

## SUMMARY

The tubicolous polychaete *Pectinaria (Pectinaria) antipoda* Schmarda discovered for the first time from Lakshadweep is redescribed. The taxonomic and ecological observations made on the species are discussed. The calcareous tube of the species is characteristic in that the building material are carefully selected small gastropod shells.

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TAXONOMIC STUDIES ON FOUR SPECIES  
OF THE GENUS *MYSTUS* SCOPOLI, 1777  
(SILURIFORMES : BAGRIDAE)

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INTRODUCTION

Catfishes of the family Bagridae from the Indian sub continent received considerable attention (Bhimachar, 1934, Hora, 1937, Hora & Law, 1941, Ahmad, 1951, Jayaram, 1954, 1955, 1956, 1959, 1962, 1966, 1968, 1971a & b, 1977a & b, David, 1963). Of the 28 genera so far known only 7 are represented in the Indian subcontinent (Jayaram, 1977b): *Mystus* Scopoli, *Aorichthys* Wu, *Rita* Bleeker, *Rama* Bleeker, *Batasio* Blyth, *Horabagrus* Jayaram and *Chandramara* Jayaram.

Genus *Mystus* Scopoli, 1777 is represented in the Indian subcontinent by 20 species (Jayaram, 1966). Jayaram (1954) revised the genus. He (1962) clarified the nomenclatural status of the genus and designated the type species. Jayaram and Bhimachar (1967), Tilak (1965) described the osteological features of some species included under the genus *Mystus*. There is still need for the redefinition of some of the species taking into consideration the intraspecific variation. In the present communication four species of the genus *Mystus* viz. *bleekeri*, *cavasius*, *vittatus*, and *gulio* are redescribed.

MATERIAL AND METHODS

The material for systematic study was collected from the fish market at Guntur, Andhra Pradesh (lying between 15° 45' to 16° 50' N and 79° 10' to 80° 55' E). In taking biometric data the methodology of Hubbs and Lagler (1947) has been followed. All morphometric data are expressed as percentages of standard length except eyediameter, snout length and interorbital width, which are expressed as percentages of head length. The range of each morphometric character as percentage is given, followed by mean in parenthesis. The following abbreviations are used in text :

BMNH : British Museum (Natural History), London ; MNHN : Museum National d' Histoire Naturelle, Paris ; RMNH : Rijksmuseum van Natuurlijke Historie, Leiden ; ZMB : Institut fur Spezielle Zoologie und Zoologisches Museum, Berlin ; ZSI : Zoological Survey of India, Calcutta.

### Subfamily BAGRINAE Regan, 1911

The two genera represented in the area of study can be identified by the following provisional key :

no interneural shield	<i>Mystus</i> Scopoli, 1777
interneural shield present	<i>Aorichthys</i> Wu, 1939

### *Mystus* Scopoli, 1777

*Mystus* Gronow, 1763, *Zoophyl. Gronoviana Anilal.*, Fas. 1 : 124, Pl. 8a, Fig. 6 (type not designated) ; admissible for nomenclatural considerations—opinion 89 of ICZN). —Scopoli, 1777, *Introd. Hist. Nat.*, : 451, (type species not designated). —Jayaram, 1954, *Rec. Indian Mus.*, 51 : 527-558 ; (Type : *Silurus pelusius* Solander = *Mystus pelusius* (Solander) ; revision.—Jayaram, 1962, *Proc. First All India Cong. Zool.* : 633-634, (Type species, *Bagrus halepensis* Valenciennes, 1839) ; generic synonymy and designation of type species:

Four species of genus *Mystus* described herein can be identified by the following provisional key :

1 a. median fontanel short, not reaching base of occipital process ; base of adipose dorsal short, less than 33 per cent in standard length	...	2
b. median fontanel long, reaching base of occipital process ; base of adipose dorsal long, more than 33 per cent in standard length	...	3
2 a. body uniform grey in colour, no. of gill rakers on lower arm 28-34	...	<i>M. gulio</i>
b. body with horizontal bands extending from behind the opercle to caudal peduncle, no. of gill rakers on lower arm 22-27	...	<i>M. vittatus</i>
3 a. maxillary barbels long, extending to between end of adipose dorsal and caudal fin, no. of gill rakers on lower arm 14-18	...	<i>M. cavasius</i>
b. maxillary barbels extend to between tip of ventrals and middle of anal fin, no. of gill rakers on lower arm 9-11	...	<i>M. bleekeri</i>

***Mystus bleekeri* (Day, 1877)**

*Bagrus keletius* Bleeker, 1853 (*nec Valenciennes*), *Beng. en Hind.*, 91 : 115. (type locality : Calcutta, river Hooghly).

*Macrones bleekeri* Day, 1877, *Fish. India* : 451, Pl. 101, Fig. 1.

*Mystus (Mystus) bleekeri* : Jayaram, 1954, *Rec. Indian Mus.*, 51 (4) : 530 ; revision.

*Material examined* : 80 examples, 60-115 mm SL ; RMNH : 6869, 2 examples, 82 and 110 mm SL (syntypes of *Bagrus keletius* Bleeker).

*Description* : B. 7-9 ; D. II, 7 ; P. I, 9-10 ; V. 6 : A. ii-iii, 8-9 ; GR. 3-4+9-11.

*As percentage of standard length* : Head length 24.00-25.60 (24.79), body depth 19.44-25.27 (22.38), head width 14.60-18.18 (16.12), pre dorsal distance 33.33-37.80 (36.26), base of rayed dorsal 13.33-16.27 (15.29), base of adipose dorsal 40.36-45.83 (42.56), anal base 8.20-10.71 (9.89), dorsal height 16.50-21.90 (19.74), caudal peduncle height 9.00-11.68 (19.58)

*As percentage of head length* : eye diameter 19.23-29.32 (23.68), snout length 33.33-43.75 (38.57), interorbital width 27.27-33.33 (29.76).

Median fontanel long, reaches the base of occipital process, occipital process reaches tip of basal bone of rayed dorsal. Maxillary barbels reach base of anal fin, nasal barbels reach preopercle, outer mandibular barbels extend to a little beyond base of pectoral fin, inner mandibular barbels just reach the origin of pectoral fin ; first dorsal spine small closely opposed to base of prominent second spine, second dorsal spine not serrated along its posterior face, pectoral fin reaches to below second dorsal spine, its spine serrated along the inner edge, number of serrations range between 11-15, origin of pelvic fin below last dorsal ray, pelvics do not reach anal origin.

*Colour and pigmentation* : three indistinct horizontal greyish bands formed of small, discrete melanophores ; one along dorsal surface, two on flanks above and below lateral line ; diffuse grey blotch behind opercle above the pectoral fin ; dark spot at the base of origin of dorsal fin ; interradiation membrane of distal half of dorsal, ventral and anal fins and inner margin of lower caudal lobe greyish ; distal margin of adipose dorsal with melanophores.

*Taxonomic notes* : Bleeker (1853) described *Bagrus keletius* [= *M. bleekeri* Day, 1877] from Calcutta in *Beng. en Hind* (p. 115) (*M. Boesemann, in litt.*) and not in *Nat. & Geneesk. Arch. Ned. Ind.* III (2) (p. 135) as cited in Jayaram (1974) and Menon (1974). In the latter publication, Bleeker only listed *Bagrus keletius* and stated that he had not observed the species in East Indies.

*Indication of lectotype*: Day's (1877) specimens (syntypes) of *Macrones bleekeri* were sent to the following Museums (*M. clarke*, *in litt.*): ZSI, Calcutta, Nos. 1076, 781; AMS, Sydney, No. B 7999; NMV, Vienna, No. 44168; RMNH, Leiden No. 3024.

According to Mrs. Clarke (*in litt.*) the two specimens in ZSI, Day figures (Pl. 101, Fig. 1) the specimen bearing No. 1076 (Talwar, *in litt.*); as per the Code (Art. 74 B) this specimen should be the lectotype of *Macrones bleekeri* Day 1877.

This is the first report of this species from peninsular India. Jayaram (1954 : 532, 556) and Menon (1974 : 61) recorded it earlier from Northern India Assam and Burma.

TABLE 1

*M. bleekeri*: frequency distribution of meristic characters.

Character	n	Range	mean	S. E.
1. Branchiostegal rays	73	7-9	8.24	±0.08
2. Pectoral fin rays	75	8-10	9.28	±0.02
3. Anal fin rays	75	10-12	11.25	±0.05
4. Gill rakers				
a. upper arm	80	9-11	10.05	±0.01
b. lower arm	63	12-15	13.24	±0.11

### *Mystus cavasius* (Hamilton, 1822)

*Pimelodus cavasius* Hamilton, 1822, Fish. Ganges, 203, 379, Pl. 40, Fig. 67 (type locality: Gangetic province).

*Bagrus nigriceps* Valenciennes, 1839, Hist. Nat. Poiss., 14 : 412 (type locality: Java).

*Mystus (Mystus) cavasius*: Jayaram, 1954, *Rec. Indian Mus.*, 51 (4) : 532-534; revision.

*Material examined*: 111 examples, 50-160 mm SL., ZSI, Regd. Nos. 425, 293 and 784-5, 3 examples, 125-142 mm SL; ZSI: Regd. Nos. 122/2, F 10322/1, 2 examples of *M. nigriceps*, 129 and 204 mm SL.

*Description*: B. 7-9; D. II, 7; P. I, 8-10; V. 6; A. 11-13; G. R. 5-6+14-18.

*As percentage of standard length*: head length 22.15-27.53 (24.21), body depth 17.37-23.56 (20.89); predorsal distance 32.74-37.36 (34.86), base of rayed dorsal fin 12.50-15.79 (14.57), base of adipose dorsal fin 37.96-44.44 (41.50), anal base 7.84-11.30 (9.79); caudal peduncle height 8.52-11.20 (9.62).

*As percentage of head length* : eye diameter 20.00-28.12 (24.49), snout length 33.75-44.69 (38.99), interorbital width 26.08-32.85 (29.40).

Median fontanel reaches base of occipital process, occipital process long narrow, reaches basal bone of rayed dorsal; maxillary barbels extend to between posterior margin of adipose dorsal, and caudal, nasal barbels extend to preopercles, outer mandibular barbels reach tip of pectoral, inner mandibular barbels extend slightly beyond origin of pectoral; first spine of dorsal small, closely apposed to base of second prominent dorsal spine, second dorsal spine smooth along anterior edge, slightly serrated along posterior edge in larger specimens; pectoral reaches to below first or second dorsal ray, its spine serrated along its inner edge, number of serrations 11-19; origin of pelvics below or just behind last dorsal ray, pelvics do not reach anal origin; adipose fin long, its base contiguous with that of rayed dorsal, reaches its maximum height behind middle, posterior edge rounded; caudal forked, upper lobe longer than lower.

*Colour and pigmentation* : dorsal side of body leaden, colour fading down the flanks; upper flanks with pale yellow and green tinge; abdomen silvery white; dorsal side of head and snout grey on yellow base; maxillary barbels grey; dark blotch at base of first dorsal spine, a series of dark spots one at base of each ray; anterior edge of distal half of second spine and upper edge of dorsal grey; surface of adipose dorsal with small discrete melanophores, increasing in number towards its dorsal margin which is dark; interradiial membrane of dorsal, ventrals and anal with melanophores; inner edge of caudal grey; indistinct greenish-yellow blotch behind operculum and above pectorals.

*Taxonomic note* : Dutt and Sharma (in press) adduced evidence to show that *Mystus nigriceps* (Valenciennes, 1839) is a junior synonym of *Mystus cavasius* (Hamilton, 1822).

TABLE 2

*M. cavasius* : frequency distribution of meristic characters.

<i>Character</i>	<i>n</i>	<i>Range</i>	<i>mean</i>	<i>S. E.</i>
1. Branchiostegal rays	101	7- 9	8.41	± 0.02
2. Pectoral fin rays	99	8-10	9.84	± 0.03
3. Anal fin rays	80	13-15	13.68	± 0.07
4. Gill rakers				
a. upper arm	111	4-6	5.05	± 0.05
b. lower arm	111	14-18	16.37	± 0.10

**Mystus vittatus (Bloch, 1797)**

*Silurus vittatus* Bloch, 1797, *Ichthyol. Hist. nat.*, 11 : 40, pl. 371, Fig. 2 (type locality : Tranquebar, South India).

*Pimelodus carcio* Hamilton, 1822, *Fish. Ganges.*, : 181, 377, Pl. 23, Fig. 60 (type locality : Northern Bengal) (written erroneously below the figure as *Pimelodus batasius*, discussed by Day, 1865 : 190-191 and Jayaram, 1954 : 535-536).

*Pimelodus tengara* Hamilton, 1822. *Fish. Ganges.*, ; 183, 377, Pl. 3, Fig. 61 (type locality : lower Bengal).

*Mystus (Mystus) vittatus* : Jayaram, 1954, *Rec. Indian Mus.*, 51 (4) : 534 ; revision.

*Mystus (Mystus) tengara* : Jayaram, 1954, *Rec. Indian Mus.*, 51 (4) : 538 ; revision.

*Material examined* : 88 examples, 50-110 mm SL ; ZMB : Regd. No. 2939, 1 example 84.5 mm SL (holotype of *Silurus vittatus* Bloch) ; ZSI : Regd. Nos. 3785, 7668 and 7669, 4 examples of *Mystus tengara*, 50-65 mm SL ; ZSI : Regd. Nos. 11382/1, 468/2, 133, 2595/2, 4 examples of *Mystus vittatus*, 52-85 mm SL ; 20 examples of *Mystus vittatus* from Calcutta, 60-80 mm SL.

*Description* : B. 9 ; D. II, 7 ; P. I, 7-8 ; V. 6 ; A. 10-13 ; GR. 7-9+22-27.

*As percentage of standard length* : head length 25.23-30.98 (28.59), body depth 21.42-30.37 (25.76) ; predorsal distance 34.65-42.62 (39.21) ; rayed dorsal base 13.91-17.31 (16.01), adipose dorsal base 21.33-30.66 (25.75), anal base 9.89-13.55 (11.73) ; caudal peduncle height 10.89-13.51 (12.19).

*As percentage of head length* : eye diameter 20.00-23.80 (22.26), snout length 27.27-37.50 (32.67), interorbital width 30.95-37.50 (33.87).

Median fontanel reaches to between posterior margin of orbit and base of occipital process, constricted in the middle ; occipital process reaches basal bone of dorsal fin, upper jaw slightly longer than lower ; maxillary barbels extend to between origin of ventral and middle of anal, nasal barbels reach pre-opercle, outer mandibular barbels extend to middle of pectorals, inner mandibular barbels extend to origin of pectoral ; first dorsal spine short, closely apposed to base of prominent second spine ; second spine with 4-7 indistinct serrations along its posterior edge and with 2-3 serrations towards its tip on its anterior edge ; pectorals extend to below second or third dorsal ray ; pectoral spine with serrations along its inner edge ; number of serrations 9-15 in the length range examined ; origin of adipose dorsal separated from rayed dorsal, its base equal to or longer than base of rayed dorsal.

*Colour and pigmentation* : upper surface of body and head leaden ; four horizontal bands along flanks formed by melanophores, another band along mid-dorsal line from nape to caudal base ; abdomen yellow ; black blotch behind opercle and above pectoral, very distinct in fresh specimens ; interradiial membrane of the distal half of rayed dorsal, outer margin of adipose dorsal, distal half of anal fin, inner margin of caudal fin with melanophores ; in fresh specimens, pectorals and ventral hyaline ; maxillary barbels dusky.

*Taxonomic note* : The specimens conform to the original description and to the holotype of *Silurus vittatus* in Zoologisches Museum, Berlin (ZMB, Regd. No. 2939), which was re-examined by me (Pl. IV, Fig. 3).

Hamilton (1822) erected four species of *Pimelodus* referable to genus *Mystus* : *carcio*, *tengara*, *gulio* and *cavasius* from northern parts of Bengal. Of these, latter two are valid. There is confusion in the treatment of the former two species of Hamilton by later workers. In his description of *P. tengara* he states (p. 183) : "The *Silurus vittatus* of Bloch (*Ichth.* Tome. II p. 40, Pl. CCCLXXI Fig. 2) has some affinity to the *Tengara*, but the prickle on the back is indented behind." Gunther (1864) treated *carcio* as a synonym of *tengara* (under genus *Macrones*) in spite of the fact that the species name *carcio* has page priority in Hamilton-Buchanan's work. Day (1878, 1889) considered *P. carcio* Hamilton-Buchanan as a synonym of *Macrones vittatus* (Bloch) and *tengara* as a distinct species. Hora (1949) treated both *carcio* and *tengara* as synonyms of *vittatus*, but Jayaram (1954) considered *tengara* as a synonym of *M. tengara* (Ham. Buch), but if the species *tengara* is valid, it should be called *M. carcio* since the species name *carcio* has page priority over *tengara*. Rossel (1964) placed *tengara* in the synonymy of *M. vittatus*. Menon (1974) considered both *carcio* and *tengara* of Hamilton as synonyms of *M. vittatus*. The problem could have been easily solved had Hamilton left behind types.

To clearly establish the validity or otherwise of the nominal species *carcio* and *tengara* and their relationship to *vittatus*, the following procedure has been adopted :

I. re-examination of :

- i. the holotype of *Silurus vittatus* Bloch, 1797 in the Zoologisches Museum, Berlin.
- ii. four specimens of *Mystus vittatus* (Regd. Nos. 11382/1, 468/2, 133, 2595/1) in ZSI (collected by Shaw & Shebbeare, Drs. Herre, Rao & Nair, Dr. S. L. Hora and Drs. B. Prasad and Hora respectively).



- iii. the four specimens labelled *Mystus tengara* (Regd. No. 3784, 3785, 7668 and 7669) in ZSI (collector not indicated).

II. examination of fresh material :

- i. 20 specimens (60-80 mm SL) collected from the market at Calcutta on 10-6-1974 (Calcutta is within the area which forms the type locality of Ham. Buch, 's species)
- ii. a statistically adequate number (88) of specimens from Guntur district, to take intraspecific variation into consideration.

III. comparison of data from the original and later descriptions of *carcio* and *tengara* with the above data.

The holotype (ZMB, Reg. No. 2939) of *Silurus vittatus* Bloch (Pl. IV, Fig. 3) has the following diagnostic characters :

- i. the median fontanel extends to just beyond the border of the orbit, and does not reach the base of the occipital process
- ii. maxillary barbels reach the origin of adipose dorsal fin
- iii. base of adipose dorsal fin is about two times the base of rayed dorsal and there is a gap between the rayed and adipose dorsal fins.

Following Day (1878), Jayaram (1954) and Srivastava (1968) record the following characters of *M. vittatus* :

- i. median fontanel is short and does not reach the base of occipital process
- ii. maxillary barbels reach to nearly middle of the body
- iii. four grey coloured bands along length of body.

Jayaram (1954 : 539) in his description of *Mystus (Mystus) tengara* remarks : "This species is allied to *M. (Mystus) vittatus* from which it is distinguished by the anteriorly serrated teeth in the dorsal spine, 8 to 10 teeth in pectoral spine ; median groove reaching base of occipital process and the length of caudal fin contained 4.3 times in total length (*versus* 5.5 times in *Mystus (Mystus) vittatus*." A critical comparison may be made of the so-called differences between *vittatus* and *tengara* :

1. presence of anteriorly serrated teeth on dorsal spine in *M. tengara* :

Day (1878, 1889) states that there are 2 or 3 teeth on the anterior side of the dorsal spine in the young of *M. vittatus*. Srivastava (1968) and Rao & Chattopadhyay (1969) also refer to the anterior serrations on the dorsal spine of *M. vittatus*. In my specimens also, I have observed 2-3 small serrations towards the tip of dorsal spine, on its anterior edge.

2. number of serrations on the inner side of pectoral spine :

Jayaram (op. cit.) distinguished *tengara* from *vittatus* by the presence in the former of 8-10 serrations on the inner side of pectoral spine, as against 16 in the latter. According to Srivastava (1968) there are 14-16 serrations in *M. vittatus* (3 specimens, 98-114 mm TL), and 14 serrations in *M. tengara* (2 specimens, 72-77 mm TL). Rao and Chattopadhyay (1969) recorded 12 serrations in *M. vittatus* (3 specimens 90-113 mm SL) and observed that the number agrees with that of *M. vittatus horai* Jayaram but not with that of *M. vittatus vittatus* (15-16 serrations). None of the above authors have taken into consideration the possibility that the apparent differences between the two nominal species could be because of the differences in size of specimens examined by them. My material shows that the number of serrations increases with growth (Table 7) and ranges from 9-15. Rao and Chattopadhyay (op. cit.) state (p. 101) "It is possible that this species *M. vittatus* contains many intraspecific groups and our collections may belong to a group different from both *Mystus v. vittatus* and *Mystus v. horai*." This statement is untenable because the number of specimens examined by them is too small (3 specimens, 90-113 mm SL). The types of *Mystus vittatus horai* Jayaram are not traceable (Talwar, in litt.).

3. extension of median fontanel :

According to Day (1878, 1889), Jayaram (1954) and Srivastava (1963), the median fontanel is long and reaches the base of occipital process in *M. tengara*, but in *M. vittatus* it is short and does not reach the base of occipital process. Rossel (1964) examined a total of 66 specimens of *M. vittatus* from different localities in Assam, from the Ganges (type locality of Hamilton's species) at Benaras and from Madhya Pradesh in the length range 29-88 mm SL. In placing *tengara* in the synonymy of *vittatus* he refers to the fact that the two have often been

considered as separate species on the basis of differences in the length of the fontanel, which is considered as reaching the base of supra-occipital process in *tengara* and only to between the eyes and the process in *vittatus*. In his material he observed all stages between the two extremes. The smaller specimens have mostly, but not always, a long fontanel and the larger specimens a shorter one. He felt that the difference could not be related to age and also that it was not indicative of a subspecies or population, because he came across all varieties in a given series. He therefore felt that two species should be synonymised.

Although my material (50-110 mm SL) does not include such small specimens as those examined by Rossel, in none of the specimens examined by me does the fontanel reach the base of the occipital process, although there is some variation with regard to the point in the front of the base of the occipital process where it terminates.

The median fontanel does not reach the base of occipital process in four specimens labelled *Mystus tengara* in ZSI (50-86 mm SL) ; they conform in all respects to *vittatus*.

Thus, all the characters used by earlier workers to distinguish *vittatus* from *tengara* are not consistent and useful. In view of the above evidence, Hamilton's *Pimelodus carcio* and *Pimelodus tengara* are considered as junior synonyms of *Silurus [=Mystus] vittatus* Bloch, 1797.

TABLE 3

*M. vittatus*: frequency distribution of meristic characters

Character	n	Range	mean	S. E.
1. Branchiostegal rays	82	8- 9	8.8	± 0.17
2. Pectoral fin rays	60	7- 8	7.42	± 0.01
3. Anal fin rays	64	10-13	11.37	± 0.03
4. Gill rakers				
a. upper arm	59	7- 9	7.77	± 0.02
b. lower arm	88	22-27	23.97	± 0.05

TABLE 4

*M. vittatus* : frequency distribution of number of serrations on the inner side of the pectoral spine in relation to total length

Total length in cm	No. of serrations*						
	9	10	11	12	13	14	15
6	9	3	—	—	—	—	—
7	1	3	6	1	—	—	—
8	1	—	3	2	—	—	—
9	—	—	3	2	1	—	—
10	—	—	—	1	7	6	—
11	—	—	—	—	2	7	—
12	—	—	—	—	—	3	1
13	—	—	—	—	—	1	3

\*the serrations on spine of the left pectoral fin only were counted

### *Mystus gulio* (Hamilton, 1822)

*Pimelodus gulio* Hamilton, 1822, Fish. Ganges, : 201, 371, Pl. 23, fig. 66 (type locality : estuaries of river Ganga).

*Mystus (Mystus) gulio* : Jayaram, 1954, *Rec. Indian Mus.*, 51 (4) : 542-543, text-fig. 7 ; revision.

*Material examined* : 100 examples, 74-155 mm SL ; ZSI : Regd. No. 387, 1 example, 84 mm SL ; 10 examples, locality Calcutta, 80-110 mm SL.

*Description* : B. 9-10 ; D. II, 7 ; P. I, 7-8 ; V. 6 ; A. iii-iv, 10-11 ; GR. 9-11+28-34.

*As percentage of standard length* : head length 26.57-30.37 (28.31), head width 18.94-22.25 (20.76) ; body depth 21.29-29.20 (25.61) ; predorsal distance 34.14-40.78 (38.38), base of rayed dorsal fin 10.82-12.38 (11.63), height of dorsal spine 13.82-13.27 (10.38), base of adipose dorsal 8.25-13.27 (10.38), anal base 11.30-15.48 (13.47), caudal peduncle height 10.65-13.96 (12.76)

*As percentage of head length* : eye diameter 17.57-22.22 (19.38), snout length 31.25-38.64 (35.04), interorbital width 35.14-40.54 (30.73).

Median fontanel lanceolate in shape, extending to posterior margin of orbit ; occipital process extends to basal bone of rayed dorsal fin ; upper jaw slightly longer than lower ; maxillary barbels reach origin of anal fin, nasal barbels reach pre-opercle, outer mandibular barbels

reach tip of pectoral fin and inner mandibular barbels extend to base of pectoral fin. First dorsal spine short, closely apposed to the base of prominent second spine, the second spine with 2-3 serrations on its anterior edge towards the tip and 7-9 serrations along posterior edge first ray of dorsal is the longest and about one and half times longer than the second spine ; pectoral fin extends to below second ray of dorsal, its spine with serrations along its inner edge ; origin of pelvics behind rayed dorsal, reaching origin of anal in juveniles ; origin of adipose dorsal some distance behind rayed dorsal, and behind vertical from origin of anal. Caudal forked, with rounded lobes.

*Colour and pigmentation* : dorsal side of head and body leaden, becoming dull on flanks, belly white ; a diffuse greyish blotch behind opercle and above pectoral fin ; upper margin of dorsal, outer margin of adipose dorsal, interradiial membrane of ventrals and anal with melanophores ; inner margin of lower and upper lobes of caudal fin dusky ; bases of pectorals, ventrals and anal yellow ; maxillary barbels grey.

*Remarks* : Jayaram (1954 : 529) includes *M. gulis* in the group with 'occipital process not reaching basal bone of dorsal fin,' but in his text-fig. 7a on p. 543, the tip of the occipital process is shown as reaching the basal bone of dorsal fin. Day (1878) in footnote on p. 445 states that "This interspace [between the tip of occipital process and basal bone of dorsal fin] seems to be absent in the immature but increases with age." Rossel (1964) observed that in some specimens examined by him, the occipital process does not reach the predorsal plate (=basal bone) of dorsal fin. He could not establish any relationship between the length of the supra-occipital process and body length. In my material (74-115 mm SL), the supra-occipital process does reach the tip of the basal bone of dorsal fin. Rao and Chattopadhyay (1969) also did not observe any space between the tip of the occipital process and the basal bone of dorsal fin.

TABLE 5

*M. gulis* : frequency distribution of meristic characters.

Character	n	Range	mean	S. E.
1. Branchiostegal rays	48	9-10	9.29	± 0.01
2. Pectoral fin rays	48	7- 8	7.64	± 0.01
3. Anal fin rays	65	13-15	14.03	± 0.02
4. Gill rakers				
a. upper arm	100	9-11	8.91	± 0.01
b. lower arm	104	28-34	30.39	± 0.05

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