have so far been recorded from the Punjab Salt Range with their distribution.

**Macrones seenghala* (Sykes)	...	The Indus, Salt Range of the Punjab, Jumna, Ganges as low as Delhi, also the Deccan, Kistna river and Assam.
Garra montis-salsi Hora. ...	...	Endemic.
Scaphiodon readingi, sp. nov.	...	,,
**Labeo ricnorhynchus* (McClell.)[3]	...	Assam, along the Himalayas to Afghanistan
Labeo sindensis (Day) ...	...	Sind, Punjab and at Poona.
Crossochilus latia (H.B.) Day	...	India and Burma.
Barbus tor (H.B.) Day ...	...	,, ,,
Barbus terio (H.B.) ...	...	Orissa, Bengal to Punjab.
Barbus punjabensis Day ...	...	Sind, Lahore and Jubbulpore.
**Barbus waageni* Day. ...	...	Endemic.
Barilius vagra (H.B.) ...	...	Sind Hills, along the Himalayas to Assam.
**Nemachilus corica* (H.B.) ...	...	Punjab, N.E.Bengal and Assam.
Nemachilus punjabensis, sp. nov.	...	Endemic.
Ophiocephalus gachua (H.B.)	...	India and Burma.

The species whose name is preceeded by an asterix (*) are not represented in my recent collection from the Salt Range.

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[1] Day, *Journ. Asiat. Soc. Bengal* XLI, pp. 318-327 (1872).

[2] Hora, *Rec. Ind. Mus.* XXII, p. 651 (1921).

[3] Day does not make any reference to this species either in the *Fishes of India* or in the *Fauna of British India*, but he included it in his Monograph of the Indian Cyprinidae (*Journ. Asiat. Soc. Bengal* XL, p. 123, 1871).

As many as four out of a total of fourteen species now known to inhabit the Salt Range are endemic, while the rest are fairly widely distributed either in India or in India and Burma.

Only those forms are discussed in the following notes which have recently been collected in the Pind Dadan Khan Tehsil of the Jhelum District.

The types of the new species are preserved in the collection of the Zoological Survey of India.

Garra montis-salsi Hora.

1921. *Garra monti-salsi*, Hora, *Rec. Ind. Mus.* XXII, p. 651.

In building up the synoptic table of the genus *Garra* in 1921 (*loc. cit.*) I had only the type of the species before me. On finding more material from the Khewra gorge in the unnamed collection, I hurriedly added a note modifying the description of the proboscis on the snout. In my recent collection from the Salt Range there are several specimens of this species. In some of them the proboscis is represented by a small knob-like projection between and slightly in front of the nostrils. The transverse cleft across the anterior region of the snout is also less conspicuous and so are the lateral tubercular areas. In this species the gill-openings extend for a considerable distance on the under surface and are separated from each other by a distance equal to the postorbital part of the head or slightly less than that. Another character that appears to be constant is that the lower lobe of the caudal is coloured grey while the upper is white. A black mark is present behind the upper corner of the gill-opening and a number of black wavy lines are present on the sides of the tail along the middle of longitudinal rows of scales. The maxillary barbel is longer than the diameter of the eye.

When revising the Indian species of the genus *Garra* it was pointed out by me (*loc. cit.*, p. 638) that the proboscis on the snout, which had been regarded as a secondary sexual character of the male, is common to both sexes in all the species in which it occurs except in *G. lamta*, of which I have had no opportunity of examining a large series of fully grown specimens. An examination of the Salt Range specimens has revealed to me the existence of secondary characters of a different nature in certain members of this genus. They exist in the form of regular rows of tubercles on the dorsal aspect of the paired fins of male specimens. On the dorsal surface of the pectoral in *G. monti-salsi* the tubercles are present on the anterior eight rays; they begin in a single row proximally but soon after they form more rows and in the case of the first four rays are continued along the divisions of the ray and extend to the margin of the fin. In the case of the other four rays they are arranged to form a single row, which ends at a considerable distance from the margin of the fin. Tubercles are also present on the postero-lateral part of the head and at the sides of the body anteriorly, but here they are not regularly arranged. In the case of the ventral fin tubercles are present on the outermost ray only in one or irregularly arranged two rows. In the males of *Garra stenorhynchus* similar characters are met with, but the rows of tubercles are not so numerous

on the pectoral, hardly exceeding one row on each ray, and are totally absent on the ventral. Each tubercle is in the form of a sharp, pointed, spine-like outgrowth resting on a broad, subcircular cushion-like base.

Similar structures in exactly the same position have already been described and figured in the males of certain species of the genus *Nemachilus*,[1] but the arrangement of tubercles in the two genera is quite different.

Garra montis-salsi is very common in mountain torrents in the Pind Dadan Khan Tehsil of the Jhelum District. Specimens were collected by me at Khewra and Choa Saidan Shah.

Scaphiodon readingi,[2] sp. nov.

(Plate VIII.)

? 1872. *Scaphiodon irregularis*, Day (in part), *Journ. As. Soc. Bengal* XLI, p. 324.

This is a stout-looking fish with both the profiles evenly arched. The dorsal profile rises gradually from the tip of the snout to the commencement of the dorsal fin, beyond which it slopes down to the base of the caudal. The head is short and conical with the tip bluntly pointed; its length is contained 5 to 5·4 times in the total length including caudal. The eyes are prominent and are placed at the sides of the head in such a way that their upper margin is slightly below the dorsal profile of the head; they are situated almost in the anterior half of the head and their diameter is contained from 4 to 5 times in the length of the head. The eye is proportionately larger in the young specimens. The snout is shorter than the interorbital width and is about 1·6 times the diameter of the eye. There is a fissure across the snout above the upper lip and there are two lateral lobes one on each side above the angle of the mouth. The nostrils are situated in the posterior half of the distance between the tip of the snout and the anterior margin of the orbit. There is a pair of well-defined maxillary barbels; they are as long as the diameter of the eye. In some specimens minute rostral barbels occur and it is not uncommon to find these structures only on one side of the fish. The upper lip is well-developed and overhangs the mouth, which is situated on the under surface slightly behind the tip of the snout; it is continuous at the angle of the mouth with the lower lip, which is widely interrupted in the middle. In some specimens the middle portion of the lower jaw is covered with a thick skin, while in others a yellowish horny covering is distinctly visible between the lateral lobes of the lower lip. In all specimens the edge of the lower jaw is sharp and cutting and the mandible is covered by a horny covering. There is a series of minute pores along the pre-opercular border.

The dorsal fin contains three spines and ten branched rays, the last of the series being divided to the base. The last spine is osseous, weak and serrated along its posterior border for about half of its length. The commencement of the dorsal is equidistant between the tip of the snout and the base of the caudal fin; its longest ray is equal to the length

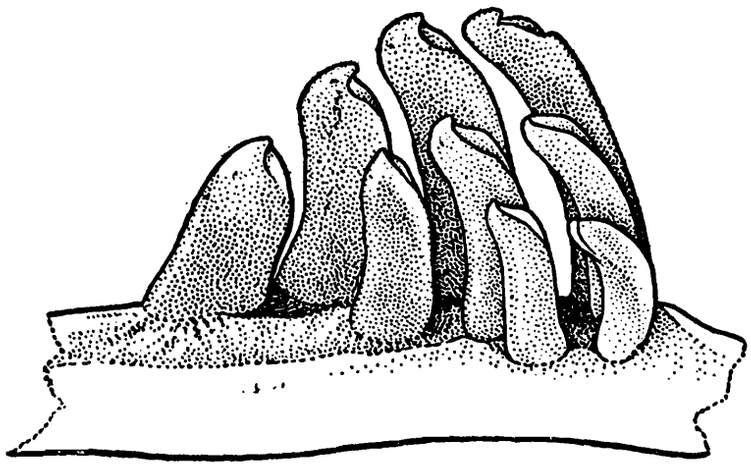
[1] Hora, *Rec. Ind. Mus.* XXIV, p. 81, figs. 4 and 5 (1921).

[2] With special permission I have named this fish after His Excellency the Right Honourable Rufus Daniel Isaac, Earl of Reading, P.C.,G.C.B.,G.M.S.I.,G.M.I.E., G.C.V.O., Governor-General and Viceroy of India.

of its base, which is almost as long as the head without the snout. The shortest ray in the dorsal fin is slightly less than the postorbital part of the head. The ventrals commence almost below the origin of the first divided ray of the dorsal fin; it is separated from the anal by half of its own length. The pectorals are as long as the head behind the anterior margin of the nostrils; it is separated from the ventrals by a considerable distance. The anal fin contains seven branched rays and its second branched ray is considerably longer than the longest ray in the dorsal fin. The caudal is longer than the head and is deeply forked; the upper lobe is better developed and is slightly longer than the lower.

The lepidosis is quite normal except on the under surface, where the scales are greatly reduced in front of the ventrals and almost indistinguishable on the chest. There are 36 to 40 scales along the lateral line and 7 to $7\frac{1}{2}$ longitudinal series above it and 4 to $4\frac{1}{2}$ below it to the base of the ventral fin. There is a scaly appendage both on the inner and outer margin of the base of the ventral fin. The scales on the sides of the anus and the anal fin are different in outline and seem to form a sheath on either side. The extreme dorsal surface in front of the dorsal fin is probably naked as no scales are visible under an ordinary power of the microscope.

In certain specimens the snout and fins are covered with regular rows of tubercles, which I believe are of parasitic origin as was shown by Dr. Baini Prashad[1] in the case of *Scaphiodon macmahoni*. They are regularly arranged along the rays of the fins, especially that of the anal and on the sides of the snout. These encysted bodies are sometimes present on the sides of the body also.



Text-fig. 1.—Teeth-bearing portion of pharyngeal bone of *Scaphiodon readingi*, sp. nov: × 12.

The pharyngeal bones are stout and each bears nine teeth, which are arranged in three rows. Their arrangement may be represented by the following formula :—4.3.2/2.3.4. Each tooth is flat and possesses a sickle-shaped crown, which bears a sharp point.

The colour in spirit is dark olive above and on the sides, fading into white below the lateral line and on the under surface. The margins of the scales in the upper three-fourths of the body are provided with

[1] Prashad, *Rec. Ind. Mus.* XVIII, p. 160 (1920).

numerous fine black dots. The membrane between the rays of the dorsal fin is also provided with fine black dots. Some of the rays of the caudal fin are infuscated with grey while both the upper and the lower margins are distinctly black.

Locality.—Salt Range, Punjab. From the arrangement and number of scales given by Day for the specimens of *Scaphiodon* collected by Dr. W. Waagen at Mari on the eastern side of the Indus, it seems quite probable that they represented this form. It was quite common in pools in the course of mountain torrents all over the portion of the range I visited. Good series were taken in the Khewra gorge, in Kas Ghandhala below Choa Saidan Shah and in gardens below Sardhi.

In 1872 Day[1] referred four specimens collected by Dr. W. Waagen at Mari to *Scaphiodon irregularis* and remarked that "they have L.1·38, L. tr. 7½/9, whilst the rows of scales above the lateral line are not so distinctly irregular." In his later and more comprehensive works[2] he states that *S. irregularis* is only found in "Sind Hills to 3500 feet elevation." But in the same place he extends the range of *S. watsoni* to the Salt Range of the Punjab. Judging from Day's statements there appears to be great confusion regarding the occurrence of either *S. irregularis* or *S. watsoni* in the Punjab Salt Range and unfortunately I have not been able to trace specimens from Dr. Waagen's collection which could clear this point. In my collection from a portion of the Salt Range that lies in the Pind Dadan Khan Tehsil of the Jhelum District there are numerous specimens of *Scaphiodon*, which do not belong to either of the two species referred to above and in my opinion represent a form hitherto undescribed. Each of the two species from the Sind Hills (*S. irregularis* and *S. watsoni*) is represented by a single specimen in our collection. These specimens were purchased from Day and are, in all probability, either the types of the species or from the type-series. The differences between these two forms and the new species are tabulated below.

S. irregularis Day.	*S. watsoni* Day.	*S. readingi*, sp. nov.
Greatest depth of body $\frac{1}{5}$ of total length.	Greatest depth of body $\frac{2}{9}$ of total length.	Greatest depth of body $\frac{5}{21}$ to $\frac{2}{9}$ of total length.
Snout 1·3 diameter of eye.	Snout 1·5 diameter of eye.	Snout 1·5 diameter of eye.
Interorbital space almost flat.	Interrobital space slightly convex.	Interorbital space slightly convex.
Third dorsal spine as long as head without the portion in front of nostrils, feeble, serrated and equals $\frac{3}{4}$ depth of body.	Third dorsal spine as long as head without snout, strong, serrated and equals $\frac{2}{3}$ depth of body.	Third dorsal spine as long as head without snout, weak, serrated and equals $\frac{2}{3}$ depth of body.
Pectoral almost as long as head.	Pectoral considerably shorter than head.	Pectoral considerably shorter than head.
Lower lobe of caudal longer.	Lobes of caudal almost equal.	Upper lobe of caudal longer.
36 scales along lateral line.	33 scales along lateral line.	36-40 scales along lateral line
9 longitudinal rows of scales between base of dorsal and lateral line.	6 longitudinal series of scales between base of dorsal and lateral line.	7-7½ longitudinal series of scales between base of dorsal and lateral line.
Arrangement of scales above lateral line irregular.	Arrangement of scales above lateral line regular.	Arrangement of scales above lateral line regular.
No marks on the body.	"Various and very irregular black spots on the body."	No definite marks on the body.

[1] Day, *Journ. As. Soc. Bengal* XLI, p. 325 (1872).
[2] Day, *Fish. India* II, p. 551 (1878); *Faun. Brit. Ind. Fish* I, P. 284 (1889).

Scaphiodon readingi is distinguished from *S. macmahoni*[1] by the possession of a proportionately longer head, shorter pectorals and a stouter caudal peduncle; from *S. baluchiorum*[2] by the same characteristics except that of the head and longer barbels; from *S. daukesi*[3] by the size and the position of the mouth and the smaller head.

In the description of the new species, I have alluded to different types of scales that occur in definite regions, but I think it worth while to discuss them in detail here as they appear to throw some light on the origin of the Schizothoracinae. The lateral scales and those on the under surface agree in form and structure with those of *Scaphiodon macmahoni* described and figured by Annandale and myself[4]. They are slightly broader than long. But a scale from the sides of the anus is quite different. It is more than twice as long as broad with the nucleus close to the proximal end. The lateral scales of Schizothoracinae are very similar in form and structure to the reduced scales found on the chest region of certain species of *Scaphiodon*, while the anal scales of the same subfamily (see Annandale and Hora *loc. cit.*) are like those of *Scaphiodon* from the same region. Moreover, there is a tendency among certain members of the genus *Scaphiodon* to possess small scales or to lose their scaly garment altogether. The irregular arrangement of scales and their small size on the dorso-lateral surface of *S. irregularis* and their absence in front of the dorsal fin in *S. readingi* are, therefore, facts not without significance in respect to the origin of the Schizothoracinae.

Measurements in millimetres.

Total length without caudal. ...	107·5	101·0	84·8	73·5	71·5	48·6	46·5	46·0	33·2
Length of caudal ...	25·0	26·0	22·5	21·0	21·4	15·0	15·1	16·1	11·5
Length of head ...	26·1	23·5	21·4	18·8	19·0	13·8	13·1	12·7	10·2
Height of body ...	31·2	27·8	22·6	20·5	21·2	12·5	11·1	13·0	8·0
Length of snout ...	8·8	8·0	6·5	6·0	6·4	4·1	4·4	5·0	3·1
Diameter of eye ...	5·3	5·1	4·8	4·5	4·6	3·7	3·8	3·4	2·6
Interorbital width ...	9·4	9·1	7·9	7·4	7·5	4·9	4·6	4·4	3·2
Longest ray of dorsal ...	18·4	17·5	18·0	12·7	14·9	8·2	9·4	9·0	6·5
Longest ray of anal ...	19·7	17·9	16·0	15·0	15·2	8·6	9·6	10·2	5·1
Length of pectoral ...	22·1	21·3	19·0	14·8	16·0	11·4	12·2	12·0	9·1
Length of ventral ...	18·2	19·0	17·0	12·6	14·1	10·8	11·4	11·0	8·8
Least height of caudal peduncle.	10·7	10·1	9·0	8·0	8·1	5·5	4·9	5·4	3·4
Length of caudal peduncle.	17·5	15·8	14·9	12·1	10·6	7·2	6·2	6·3	4·6

Labeo sindensis (Day).

1872. *Cirrhina sindensis*, Day, *Journ. As. Soc. Bengal* XLI, p. 319.
1878. *Labeo sindensis*, Day, *Fish. India* II, p. 544, pl. oxxxii, fig. 2.

This species is represented in the collection by a single specimen, which was taken in Kas Gandhala below Choa Saidan Shah. It agrees fairly closely with a specimen of *Labeo sindensis* from Sind in the collection of the Indian Museum. A specimen from Mari on the east of the Indus is also present in our collection.

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[1] Regan, *Journ. As. Soc. Bengal* II, p. 8 (1906).
[2] Jenkins, *Rec. Ind. Mus.* V, p. 124 (1910).
[3] Zugmayer, *Ann. Mag. Nat. Hist.* (8) X, p. 596 (1912).
[4] Annandale and Hora, *Rec. Ind. Mus.* XVIII, p. 157 (1920).

Labeo sindensis according to Day (*op. cit.* 1878) is found in " Sind, the Punjab (at Lahore and Hardwar), also the Deccan at Poona."

Crossochilus latia (Ham. Buch.) Day.

1878. *Cirrhina latia*, Day, *Fish. India* II, p. 548, pl. cxxx, fig. 4.

I refer provisionally a large number of specimen to the form recognised by Day as *Cirrhina latia*. On an examination of specimens referred to this species in the collection of the Indian Museum, I believe that several forms capable of specific separation have been grouped together under this name. It is, however, beyond the scope of the present paper to enter into details regarding *C. latia*.

This " species " is quite common all over India and is found in Burma also.

Barbus tor (Ham. Buch.) Day.

1878. *Barbus tor*, Day, *Fish. India* II, p. 564, pl. cxliii, fig. 3.

It has already been pointed out by Dr. N. Annandale[1] that there is great confusion in the group of species of the genus *Barbus* familiar to Indian sportsmen as Mahseer. I have several specimens in my collection taken in Kas Gandhala below Choa Saidan Shah, which I refer to *B. tor* (*s. l.*). They possess a long and pointed head and in this respect resemble the form *mosal* of Hamilton Buchanan.

Barbus tor, to use the name in its accepted sense, is found throughout India and Burma.

Barbus terio (Ham. Buch.).

1878. *Barbus terio*, Day, *Fish. India* II, p. 580.

There are four damaged specimens from Kas Gandhala below Choa Saidan Shah which I hesitatingly refer to *Barbus terio*. They agree with *B. terio* in several important characters but differ in details.

This species is commonly found in the Indo-Gangetic plain.

Barbus punjabensis Day.

1878. *Barbus punjabensis*, Day, *Fish. India* II, p. 580, pl. cxiv, fig. 2.

Several specimens of this species were taken in a big pond near Chalisa railway station, which is at some distance from the base of the Salt Range.

Barbus punjabensis is found in Sind, the Punjab and at Jubbulpore.

Barilius vagra (Ham. Buch.).

1878. *Barilius vagra*, Day, *Fish. India* II, p. 589, pl. cxlviii, fig. 3.

This species is represented by several young and half grown specimens taken in a small stream near Dheri Jaba. The edge of the caudal fin in all specimens is conspicuously stained with grey.

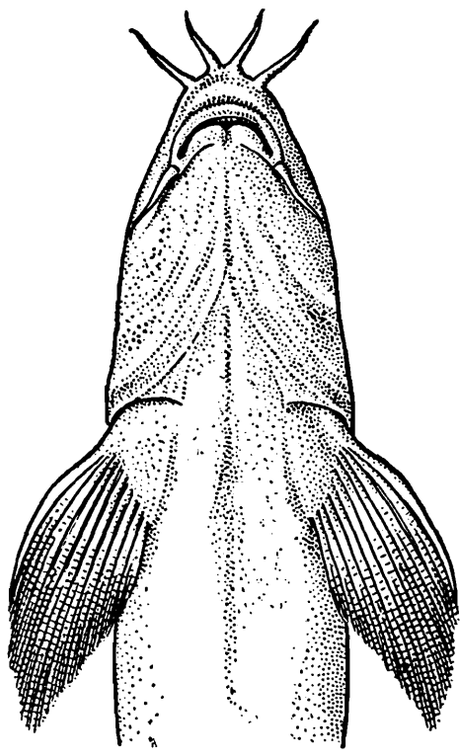
[1] Annandale, *Rec. Ind. Mus.* XVI, p. 134 (1919).

Barilius vagra is found in the Sind Hills, the Punjab, along the Himalayas and Assam.

Nemachilus punjabensis, sp. nov.

D. 2/7. A. 1/5.

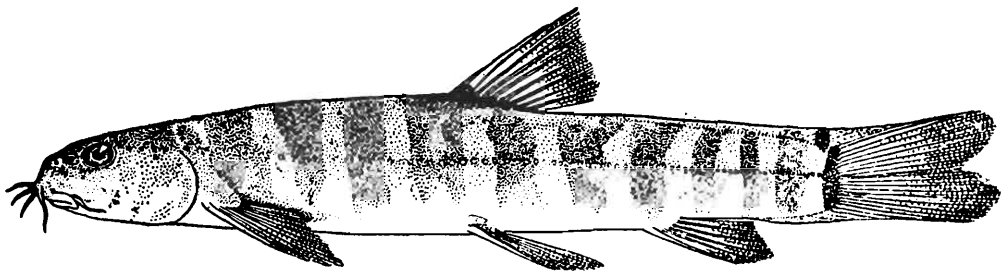
In this loach the dorsal and the ventral profiles run almost parallel to each other, the former is but slightly arched and the latter is straight and horizontal throughout. The head is sub-triangular and depressed, its lower surface is greatly flattened; its length is contained from 5·2 times (in the young) to 6·1 times in the total length including caudal. The depth of the body is about two-thirds the length of the head. The caudal fin is longer than the head. The eyes are not visible from below and for a greater part lie in the anterior half of the head. There are six barbels, the inner maxillary are almost as long as the diameter of the eye while the others are much longer. The mouth is bordered by well-developed lips, which are continuous at the angles; the lower lip is provided with a free labial fold which is widely interrupted and the lip itself is divided in the middle. The lateral line is complete and the body is devoid of scales.



TEXT-FIG. 2.—Under surface of head and chest of *Nemachilus punjabensis*, sp. nov. : × 5.

The commencement of the dorsal is almost equidistant from the tip of the snout and the base of the caudal or somewhat nearer to the base of the caudal than to the tip of the snout; its longest ray is considerably greater than the depth of the body below it. The free upper margin of the dorsal is truncate. The pectoral is longer than the head and is separated from the ventral by a distance equal to half of its own length.

The ventrals miss the anus by a short distance. The caudal is divided in its last third.



Text-fig. 3.—Lateral view of *Nemachilus punjabensis*, sp. nov. : × $2\frac{2}{3}$.

There are from eleven to thirteen dark zones encircling the body but not meeting on the abdomen. In front of the dorsal they run obliquely. These are separated from each other by much narrower but more conspicuous zones of ground colour which in spirit-specimens is slightly yellow. There is a dark band across the base of the caudal and a black spot at the base of the first two rays of the dorsal fin. Both the dorsal and the caudal are faintly marked with greyish bands across the middle of their lengths. The upper surface of the head is grey while the cheeks and the under surface are yellow. The under surface of the body is pale olivaceous.

Nemachilus punjabensis is readily distinguished by its long and narrow form, by the long pectorals and the characteristic colouration. The depth of the body is about one-ninth of the total length.

Measurements in millimetres.

Total length including caudal ...	44·0	47·0	44·6	39·5	31·2
Length of caudal	8·3	8·5	8·0	7·0	6·6
Length of head	7·6	7·9	7·2	6·9	6·0
Depth of body	5·0	5·2	5·0	4·8	4·5
Length of snout	3·0	2·6	2·8	2·8	2·2
Length of caudal peduncle ...	6·0	6·2	6·0	5·6	3·0
Least height of caudal peduncle ...	3·4	4·8	4·2	3·4	2·8
Longest ray of dorsal	6·3	5·8	6·0	6·0	5·0
Length of pectoral	8·0	8·0	8·0	7·8	5·6
Length of ventral	6·8	7·3	6·5	6·0	4·8

Ophiocephalus gachua (Ham. Buch.)

1878. *Ophiocephalus gachua*, Day, *Fish. India* II, p. 367

Two young specimens of this species were taken in Kas Gandhala below Choa Saidan Shah. *Ophiocephalus gachua* is widely distributed in India and Burma.