

OCCASIONAL PAPER NO. 207

**RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA**

**A taxonomic revision of the fishes of the genus
Mystus Scopoli (Family : BAGRIDAE)**

**K. C. JAYARAM
ANURADHA SANYAL**

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सत्यमेव जयते

**Zoological Survey of India
Kolkata**

CITATION

Jayaram, K. C. and Anuradha Sanyal. 2003. A taxonomic revision of the fishes of the genus *Mystus* Scopoli. (Family : Bagridae) *Rec. zool. Surv. India, Occ. Paper No. 207* : 1-141. (Published by the Director, *Zool. Surv. India*, Kolkata)

Published : March, 2003

ISBN : 81-85874-92-1

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- The correct price of this publication is the price printed on this page. Any revised price indicated by a rubber stamp or by a sticker or by any other means is incorrect and should be unacceptable.

PRICE

India : Rs. 200.00

Foreign : \$ 15; £ 10

Published at the Publication Division by the Director, Zoological Survey of India, 234/4, A. J. C. Bose Road, 2nd MSO Building (13th Floor), Nizam Palace, Kolkata 700020 and printed at Krishna Printing Works, 106, Vivekananda Road, Kolkata 700 006.

NOT FOR ISSUE

Records of the Zoological Survey of India Occasional Paper

No. 207	2003	1-141
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INTRODUCTION

Catfishes constitute a large group of chiefly freshwater fishes distributed around the World. Africa, India and South America are especially rich in quantity and species diversity of catfishes. The entire order Siluriformes comprises about 30 families and 2000 species. Of these, family Bagridae is the Old World counterpart of the Pimelodid catfishes and are economically valuable in India and eastern parts of its range. It is distributed from Africa through Middle Asia, Pakistan, India, Bangladesh through Myanmar, Thailand, Malaysia and East Indies up to China. The density of the species concentration decreases from west to east and is minimal in China. Of about the two dozen valid genera known so far of the family, *Mystus* is the most common in India and adjacent countries. The fishes of this genus though not growing to a large size, excepting a few, provide by numbers the required protein to the masses. Being easily available in almost all types of freshwaters, they are caught by diverse gears and tackles and are fresh or dried. Two species *Mystus gulosus* and *M. vittatus* enter the sea also though not to a great distance. Some as *M. krishnensis* grow to giant size (90 cm) a few as *M. punctatus*, *M. montanus* attain a length of about 60 cm. The entire genus comprises of 44 species and no consolidated revision on a worldwide basis has been done so far. The nomenclature of the genus, the fixation of the type species, a part revision of the Indian and Thailand species and osteological comparisons of selected species were the only contributions made of this genus.

The inter-specific affinities and the generic composition of this genus as a whole needed an investigation. Whether the species formed any natural groupings and if so, as to what measurable extent their integration existed was also worth a study.

This paper aims to look into these aspects and present a World-wide revision for the first time. This work formed a part of the Thesis for the Doctor of Philosophy (Ph. D.) of the Calcutta University for the second author. The work was done between the years 1983 to 1987, the thesis submitted in 1988 and degree awarded in 1993. The delay between the submission of the thesis and award of the degree was due to the procedural formalities of the University. In the meantime both the authors were preoccupied with other commitments and could not make the thesis ready for publication. In the intervening period much work and descriptions of new taxa, redefinition of the genus and concepts were published notably by Drs. Tyson Roberts and H. H. Ng. The first author undertook the task of updating the entire work and made it fit for publication.

II. MATERIAL AND METHODS

This study is based on an examination of the named and unnamed material of the genus in the National collections of the Zoological Survey of India at Calcutta, Calicut, Chennai, Shillong and also from freshly collected specimens. In this context the entire Wayanad and Malabar range of hills of the Western Ghats was extensively surveyed. Specimens of some species poorly represented in the ZSI, such as *Mystus oculatus* (Valenciennes); *M. malabaricus* (Jerdon) and *M. armatus* (Day) were collected from their respective type localities. Besides, the types of all species present in the ZSI were also examined. Material of extra Indian species was obtained on loan basis from foreign museums where they are present. A list of such institutions is given separately. Where no specimens were available we have drawn their descriptions and data from published literature. Locality names in synonymy; specimens studied have not been corrected. Color mentioned of each species is mostly of formalin preserved specimens; where live specimens were collected their natural colour is indicated.

METHODS

Measurements and counts used in this work are as per Jayaram (1981, 1999). All measurements were taken with the help of Dial Calipers to the nearest half of a millimeter for the size range up to 150 mm and using measuring steel scale and dividers above this size. Measurements of all characters, both morphometric and meristic were taken. The radiographs were taken with the help of two types X-ray machines on two types of X-ray films. The details are as below :

Equipments used

1. (A) Ray Max X rays machine Manufactured by M/s Radon House, Calcutta. Target Copper.

Voltage 30 KVp

Current 10 mA

Distance between the window and the film 100 to 120 cm approximately

Contact radiographs.

1. (B) Diagnostic X ray machine Unit Stallion 50

Manufactured by International General Electric (India) Ltd, Calcutta. Target - Tungsten

Voltage 40 to 85 KVp

Current 10 to 50 mA

Distance between X ray machine and film 90 cm approximately.

Contact radiographs.

2. (A) Medical X ray films

2. (B) Industrex X ray films

3. Film cassette with intensifying screens

Procedure

1. Fishes of nearly equal sizes were selected for radiographs.
2. They were taken out of the preservative and wiped dry with cotton dusters/napkin.
3. The cassettes were loaded in the dark room with X-ray films of the required sizes.
4. About 5 to 6 smaller fishes were placed over the tube side of the X ray film cassette.
5. The fishes were held straight in proper position by tying their proximal and distal ends with the help of needle and thread to a pair of metallic stands placed on either side of the cassette.
6. Proper KVp and mAs were selected depending upon the type of fish and exposure was made.
7. In the case of larger fishes, only one or two specimens could be placed over each cassette for a single exposure.
8. Radiolucent packing material (cotton wool) was used to maintain the proper position of the larger fishes at the time of exposure.
9. The exposed films were taken out of the cassettes in the dark room laboratory and processed accordingly.
10. The finished products were then washed in running tap water, dried and viewed in view box for necessary readings.
11. Proper tabulations were made to identify the fishes that were being serially exposed for skiagraphy.

III. ABBREVIATIONS AND CONDENSATIONS

AMNH	- American Museum of Natural History, New York, USA
BMNH	Natural History Museum, London, England
CAS	California Academy of Sciences, San Francisco, USA
MNHM	Museum National d'Histoire Naturelle, Paris, France
ROM	Royal Ontario Museum, Ontario, Canada
USNM	United States National Museum, Smithsonian Institution, Washington DC, USA

VNHM	Naturhistorisches Museum, Wien, Austria
ZSI	Zoological Survey of India, Calcutta
ZSI/SRS	Southern Regional Station, Chennai
ZSI/WRS	Western Regional Station, Pune
ZSI/WGRS	Western Ghats Regional Station, Calicut, Kerala
NWFP	North West Frontier Province, Pakistan
AP	Andhra Pradesh

IV. ACKNOWLEDGEMENTS

We express our thanks to the Director, Zoological Survey of India for extending all laboratory facilities. Many individuals have helped us by their constructive suggestions and loan of specimens for this study. In cases where specimens could not be sent on loan, information and other relevant data were furnished freely. To each and everyone cited below we are indebted and trust that no one has been overlooked.

Mme M. L. Bauchot (Paris); Dr. Tyson Roberts (San Francisco); Dr. Brian Coad (Ottawa); Dr. B. B. Collette (Washington DC); Dr. Godon Howes (London); Dr. Volker Mahnert (Geneva); Dr. H. Wilkens (Hamburg); Dr. Maurice Kottelat (Comol, Switzerland); Dr. Barbara Herzig (Wien); Dr. Munir K. Bunni (Baghdad); Mr. Nuri Mahdi (Baghdad); Prof. H. Tombi Singh, Dr. Vishwanath Singh (Imphal); Dr. P. K. Talwar (N. Delhi); Dr. R. Natarajan (Porto Novo); Dr. M. Ramakrishnaiah (Eluru); Dr. G. M. Natarajan (Coimbatore).

Special thanks are due to Dr. Debabrata Sanyal, husband of the second author for patiently taking the X-ray photographs. She is grateful to her late father Amulya Chakraborti and her mother Smt. Ruby Chakraborti who provided constant source of inspiration and encouragement.

Our thanks are due to Sri A. K. Mondal, Sri M. K. Sen, artist and photographer and all the staff members of the fish division of ZSI for their support. The thesis was patiently typed by Sri A. K. Chaudhury to whom also our thanks are due.

V. HISTORICAL REVIEW

Gronovius in 1763 in his famous work "Zoophylacii Gronoviana" described certain fishes using polynomial phrases. The International Commission of Zoological Nomenclature (Opinion 89) invalidate Gronow's work. In 1777 Scopoli adopted the genera of Gronovius and gave binomial names to some of the them. Thus Scopoli's genera have been accepted by the International Commission as valid. Later, Meuschen (1781) named one of the species of Gronovius (No. 388) as *Mystus anguillaris*. Solander in 1794 reporting on the fishes collected by Russell from the river Aleppo, Syria described *Silurus pelusius* which incidentally

happens to the type-species of this genus as elucidated by Jayaram in 1962 and described later in detail by Anuradha & Jayaram in 1985. Bloch in 1797 described from Tranquebar certain catfishes of which *Silurus vittatus* is a species of *Mystus*. Hamilton-Buchanan in 1822 in his invaluable account of the "Fishes of the Ganges" described 35 species under the name *Pimelodus*. Of these, four are referable to *Mystus*. A great advantage of Hamilton-Buchanan's work is that he was able to illustrate most of the fishes described by him from live specimens collected during his sojourn. It is a historical fact that Hamilton-Buchanan was not allowed to take all the drawings which he got executed while he was in India, but fortunately some of these unpublished drawings preserved in the India Office Library, London have been published by Hora (1929). It is worthy of attention that some of the illustrations published by Hamilton-Buchanan (1822) do not tally with the description of species given by him in the text. For instance the figures of *Mystus cavasius* (pl. 9, fig. 67), *Mystus gulio* (pl. 23, fig. 66) differ significantly from their respective published accounts on pages 203 and 201 respectively. This may be due to the fact that Hamilton-Buchanan may have had two different sets of specimens at the time of illustration and description. Despite such confusions the above-cited species are validly referable to *Mystus*. The genus *Pimelodus* as envisaged by Hamilton-Buchanan is a composite one and comprises of 15 to 17 genera of Indian fishes. Hora in 1948 analysed the species composition of Siluroids in particular and indicated that 49 species previously referred to under *Pimelodus* are siluroid fishes.

Valenciennes (1839) described 58 species under the genus *Bagrus*, which included some of Hamilton-Buchanan's species described under *Pimelodus* also. Valenciennes too realised the composite nature of Hamilton-Buchanan's *Pimelodus* and opined that it could be subdivided even on the character of the number of barbels. Jayaram (1959) analysed the systematic position of the species included under *Bagrus* and showed that 21 species can be assigned to Bagridae of which 17 are referable to *Mystus*.

Sykes (1841) reporting on some fishes from "Dukhun" (=Deccan) described *Pimelodus seenghala* and *Pimelodus seengtee* with beautiful coloured illustrations. These two are now referable to *Aorichthys seenghala* and *Mystus cavasius* respectively. However, Sykes while describing *Platystoma seenghala* stated "this fish is remarkable for having the first ray of the ventral fins as well as that of the pectoral serrated posteriorly and the first dorsal spine not serrated" (page 372). The illustration of this species on plate 45, fig. 2 also shows this character of the ventral fins (pelvic fins) having the first ray serrated posteriorly. No species of Indian Bagridae has such a feature where the pelvic fin first ray is serrated posteriorly.

Jerdon (1849) reporting on a collection of freshwater fishes from Southern India described under *Bagrus* 16 species of which 8 are referable to *Mystus*. It is worthy of note that Jerdon's descriptions were brief and without any illustrations. Most of the species were described not from many examples and the provenance of species uncertain. However, we have been able to collect first hand (February, 1985) a large number of topotypes of many species described by Jerdon in the Waynaad and north Kerala areas comprising 35 examples of *M. montanus*, seven of *M. malabaricus* and four of *M. oculatus*.

Dumeril (1856) erected the genus *Macrones* to accommodate *Bagrus lamarii* Valenciennes (= *Aorichthys seenghala* (Sykes)) and defined the genus. Dumeril did not describe any species in detail. In spite of this, Dumeril's work is considered as the first one initiating a taxonomic study of this genus. Unfortunately, the name *Macrones* (=broad mouthed fishes) is nomenclaturally invalid since it is preoccupied in Coleoptera (Insecta) and has been subsequently replaced by *Aoria* Jordan (1919) which again is preoccupied in the same group of insects and has to be substituted by the name *Mystus* Scopoli (1777). The different usages of the name *Mystus* has been dealt with by us in another publication (Jayaram & Anuradha, 1984). The nomenclatural status of the names *Mystus*, *Macrones*, *Aoria* has also been clarified by Jayaram (1959). Bleeker in 1846 gave an analysis of the siluroid species and utilised the characters of relative lengths of adipose and anal fins and number of branchiostegal rays and barbels for separating them. In this work he described 13 species under the genus *Bagrus* which he later (1858) reduced to nine. In 1859 while enumerating the list of species of the Indo-Australian Archipelago he recognised the occurrence of *B. aor* (= *Aorichthys aor*), *B. cavasius* (= *Mystus cavasius*), *B. keletius* (= *Mystus bleekeri*), *B. tengara* (= *Mystus tengara*) in India but made no comments regarding their taxonomic status. In 1962 in his Atlas Ichthyologique, he amended the generic limits of *Bagrus* and placed it under "Phalanx 4 Bagrie" He gave coloured illustrations of some species of *Hemibagrus* (*nemurus*, *planiceps* and *wyckii*), *Hypselobagrus* (*nigriceps*, *wolffi* and *micracanthus*) and *Aspidobagrus* (*gulio*). It is of interest to note here that Bleeker recognised for the first time Dumeril's genus *Macrones* in his work and emended its limits in a more elaborate way. Like Dumeril, Bleeker also did not include the other species of *Mystus* described under *Bagrus* Valenciennes except *Bagrus lamaarii* (= *Aorichthys seenghala*). Reporting upon Siluroid fishes he could procure, Edward Blyth in 1858 recorded from the Calcutta bazaar five species. Gunther (1864) in his Catalogue of the fishes in the British Museum included the genus *Macrones* as the 31st genus in the Family Siluridae under the 4th sub-family Siluridae Proteropterae group F. Bagrina. He based his classification of the different genera on the nature of dentition on the palate, the number of soft rays in the dorsal fin and the total number of mandibular barbels. He merged under the genus *Macrones* all the genera of Bleeker such as *Hypselobagrus*, *Hemibagrus* and *Aspidobagrus*. Nineteen species were described under *Macrones* of which *Mystus elongatus* from Thailand was new. Gunther's conception of *Macrones* was composite in the sense that he included under this genus species like *M. batasio affinis*, *M. tengana* which now belong to the genus *Batasio* Blyth, and *M. itchkeea* is now assigned to the genus *Gagata* Bleeker. In fact almost all the earlier authors considered *Macrones* as a catch-all for all catfishes which had four pairs of barbels. The fine differences such as the presence of sensory pores, position of barbels and eyes were not looked into by them. Subsequent to Gunther, Day in 1865 in his *Fishes of Malabar* described *Mystus malabaricus* under the genus *Hara* Blyth. He recognised in this work all the genera of Bleeker such as *Pseudobagrus*, *Hemibagrus*, *Hypselobagrus* and *Aspidobagrus*. However, in his monumental work on the *Fishes of India* (1876-1878) he merged all these under *Macrones*. It is interesting to mention here that Day included Jerdon's (1849) *Bagrus malabaricus* (= *Mystus malabaricus*) from Malabar but failed to notice that his *Hara malabarica* is the same as that of Jerdon's species. Some of these species described earlier under

Macrones were placed under different Bleekerian genera in his work on the *Fishes of Malabar* (1865a) but in his *Fishes of India* he reversed his treatment of recognising the different genera of Bleeker and placed them all under *Macrones*. One of the reasons for his synonymising all these under *Macrones* may be that he found these divisions to be arbitrary and unsuitable as they were based on the total number of anal fin rays which he considered as a variable character. However, it is worthy of note that Day utilised the very same character of the count of anal fin rays to separate the different species of *Macrones* = *Mystus* in his *Fishes of India* as well as in the *Fauna of India* volumes (1889). In the former work Day described 18 species of which *Mystus microphthalmus* from Myanmar was new. The main utility of Day's *Fishes of India* as constant source of reference even today, lies in the fact that Day gave illustrations of a majority of the species described in his work. In respect of *Mystus*, Day illustrated all the species with the exception of *M. blythii* (= *Batasio tengana* Hamilton-Buchanan) and *M. aor* (= *Aorichthys aor* Hamilton-Buchanan). *M. keletius*, which is illustrated in plate 98, fig. 5, by misprint appears in the text as fig. 3. *M. vittatus* is delineated twice to show the different colour patterns. All the species described in the *Fishes of India* are included in the *Fauna of India* volume also.

Gunther (1873) described erroneously *Macrones (Pseudobagrus) tenuis* and *Macrones (Liocassis) taeniatus* from Shanghai collected by Mr. Swinhoe and placed them under the genus *Mystus* but in reality referable to *Liocassis* Bleeker. Vinciguerra (1890) gave a synopsis of 10 Burmese species with a good historical resume. He described *M. dayi* as a new species, which belongs to the genus *Batasio*. He also described another species *Mystus rufescens* which is valid. Roberts (1994) has recently recorded it and has given a good diagnosis.

In (1901) Steindachner divided these fishes into two groups : "Gruppe Bagrina" and "Gruppe Ariina" The first group included *Hypselobagrus micracanthus* Bleeker (= *Mystus micracanthus*) and was correctly placed, whereas under the second group *Macrones (Hemibagrus) nemurus* (= *Mystus nemurus*) was included which is an error. Volz (1904) recorded five species of this genus from Sumatra.

Regan (1911) published in two parts a classification of teleostean fishes based on osteological characters. This excellent work paved the way for classification of these fishes for a number of years. Regan raised the sub-family Bagrinae to the rank of a family Bagridae, a position which has remained unchanged for many years.

Weber and de Beaufort (1923), in their treatise on the *Fishes of the Indo-Australian Archipelago* described eight species under *Macrones* and gave a key for their identification.

Jordan (1919) in his *Genera of Fishes* proposed a substitute name *Aoria* for *Macrones*, because of the latter's preoccupation in Coleoptera (Insecta) as already mentioned. It is unfortunate, Jordan did not know that the name *Aoria* itself was preoccupied in the same order of Insects. Jordan and Evermann (1917) identified *Bagrus halepensis* Valenciennes as equivalent to *Mystus cirris octo capito longioribus* Gronow and designated this species as

the type-species of *Mystus*. Hora (1921) erected a new sub-genus *Macronoides* for some species of *Mystus* which later in (1941) Hora & Law correctly placed it under the genus *Batasio* Blyth. Fowler (1928) was the first author to use the name *Mystus* after Scopoli. Prashad and Mukerji (1929) reporting on the fishes from Indawgyi Lake, Myanmar included six species of which four are referable to *Mystus*, they used the name *Aoria*. Subsequent Ichthyologists like Hora and Mukerji (1934), Herre and Myers (1937) and Smith (1945) 'adopted' the name *Mystus*. Holly (1939) proposed a new name *Sperata* for this group of fishes, designating *Silurus vittatus* (Bloch) = *Mystus vittatus* as the type species. Wu (1939) reporting on fishes of Li-Kiang, proposed *Aorichthys* as a substitute for Jordan's *Aoria*. White and Moy Thomas (1940) proposed a new name *Macronoichthys* for *Macrones* Dumeril (1856). Nichols (1943) described *Mystus* species from China and used the name *Aoria*.

Ahmed (1943) gave diagnostic characters of the genus *Mystus* and gave a key to the species. Smith (1945) listed nine species from Thailand of which *M. havmolleri* is a synonym of *Batasio tengana* (Hamilton-Buchanan).

Jayaram (1954) revised the Indian species of the genus *Mystus* and separated *Mystus aor*, *seenghala* and *leucophasis* under a new sub-genus *Osteobagrus*. He gave a key to the 11 species of *Mystus* and three species of *Osteobagrus*. He gave also a list of extra Indian species besides a brief discussion on the zoogeographical aspects. In 1959 the same author designated the correct type species of this genus and clarified the nomenclatural status. Bhuiyan (1964) gave a key to *Mystus* species from Dacca, Bangladesh and also elaborated the diagnostic characters of the genus. Jayaram (1966) discussed the inter-relationships of this genus with allied genera and also discussed (1978) the systematic status of species known from China. Islam and Siddiqi (1971) gave a key to the species, their brief description regarding colour and synonymy from river Jhelum, Punjab. Rahman (1974) gave a checklist, key to species and local names of this genus from Bangladesh. He included six species. Ganguly and Datta (1975) gave a diagnosis of this genus based on osteological characters and discussed its taxonomic status also. Desoutter (1975) gave a description and key to species from Kampuchea which are *M. aubentoni*, *M. cavasius*, *M. micracanthus*, *M. nemurus*, *M. planiceps*, *M. wyckii* and *M. wyckioides*. Jayaram (1977a) discussed the commercial importance of the species of this genus. In another contribution in the series "Aid to the identification of siluroid fishes" he (1977) gave an illustrated key for identification of species of this genus. Dutt and Sharma (1979) gave a key to *M. bleekeri*, *M. cavasius*, *M. gulio* and *M. vittatus* known from the central coastal areas of Andhra Pradesh. Jayaram (1981) in his Handbook on the Freshwater Fishes of India, gave a list of 18 species, their distribution, a key for their identification besides a generic diagnosis.

Dutt, Sharma and De Soutter (1982) gave a synonymic list of this genus. In 1984 Sharma and Dutt gave a taxonomic account of four species of this genus known from Guntur besides a key for their identification. They treated *M. nigriceps* as junior synonym of *M. cavasius*. *M. tengara* and *M. carcio* were relegated to the synonymy of *M. vittatus*. Mirza and Omer (1984) gave a key for identification of *Mystus cavasius* and *M. gulio* known from Baluchistan. Roberts (1989, 1992 and 1994) revised some Thailand species of the

genus and advocated a new definition. This is discussed elsewhere (Jayaram 1999) where 19 species from the Indian region have been listed. Talwar & Jhingran (1991) gave a descriptive account of the Indian species. More recently Ferraris (1999) advocates the use of *Sperata* in place of *Aorichthys*.

VI. EVALUATION OF TAXONOMIC CHARACTERS

Catfishes of the genus *Mystus* Scopoli are of common occurrence in Indian waters. There is hardly any body of water where these fishes are not found. As many as 21 species are known from India, Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka, whilst a total of 44 species are known from its entire range of distribution. Although they are common in fishery operations and are sold extensively in fresh and dried condition, many species are so much generalised that quite often the same local name is applied to one or more species. For instance, the popular name 'tengra' is uniformly used for all catfishes, although strictly speaking it should be applicable to only *Mystus tengara*. Even in taxonomic literature, confusion in identity of species has risen. Previous workers have relied on highly variable characters, which has added only to the prevalent chaos. In order to provide an easy identification manual and also to place the taxonomy of this group on a firm footing it was considered necessary to evaluate the different characters which have been so far used for their merits and demerits. It was also thought prudent to test the utility of some unconventional characters, which have not been so far tested.

1. Barbels : Jayaram and Anuradha (1984) discussed the various usage of the name *Mystus* and have shown that invariably the name '*Mystus*' has been used to denote all fishes with barbels irrespective of their number. This seems to have prompted earlier ichthyologists as Belon (1553), Gronovius (1763), Scopoli (1777) and Meuschen (1781) to adopt the same as a basic character for classification. Even veteran ichthyologists as Hamilton-Buchanan (1822), Bleeker (1862), Gunther (1864), Day (1878) utilised the number, the relative lengths of the barbels as a taxonomic tool. Unfortunately the relative lengths of the barbels have been found to vary within individuals of the same species and as such can be used only in a limited manner. Some authors as Babu Rao and Chattopadhyay (1969) have also used the relative length of the nasal barbels and mandibular pair.

2. Position of eyes : Most siluroids have a pair of moderate sized eyes situated on the upper part of the head. *Mystus* species in particular have more or less a uniform size of eyes with a free eyelid. No species has so far been found which has inferiorly placed eyes as in the case of *Chandramara* or *Horabagrus* for which character Jayaram (1955, 1973) gave generic importance. As such the size and position of the eyes are of no value in classification of *Mystus* species.

3. Median longitudinal groove : It is known that the median longitudinal groove running mid-dorsally on the head of *Mystus* species represents the cranial fontanel covered by skin, rough or smooth and most often with a thick coating of mucous. As it represents

an osteological formation it is highly dependable and is of value in classifying species. Depending upon the extent of fusion of the bones, the fontanel may be single (*M. gulio*) or double (*M. punctatus*). Many workers have used this character as a primary aid for separating groups of species. The posterior end of the posterior fontanel may or may not run up to the base of the supra-occipital process. This feature of the extent of the posterior fontanel reaching or not reaching the base of the occipital process is also an important character. This feature though very dependent, often times difficulties arise in determining the reach of the bone. The termination of the posterior end of this fontanel is often obliterated by the thick skin of mucous. On such occasions useful results have been achieved by clearing the specimen of mucous or dissecting the skin if necessary to expose the posterior end or even by insertion of a dissecting needle into the fontanel and dragging it to the end of the fontanel.

4. Occipital process : *Mystus* species have an extension of the supra-occipital bone in the form of an elongated bone called the supra-occipital process. This bone extends towards the basal bone of the dorsal fin and thereby gives support to the fin. Jayaram (1971, 1971a) erected the genus *Osteobagrus* in which a distinct interneural shield in between the basal bone of the dorsal fin and the occipital process is present. In *Mystus* there are two groups of species : in one the occipital process is long and meets the basal bone of the dorsal fin and in the other the occipital process is short and does not meet the basal bone of the dorsal fin. In most species the occipital process invariably meets the basal bone of the dorsal fin as in *M. armatus*, *M. bleekeri*, *M. cavasius*, *M. gulio*, *M. oculatus* and *M. tengara*. In species like *M. elongatus*, *M. keletius*, *M. malabaricus*, *M. menoda*, *M. microphthalmus*, *M. punctatus*, *M. vittatus* the occipital process does not reach the basal bone of the dorsal fin. Many workers like Gunther (1864), Day (1889), Smith (1945), Babu Rao and Chattopadhyaya (1969), Jayaram (1971) have extensively used this character. In this character also as in the case of the median longitudinal groove, the termination or the meeting point of the occipital process is often ambiguous. Here again a little dissection of the covering skin and exposure of the bone will help considerably the final determination of the extent of the posterior end of the occipital process.

5. Cubito-humeral process : This is a small bone above the pectoral fin, being the posterior prolongation of the post-temporal bone and of the pectoral girdle. The bone is exposed, rugose and often times may be longer than usual as in *Rita*. No attempts have so far been made to use this character as in aid for classification. However, in *Mystus* species there is not much variation and it is of uniform length and width and as such is of no use for classification.

6. Gill openings : Catfishes are mostly bottom feeders and as such unlike hill stream fishes, the gill openings are extensive and open nearly up to the lateral line on the dorso-lateral side. The gill membranes are free and are fused with the isthmus. No specialisations are seen in the attachment of the membranes. However, the number of branchiostegal rays is significant.

7. Snout : The shape and structure of the snout has been of use in taxonomic studies. Jayaram (1968) utilised the shape of the snout in classifying *Pelteobagrus*, *Pseudobagrus* and *Leiocassis*. He demonstrated that depending upon the length and shape of the snout invariably the position of the mouth also shifts from the terminal to sub-terminal or even inferior position. The snout may be pointed, rounded, obtuse or spatulate. In species of *Mystus*, it is generally seen that the snout is obtuse. However *seenghala* and *aor* have a spatulate snout. It may be indicated here that these two species are now segregated under a separate genus *Aorichthys*. Some species as *M. leucophasis*, have somewhat a less rounded snout. Species as *M. micracanthus*, *M. nemurus*, *M. bleekeri*, *M. cavasius*, *M. keletius* have a more rounded snout.

8. Barbels : These are sensitive organs or feelers in almost all catfishes. Unlike that of carps, these barbels have a cartilaginous core and with their help the fishes are able to decide the quality of food and also the width or depth of the aperture and crevices into which they are perforce obliged to move. Jayaram (1978) discussed the responses of catfishes barbels in detail. In *Mystus* species there are four pairs of barbels. The maxillary is invariably longer than the head. The position of the barbels, particularly the maxillary and nasal are of no taxonomic importance, except of course that of the mandibular pairs which is of value in separating some species. This character of the position of insertion of the mandibular barbels has been used in segregating species of the genera *Gagata* and *Nangra* (Family Sisoridae). Day (1876-78), Hora and Law (1941), Jayaram (1979) and many others used the lengths of the maxillary barbels as a differentiating character. It has been found that this character is not reliable as it varies with age and growth. For instance in *M. cavasius* the maxillary barbels are reported to extend beyond the base of the caudal fin, but it is often seen that in many instances they fall short of the anal. As such this character has its own limitations.

9. Dentition : The pattern of teeth formation has been of much use and disuse in siluroid fishes. Hora (1936) discussed this variable pattern of dentition in siluroid species and demonstrated its utility as a taxonomic tool. In Bagridae, excepting the genus *Rita* Bleeker, where the dentition pattern is entirely different, in respect of almost all the species of the family, the teeth are villiform and are in bands; *Mystus* is no exception. In *Mystus* species the teeth bands are in the form of a semi-lunar uninterrupted band on the palate and on the upper jaw; in the lower jaw a deeply curved interrupted band is present. However in *Mystus horai* the palate band is mesially interrupted which is an exception. As such the dentition character is of no value in respect of this genus.

10. Mouth : The position of the mouth is an important character in siluroids as it relates to the habitat of the fish. In general it is known that an upturned mouth as in Clupeids enable them to browse at the surface whereas an inferior mouth renders the fish to feed at the bottom. Often the mouth is provided with suckers. However in *Mystus* species no such modification or change of position are seen since most of them are bottom feeders and browsers. The mouth is subterminal. The width of gape of mouth is also of little value in separating species.

11. Lips : In most species of *Mystus* lips are simple without and labial fold or sensory papillae or pores. The extent of the lips is also not wide and considering that these fishes are mostly bottom feeders, the lips are not in any way specially modified for picking up detritus from the bottom.

12. Position of nostrils : All fishes have a pair of nostrils situated on the anterior part of the snout. The position of the nostrils is a major character of family value. For instance the Sisorids and Ariids have a pair of closely placed nostrils whereas in Bagridae the nostrils are widely separated. However, within the family itself for differentiation of genera and species the position of the nostrils is of little use since they are placed in a uniform position.

13. Gill raker count : The gill raker counts on the lower and upper limb of the first gill arch are of taxonomic value. Generally the count on the lower limb is alone taken into consideration. It is found that in *Mystus* species the count is more or less constant and non-variable. So this character is helpful in differentiating species and groups of species only to a limited extent. The data obtained by us are presented in Table I.

Table I : Gill raker counts in certain species of *Mystus*

Species	Standard length (in mm)	first gill arch	
		Upper limb	Lower limb
<i>argentivittatus</i>	40.3-40.7		
<i>armatus</i>	56.0-159.2	5	12
<i>aubentoni</i>	185.2-297.5	3-4	8-9
<i>baramensis</i>	131.8	5	14
<i>bleekeri</i>	40.9-123.8	4-8	8-16
<i>cavasius</i>	63.4-200.7	3-4	8-12
<i>chinensis</i>	269.4-398.0	5	14
<i>dibrugarensis</i>	60.3	6	16
<i>elongatus</i>	164.5-236.0	6	17
<i>gulio</i>	53.2-141.1	7-9	26-30
<i>keletius</i>	39.8-70.2	7	26-28
<i>krishnensis</i>	322.1-419.0	2-3	5-8
<i>leucophasis</i>	44.5-210.3	4-6	12-21
<i>malabaricus</i>	68.6-107.1	6-8	20-23
<i>menoda</i>	150.1-287.1	4-5	8-13
<i>micracanthus</i>	76.3-151.5	6	18-21
<i>microphthalmus</i>	139.6-247.1	2-3	8-9
<i>montanus</i>	59.4-79.8	7-9	20-24
<i>nemurus</i>	129.5-176.1	3	9-12
<i>oculatus</i>	78.0-86.8	6-7	20-21
<i>peguensis</i>	76.4	4	12
<i>pelusius</i>	142.8-171.2	3-4	10-11
<i>planiceps</i>	85.1-114.1	3-5	13-14
<i>pulcher</i>	48.2-56.5	6-8	20-25
<i>punctatus</i>	120.8-196.8	4-5	14-15
<i>sabanus</i>	77.8	7	22
<i>tengara</i>	36.8-67.9	6-10	19-24
<i>trachacanthus</i>	87.7	10	25
<i>vittatus</i>	35.5-88.5	4-6	15-19
<i>wyckii</i>	100.6-398.5	3-4	9-10

14. Pharyngeal teeth : The innermost gill raker is modified in the form of a bone and bears strong bony teeth. This character has also been used by many workers and is of some taxonomic value as that of gill raker count. As stated elsewhere museum specimens, solitary examples, type specimens cannot be mutilated; hence this character is of restricted importance only.

15. Fin-ray counts : One of the most important meristic characters of classificatory value in all groups of fishes is the fin ray count. The paired and the unpaired fins exhibit a remarkable constancy in respect of these counts of simple and branched rays. The frequency distribution data of the fin ray counts have been variously analysed by several workers and significant results have been obtained. Jayaram (1966) separated the genus *Rita* into a separate sub-family Ritinae solely on the basis of its members having seven or eight pelvic fin rays versus a constant six in all other members of the family. In a similar manner Singh and Jayaram (1981) found that the number of branched rays in the upper and lower lobe of the caudal fin is more or less constant as 7+8. The dorsal fin rays are almost always constant and is of family significance. Jayaram (1952, 1955) on the basis of the characters of the anal fin having more than 17 rays unlike other species of *Mystus* with only 10 to 14 rays separated *Mystus chryseus* as a separate genus *Horabagrus*. In the case of *Mystus* species the dorsal fin has one spine and 5 to 7 branched rays. Since this number is more or less constant, this character is of no use in separating the species. However, in some species as *M. dibrugarensis* a prolongation of the dorsal fin in the form of a filament is seen which Chaudhuri (1913) used as a taxonomic character. The length of the dorsal fin rays has been thought of some use in differentiating species but this is associated with sexual dimorphism and as such cannot be relied upon. The width of the base of the dorsal fin invariably depends upon the number of fin rays the species possesses as such the last two cited characters are of no use.

16. Adipose dorsal fin : Siluroids as Chacidae, Clariidae, Heteropneustidae, Plotosidae, Siluridae have no adipose dorsal fin. All other families (Akysidae, Amblycipitidae, Bagridae, Olyridae, Pangasiidae, Schilbeidae, Sisoridae) bear a second dorsal fin which is smooth and without any rays or spine. This adipose dorsal fin is of varying length and has been of some taxonomic value. In the case of *Mystus* species the adipose dorsal fin is always free from the caudal fin and not confluent with it, but is placed at varying distance from the rayed dorsal fin; for instance in the case of *M. bleekeri*, *M. cavasius*, the interspace between the dorsal and adipose dorsal fin is almost negligible, whereas in the case of species as *M. gulio*, *M. punctatus*, *M. vittatus* the interspace is considerable. This character is of value and earlier authors as Gunther (1864), Day (1876-78) have utilised the width of the adipose dorsal fin as opposed to the width of the anal fin as at taxonomic aid. One of the handicaps in utilising this character is in the case of old preserved specimens or badly preserved examples, where the origin of the adipose dorsal fin becomes obliterated because of shrinkage and as such the extent of the fin cannot be accurately derived. Hence this character is also of limited value.

17. Pectoral fins : The count of the pectoral fin rays has not received as much attention as it deserved. One of the reasons may be that the inner pectoral fin rays are generally thin and are hard to discern for counting purposes. The data obtained by us for certain *Mystus* species is presented in Table 2. It is seen that there is always only a single simple ray but the number of branched rays varies which is of some significance. The pectoral spine is always serrated on the inner edge with antrorse teeth and the outer edge is smooth. In genera as *Conta*, *Erithistes* (Sisoridae) the serrations of the spine are different and they are of much value.

Table 2 : Pectoral fin ray counts in certain species of *Mystus*.

Species	Standard length (in mm)	Pectoral fin rays count	
		Simple	Branched
<i>argentivittatus</i>	40.3	1	6
<i>armatus</i>	56.0-159.2	1	7-8
<i>baramensis</i>	131.8	1	9
<i>bleekeri</i>	40.9-123.8	1	9-10
<i>cavasius</i>	63.4-200.7	1	8-10
<i>chinensis</i>	269.4-398.0	1	9-10
<i>elongatus</i>	164.5-236.0	1	8-10
<i>gulio</i>	53.3-141.1	1	8-9
<i>keletius</i>	39.8-70.2	1	9
<i>krishnensis</i>	322.1-419.9	1	8-9
<i>leucophasis</i>	44.5-210.3	1	8-10
<i>malabaricus</i>	68.6-107.1	1	7-8
<i>menoda</i>	150.1-287.1	1	9
<i>micracanthus</i>	79.3-151.5	1	9
<i>microphthalmus</i>	139.6-247.1	1	8-9
<i>montanus</i>	59.4-79.8	1	6
<i>nemurus</i>	129.5-176.1	1	7-8
<i>oculatus</i>	78.0-86.8	1	8
<i>peguensis</i>	76.4	1	6
<i>pelusius</i>	142.8-171.2	1	8
<i>planiceps</i>	85.1-114.1	1	9
<i>pulcher</i>	48.2-56.5	1	9
<i>punctatus</i>	120.8-196.8	1	9
<i>sabanus</i>	77.8	1	9
<i>tengara</i>	36.8-67.9	1	8
<i>vittatus</i>	35.5-88.5	1	8-9
<i>wyckii</i>	100.6-398.5	1	9-11

18. Anal fin : As stated earlier, length of the anal fin and consequently the number of anal fin rays have been used by Jayaram (1955) for separating *M. chryseus* (Day) as a new

genus *Horabagrus*. In all other species of *Mystus*, the frequency distribution of anal fin rays is as below (Table 3).

Table 3 : Anal fin ray counts in certain species of *Mystus*

Species	Standard length (in mm)	Anal fin ray count	
		Simple	Branched
<i>argentivittatus</i>	40.3	1	12
<i>armatus</i>	56.0-159.2	2	8-9
<i>baramensis</i>	131.8	2	9
<i>bleekeri</i>	40.9-123.8	3	6-7
<i>cavasius</i>	63.4-200.7	3	7-9
<i>chinensis</i>	269.4-398.0	1-3	11-12
<i>elongatus</i>	164.5-236.0	1-3	10-11
<i>gulio</i>	53.3-141.1	3	9-11
<i>keletius</i>	39.8-70.2	2-3	7-8
<i>krishnensis</i>	322.1-419.9	3	9-11
<i>leucophasis</i>	44.5-210.3	2-3	9-10
<i>malabaricus</i>	68.6-107.1	2-3	8-9
<i>menoda</i>	150.1-287.1	3-5	8
<i>micracanthus</i>	78.3-151.5	2-3	8-9
<i>microphthalmus</i>	139.6-247.1	2-3	9
<i>montanus</i>	59.4-79.8	3	8-9
<i>nemurus</i>	129.5-176.1	2	9-10
<i>oculatus</i>	78.0-86.8	3	9
<i>peguensis</i>	76.4	2	12
<i>pelusius</i>	142.8-171.2	2	8-9
<i>planiceps</i>	85.1-114.1	2	9-10
<i>pulcher</i>	48.2-56.5	2	9-10
<i>punctatus</i>	120.8-196.8	2-3	7-9
<i>sabanus</i>	77.8	4	8
<i>tengara</i>	36.8-67.9	2-3	9-10
<i>vittatus</i>	35.5-88.5	2-3	9-10
<i>wyckii</i>	100.6-398.5	3	10

It is seen from the above that the number of branched rays is not of much significance in separating species unlike the simple rays. Earlier workers like Gunther (1864), Day (1876-78) utilised the number of branched rays for separating species but the results were not satisfactory. Further, for a field worker it becomes difficult to determine the number of simple or branched rays without the aid of a hand lens. However it is evident that two groups are apparent : one with 1 or 2 simple rays and the other with 3 or 4 simple rays.

19. Caudal fin : The shape of the caudal fin has been of great diagnostic value in separating bagrid genera (Jayaram 1966). The caudal fin may be furcate, rounded, elongated, emarginate or deeply forked. In the case of *Mystus* species, since all of them have a forked caudal fin, the shape of the fin cannot be taken as a taxonomic aid. The number of branched rays in the upper caudal fin lobe has been computed and the data indicates that the upper lobe always has 7 branched rays and the lower 8. As such the count of the caudal rays or shape is of no value.

Some authors have considered the difference in the lengths of the upper and lower lobes of the caudal fin as a taxonomic tool. For example *M. microphthalmus* has the upper lobe of the caudal fin longer than the lower and has an elongated filament, whereas in *M. peguensis*, the lower lobe of the fin is longer. *M. trachacanthus* the upper lobe has an elongated filament and Chaudhury (1913) made it a separate species. In preserved examples, the caudal fin tends to be broken and hence the value of this character is much limited.

20. Position of fins : The place of insertion of the dorsal and pelvic fins has been considered as useful even in delineating families and orders. For instance genera as *Aspidoparia*, *Chela*, *Oxygaster* (Cyprinidae) are known by their posterior position of the dorsal fin.

In siluroids also some genera have a more anteriorly inserted dorsal fin. As such it can be seen that this character is of high significance. Though it is so, in respect of *Mystus* species, however, the dorsal is always inserted more or less above the pelvic fin insertion, slightly anteriorly. Hence this character also is of little value.

21. Shape of caudal peduncle : The caudal peduncle acts as a shaft for propelling the caudal fin in the locomotion of the fishes. As such depending upon the habit of the fish, the caudal peduncle varies from being narrow or whip-like as in *M. cavasius*, *M. keletius*, or broad and thick as in *M. armatus*, *M. malabaricus* etc. The least height of the caudal peduncle as opposed to its length has been found to be useful, since not much variation is seen in this. This character is as such of good taxonomic value.

22. Spine serrations : The dorsal and pectoral spines are often times serrated in almost all species. The pectoral spines are invariably serrated with deeply cut teeth along the inner face with the outer surface rough. In the case of dorsal spine there may be a few serrations along the inner edge but this is not always constant. Hora (1951) used the character of pectoral spine serrations in distinguishing some sisorid genera as *Erethistes*, *Erethistoides* but such clear-cut difference in serration are not seen in *Mystus*. The counts of pectoral and dorsal spine serrations are not constant and are highly varying within the individuals of the same species as seen from data presented in Table 4.

Table 4 : Spine serrations in species of *Mystus*

Species	Pectoral spine		Dorsal fin	
	Inner edge	Outer edge	Inner edge	Outer edge
<i>argentivittatus</i>		Damaged on both sides	9 minute	smooth
<i>armatus</i>	10-14	slightly rough	minute	smooth
<i>baramensis</i>		Damaged on both sides	5 small	smooth
<i>bleekeri</i>	10-15	smooth	rough	smooth
<i>cavasius</i>	11-14	smooth	slightly rough	smooth
<i>chinensis</i>	14	finely serrated	7 small teeth	rough
<i>elongatus</i>	12	smooth	finely serrated	smooth
<i>gulio</i>	9-12	smooth	slightly rough	smooth
<i>keletius</i>	10-12	smooth	minute	smooth
<i>krishnensis</i>	13-22	rough	finely serrated at tip	smooth
<i>leucophasis</i>	11-20	smooth	finely serrated	smooth
<i>malabaricus</i>	8-10	smooth	minute	smooth
<i>menoda</i>	20-23	smooth	2-3 minute at tip	smooth
<i>micracanthus</i>	8-14	smooth	finely serrated	smooth
<i>microphthalmus</i>	11-13	smooth	finely serrated	smooth
<i>montanus</i>	14-15	slightly rough	rough	smooth
<i>nemurus</i>	13-14	smooth	4-6 small	smooth
<i>oculatus</i>	8-10	smooth	2 small	smooth
<i>peguensis</i>	10	finely serrated	minute	smooth
		all along margin		
<i>pelusius</i>	14-18	smooth	minute	smooth
<i>planiceps</i>		Damaged on both sides	Damaged in all exs.	
<i>pulcher</i>	8-11	smooth	8 small	slightly rough
<i>punctatus</i>	12-16	smooth	4-5 small	smooth
<i>sabanus</i>	11	smooth	nearly smooth	smooth
<i>tengara</i>	8-10	smooth	finely serrated at tip	smooth
<i>vittatus</i>	15-16	smooth	3-5 minute at tip	smooth
<i>wyckii</i>	9-10	smooth	finely serrated	smooth
			along margin	

23. Fin shape : The shape of the caudal fin and its utility in distinguishing genera has already been discussed. In the case of *Mystus* the dorsal fin is of a normal shape with the anterior rays being all tall and the posterior rays short. The anal fin and the paired fins also do not exhibit any peculiar shape to be used as a taxonomic aid.

24. Vertebral counts : One of the trends in taxonomy of fishes is to take radiographs of the specimens. It was not until 1930's that x-rays began to receive the serious attention of the taxonomist. For specimens and the type specimens, there is no substitute for a x-ray if knowledge of the internal structure is required for identification. Thus it is helpful to obtain counts of vertebrate in fishes more accurately and without causing any injury to the specimens.

In the case of *Mystus* species radiographs of as many species as possible were taken to ascertain the vertebral counts specifically as it serves as an additional tool for differentiating and determining the taxonomic relationships in closely related species. Moreover for comparative studies, the vertebral counts provide valuable data, as they do not fluctuate physiologically, rhythmically or seasonally throughout the post-embryonic life of the fish. Data obtained is presented in Table 5 below :

Table 5 :

Species	SL (mm)	Time of exposure	Current mA	Voltage Kvp	Vertebrae		
					Pre-caudal	Caudal	Total
<i>argentivittatus</i> (Pl. I, fig. a)	40.3	05 min.	10	30	13	19	32
<i>armatus</i> (Pl. I, fig. b)	159.2	0.7 sec.	15	40	21	21	42
<i>baramensis</i> (Pl. I, fig. c)	131.8	12 m. 30 sec.	10	30	22	23	45
<i>bleekeri</i> (Pl. I, fig. d)	82.1	06 min.	10	30	19	18	37
<i>cavasius</i> (Pl. II, fig. e)	82.4	08 min.	10	30	20	19	39
<i>chinensis</i>	269.4	0.9 sec.	15	40	25	25	50
<i>gulio</i> (Pl. II, fig. f)	63.8	06 min.	10	30	16	17	33
<i>krishnensis</i> (Pl. II, fig. g)	419.9	0.9 sec.	15	40	26	25	51
<i>leucophasis</i> (Pl. II, fig. h)	156.8	01 sec.	15	40	19	18	37
<i>malabaricus</i> (Pl. III, fig. i)	84.3	06 min.	10	30	19	19	38
<i>menoda</i>	150.1	0.8 sec.	15	40	24	21	45
<i>micracanthus</i> (Pl. III, fig. j)	151.5	01 sec.	15	40	20	20	40
<i>microphthalmus</i> (Pl. III, fig. k)	139.6	0.8 sec.	15	40	30	23	53
<i>montanus</i> (Pl. III, fig. l)	79.6	06 min.	10	30	17	16	33
<i>nemurus</i> (Pl. IV, fig. m)	145.1	12 m. 30 sec.	10	30	20	21	41
<i>peguensis</i> (Pl. IV, fig. n)	76.4	03 min	10	30	17	23	40
<i>pelusius</i> (Pl. IV, fig. o)	164.3	12 m. 30 sec.	10	30	22	22	44
<i>punctatus</i> (Pl. IV, fig. p)	196.8	15 min.	10	30	23	22	45
<i>sabanus</i> (Pl. V, fig. q)	77.8	08 min.	10	30	16	17	33
<i>tengara</i> (Pl. V, fig. r)	36.8	02 min.	10	30	13	16	29
<i>vittatus</i> (Pl. V, fig. s)	66.5	03 min.	10	30	17	15	32
<i>wyckii</i> (Pl. V, fig. t)	117.9	0.8 sec.	15	40	25	22	47

It will be seen from the above discussion that the number of taxonomic characters that can be utilised for separating species of *Mystus* are very much limited and the few that are available are also of restricted utility. This is true in the case of all generalised fishes like *Mystus* where taxonomic differentiation is a difficult task.

VII. DEFINITION OF GENERIC LIMITS

The genus has undergone several nomenclatural changes besides taxonomic modifications. The history of the usage of the name *Mystus*, since its inception in 1763 by Gronow, the

nomenclatural aspects has already been published (Jayaram & Anuradha, 1984). It will be seen that for a number of years several siluroid genera with some common characters have been placed under the name *Mystus*. For a number of years the genus has remained as a single unit with 44 species described so far. Jayaram (1968) made an attempt to restrict the genus geographically as well as taxonomically by examining the systematic position of some extra-Indian species. Geographically the genus is concentrated maximum in the Indian peninsula and least in West Asia. Taxonomically the species of West Asia are different from those of the Indian peninsula. Though the genus itself is much generalised, most of the 44 species are well defined, each with a distinct diagnostic feature.

Tilak (1965) studied the osteocranium and Weberian apparatus of *M. gulio*, *M. vittatus* and *M. cavasius*. Jayaram and Bhimachar (1967) compared the osteocranium differences between *M. leucophasis* and *M. gulio*, *M. vittatus* and *M. tengara*, *M. bleekeri* and *M. cavasius*. Tilak (1965) grouped *M. cavasius* and *M. oculatus* under one head characterising them as having the central ridge of tripus continuous with the heel-like process; no cartilage between the lateral ethmoids; frontals forming half of the posterior fontanel; sub-temporals absent; foramen for cranial nerve 2 and 3 of both sides united to form a single median ventral foramen. Likewise he grouped *M. vittatus* and *M. gulio* under another head, differentiating them as having the ventral ridge of tripus independent of the heel like process; cartilage between the lateral ethmoids present; posterior fontanel completely enclosed by frontal or may be absent; sub-temporal present; foramen for 2-5 cranial nerves separate. Jayaram and Bhimachar (1967) demonstrated that apparently similar species are structurally different and they may be separated generically. Roberts (1989) described five species from western Borneo besides *M. olyroides* as new. He stated further that division of *Mystus* into other genera needs a further study. However in 1994 he revised the genus and restricted the generic limits to comprise species with (i) moderately to very long maxillary barbels extending beyond pelvic fins; (ii) very long adipose fin almost equal to or longer than anal fin; (iii) total gill rakers on first gill arch 11-30; (iv) total vertebrae 37 to 46 (about equally divided between abdominal and caudal vertebrae). *Mystus pelusius* was designated as the type species. *Mystus sensu stricto* was thus restricted to include the following species besides *olyroides* and *pelusius*.

- | | |
|---------------------------------------|--|
| 1. <i>M. pelusius</i> | Euphrates basin; Turkey, Syria, Iraq and Iran. |
| 2. <i>M. bleekeri</i> | - India, Pakistan and Bangladesh. |
| 3. <i>M. cavasius</i> | - Bangladesh and Sri Lanka. |
| 4. <i>M. rufescens</i> | - Myanmar. |
| 5. <i>M. albolineatus</i> new species | - Chao Phraya and Bangpakong basins, Thailand, Lower Mekong basin : Cambodia. |
| 6. <i>M. bocourti</i> | - Thailand and Cambodia. |
| 7. <i>M. rhegma</i> | Thailand and Cambodia. |
| 8. <i>M. singaringan</i> | - Thailand, Cambodia, Malaysia (Peninsular Malaysia and Saravak) and Indonesia (Sumatra, Kalimantan and Java). |

If we apply the above four criteria of Roberts, it is seen that besides the species listed above the following also are likely to come under *Mystus s. s.* :

M. horai; *M. malabaricus*; *M. leucophasis*; *M. montanus*; *M. pulcher*; *M. tengara*.

These six species have a long adipose dorsal fin and maxillary barbels extending up to pelvic or beyond anal fin. The total gill raker count is in a wide range which almost covers all the species. The total vertebral count is not very indicative since most of the species fall under the range 37 to 46 excepting *krishnensis* and *microphthalmus*. It must be however conceded that our radiological examination and gill raker counts were limited to a few examples only. As such the range of variation is not known.

The character of the length of adipose dorsal fin is not much dependable. The fin shrinks in many old museum preserved specimens and even in fresh examples variations are often seen.

Bleeker (1862) divided *Mystus* into four groups :

Aspidobagrus type species *Bagrus gulio* Hamilton-Buchanan
Hypselobagrus type species *Bagrus macronema* Bleeker = *Bagrus nigriceps* Valenciennes
Hemibagrus type species *Bagrus nemurus* Valenciennes.

The position in respect of the remaining 23 species is as below :

Table 6 : Generic position of species

Sl. No.	Species	Max. barb extending beyond pelvic fin	Adipose dorsal fin base longer than anal base	Total gill rakers	Total Vertebrae
1.	<i>amemiyae</i>	No	Yes	...	...
2.	<i>argentivittatus</i>	No	No	...	32
3.	<i>armatus</i>	No	No	...	42
4.	<i>atrifasciatus</i> *	Yes	Yes	...	...
5.	<i>bimaculatus</i> *			23-24	32-35
6.	<i>baramensis</i> *	Yes	No	...	45
7.	<i>chinensis</i> *		Yes	...	50
8.	<i>elongatus</i> *	No	Yes	23	...
9.	<i>keletius</i> *	Yes	Yes	33-35	...
10.	<i>macropterus</i>	No	Yes	23	...
11.	<i>maydelli</i> *	Yes	Yes	...	...
12.	<i>menoda</i> *	Yes	Yes	...	45
13.	<i>micracanthus</i>	Yes	Yes	24-27	36-40
14.	<i>multiradiatus</i> *	Yes	Yes	40	...
15.	<i>mysticetus</i>	No	No	36-97	...
16.	<i>oculatus</i>	Yes	No	...	...
17.	<i>peguensis</i> *	No	No	...	40
18.	<i>planiceps</i>	No	No	...	...
19.	<i>punctatus</i> *	No	No	...	45
20.	<i>pluriradiatus</i>	Yes	Yes	...	...
21.	<i>sabanus</i> *	Yes	Yes	...	33
22.	<i>vittatus</i>	No	Yes	19-25	32
23.	<i>wolfii</i> *	Yes	Yes	24-29	37-39

It can be seen that out of 23 species as listed above only 14 (asterisk) marked can be further referred to *Mystus sensu stricto*, the position of the remaining is uncertain for want of data. They are best kept under *Mystus sensu lato*.

To sum up the generic break up of the 44 species is as below :

Genus *Mystus sensu stricto*

1. *albolineatus*
2. *atrifasciatus*
3. *baramensis*
4. *bimaculatus*
5. *bleekeri*
6. *bocourti*
7. *cavasius*
8. *chinensis*
9. *elongatus*
10. *horai*
11. *keletius*
12. *krishnensis*
13. *leucophasis*
14. *macropterus*
15. *malabaricus*
16. *maydelli*
17. *menoda*
18. *microphthalmus*
19. *montanus*
20. *multiradiatus*
21. *olyroides*
22. *peguensis*
23. *pelusius*
24. *pulcher*
25. *punctatus*
26. *rhegma*
27. *rufescens*
28. *sabanus*
29. *singaringan*
30. *tengara*

Genus *Mystus sensu lato*

1. *amemiyae*
2. *argentivittatus*
3. *armatus*
4. *mysticetus*
5. *oculatus*
6. *pluriradiatus*
7. *vittatus*

Genus *Aspidobagrus*

1. *gulio*

Genus *Hypselobagrus*

1. *nigriceps*
2. *wolfii*
3. *macracanthus*

Genus *Hemibagrus*

1. *nemurus*
2. *planiceps*
3. *wyckii*

It would appear *sensu stricto* only 30 species could be assigned to *Mystus* as per Robert's classification. We have however treated all the 44 species under *Mystus sensu lato* pending further analysis and detailed study of all the species especially in respect of their vertebral and gill raker counts.

VIII. SYSTEMATIC ACCOUNT

Genus *Mystus* Scopoli, 1777

1756. *Mystus* Russell, *Nat. Hist. Aleppo*, 1 : 76. species 'n' pl. 13, fig. 1 (type species : *Silurus pelusius* Solander = *Mystus pelusius* : Coic River, Aleppo, Syria).
1763. *Mystus* Gronovius, *Zoophylacium Gronoviana* 1 (388) : 124, pl. 8a, fig. 6 (type species *Mystus anguillaris* Meuschen. Seven siluroid fishes described under *Mystus*. Species divided into three groups based on number of barbels. Latin names of species are not consistently binominal. Gronow's work invalidated by ICZN opinion 261).
1777. *Mystus* Scopoli, *Intrd. Hist. Nat.* : 451 (Gronow's genera adopted. One line characterisation. Generic name based on Linnaean species of *Silurus*. Scopoli, name accepted by International Commission. Type species by subsequent designation. (Jordan 1917 : 21. *Bagrus halepensis* Valenciennes 1840 = *Silurus pelusius* Solander).
1794. *Silurus* (in part), Solander in Russell's *Nat. Hist. Aleppo*, 2 : 210, pl. 7, fig. 1 (binominal names to fishes cited by Russell. *Bagrus halepensis* Valenciennes = *Silurus pelusius* Solander).
1797. *Silurus* (in part), Bloch, *Ichthyol. Hist. Nat.* II : 40, pl. 371, fig. 2.
1822. *Pimelodus* (in part) Hamilton-Buchanan, *Fish Ganges* : 160 (generic description composite. Out of 33 species described only four referable to *Mystus*).
1839. *Bagrus* (in part) Valenciennes, *Hist. Nat. Poiss.* 14 : 388 (description of 58 species included, out of which only 10 referable to *Mystus*).
1841. *Platystoma* (in part) Sykes, *Trans. Zool. Soc. London*, 2 : 371.
1844. *Bagrus* (in part), Jacquemont, *Voy. Ind. Pls.* 18 & 17.
1849. *Bagrus* (in part), Jerdan, *Madras J. Lit. Sci.* 15(2) : 335 (diagnosis only, 16 species included out of which only seven referable to *Mystus*).
1856. *Macrons* Dumeril, *Mem. Acad. Sci. Paris* 28(1) : 484 (type species : *Bagrus lamarii* Valenciennes; name preoccupied in Coleoptera, *Entomologist* 1(3) : 33, 1841).
1858. *Bagrus* (in part), Bleeker, *Ichthyol. Archipel. Ind. Prodr.* 1, Siluri : 144 (generic description, nine species included with distribution).
1859. *Bagrus* (in part) Bleeker, *Act. Soc. Sci. Indo-Neerl.* 6 : 257 (synonymy, four species included, out of which only three referable to *Mystus*).
1862. *Bagrus*, *Macrones*, *Hypselobagrus* and *Aspidobagrus* Bleeker, *Atlas Ichthyol. Ind-Orient Neerl.* 2 : 9, 10 (description of the genus with type species and their synonymy).
1863. *Bagrus*, *Macrones*, *Hypselobagrus*, *Hemibagrus*, *Aspidobagrus*, Bleeker, *Ned. Tijdschr. Dierk.* 1 : 96.
1864. *Macrones*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 74 (brief diagnosis, genus divided into three groups. 19 species included out of which only 12 referable to *Mystus*).

1864. *Heterobagrus* Bleeker, *Vers. Akad. Amsd.* 16 : 355 (type species by original designation *Heterobagrus bocourti* Bleeker).
1877. *Macrones*, Day, *Fish India* : 442 (description; most parts of Asia, numerous in freshwaters of India and Sri Lanka. *Macrones gulio* often captured in sea).
1889. *Macrones*, Day, *Fauna Brit. India Fishes*, 1 : 146 (synonymy, description, distribution, uses, synopsis of Indian species).
1901. *Hypselobagrus*, *Hemibagrus*, Steindachner, *Abh. Senckenb. Naturf. Ges.* 25 : 446.
1904. *Macrones*, Volz, *Revue Suisse Zool.* 12 : 466 (five species from Sumatra recorded).
1913. *Macrones*, Weber and de Beaufort, *Fish Indo-Austral Archipel.* 2 : 336 (synonymy, description, key to species).
1914. *Macrones*, Raj, *Rec. Indian Mus.* 12 : 265 (Madras).
1916. *Macrones*, Chaudhuri, *Mem. Indian Mus.* 5 : 43 (Chilka lake, Orissa).
1916. *Mystus*, Jordan and Evermann, *Genera of Fishes* : 21 (type designated as *Bagrus halepensis* = *Mystus cirris octo capite longioribus* Gronow).
1917. *Aoria* Jordan, *Proc. Acad. Nat. Sci. Philad.* 70 : 341 (name preoccupied in Coleoptera, *J. Ent. London*, 2 : 149, 1863).
1925. *Macrones*, Nichols, *Amer. Mus. Novit.* (185) : 2.
1928. *Mystus*, Fowler, *J. Bombay nat. Hist. Soc.* 33 : 105.
1929. *Aoria*, Prashad and Mukerji, *Rec. Indian Mus.* 31 : 178-180 (six species included, out of which four referable to *Mystus*).
1934. *Mystus*, Hora and Mukerji, *Rec. Indian Mus.* 36 : 355 (footnote : Jordan's usage of *Aoria* indicated).
1934. *Prajadipokia* Fowler, *Proc. Acad. Nat. Sci. Philad.* 86 : 338 (type species *Prajadipokia rex* Fowler = *Heterobagrus bocourti* Bleeker).
1934. *Mystus*, Smith, *J. Siam Soc. Nat. Hist.* 9(3) : 294.
1939. *Sperata* Holly, *Zool. Anz.* 125 : 143 (type species *Silurus vittatus* Bloch).
1939. *Aorichthys* Wu, *Sinensia*, 10 : 131 (substitute name for *Aoria* Jordan proposed).
1940. *Macronoichthys* White and Moy Thomas, *Ann. Mag. Nat. Hist.* 5 : 505 (substitute name for *Macrones* Dumeril proposed).
1941. *Mystus*, Hora and Gupta, *Bull. Raffles Mus.* 17 : 22 (key characters).
1942. *Mystus*, Hora, *Rec. Indian Mus.* 44(2) : 199 (seven species of *Mystus* recorded from Mysore State and the neighbouring ranges of Nilgiris, Waynaad and Coorg).
1943. *Mystus*, Ahmed, *Bull. Dept. Zool. Punjab Univ.* 1(5) : 219 (diagnostic characters), 320 (key to species).
1943. *Aoria*, Nichols, *IN : Nat. Hist. Central Asia* 9 : 36 (type species : *Bagrus lamarii* Cuvier and Valenciennes, description; Southern Asia and East Indies, China).
1944. *Macrones*, Hora, *Proc. Nat. Inst. Sci. India* 10(4) : 424 (distribution discussed).
1945. *Mystus*, Smith, *Bull. U. S. Nat. Mus.* (188) : 381 (synonymy, local names; rivers, canals and lakes of Thailand; 382 (key to local species).

1954. *Mystus*, Jayaram, *Rec. Indian Mus.* **51**(4) : 527-530 (synonymy, description, key to sub-genera and species, type locality, distribution).
1959. *Mystus*, Jayaram, *First All-India Congr. Zool. Jabalpur* : 632-635 (synonymy, type species designated).
1960. *Mystus*, Jayaram, *J. Zool. Soc. India* **12**(2) : 240 (synonymy).
1964. *Mystus*, Bhuiyan, *Asiat. Soc. Pakistan Publ. No.* **13** : 57 (diagnostic characters, key to species).
1966. *Mystus*, Jayaram, *Int. Revue ges. Hydrobiol.* **51**(3) : 444 (type species, inter-relationship with allied genera : 445 (inter-relationship with allied genera and systematic status of species of *Mystus* so far recorded from China) : 446 (distribution and list of valid species).
1971. *Mystus*, Islam and Siddiqi, *Biologia* **17**(1) : 38 (key to species).
1974. *Mystus*, Aatur Rahman, *Bangladesh J. Zool.* **2**(1) : 1 (distinguishing features) : 2 (checklist).
1975. *Mystus*, Ganguly and Dutta, *Dr. B. S. Chauhan Comm. Vol.* : 293 (diagnosis, osteological characters, taxonomic status).
1975. *Mystus*, Desoutter, *Bull. Mus. Nat. Hist. Naturae* no. **296** : 443 (synonymy, description, key to species from Cambodia = Kampuchea).
1977. *Mystus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No.* **8** : 19 (synonymy, description, distribution, key to species).
1978. *Mystus*, Jayaram, *Proc. Indian Acad. Sci.* **87B**(9) : 221 (synonymy, distribution).
1979. *Mystus*, Dutt and Sharma, *Mem. Soc. Zool. Guntur* **1** : 110 (key to four species; central coastal Andhra Pradesh).
1981. *Mystus*, Jayaram, *Handbook Freshw. Fish India* : 195 (description, list of species with distribution and key).
1982. *Mystus*, Dutt, Sharma and Desoutter, *Cybiurn* **6**(4) : 27 (synonymy).
1983. *Mystus*, Sharma and Dutt, *Rec. zool. Surv. India* **81** (1 & 2) : 332 (taxonomic account of four species, key to species from Guntur).
1984. *Mystus*, Mirza and Omer, *Biologia* **30**(1) : 87 (key to *Mystus cavasius* and *Mystus gulio*; Baluchistan).
1985. *Mystus*, Anuradha and Jayaram, *Bull. Zool. Soc. India* **7**(1) : 107, figs. 1, 2 (redescription of the type species *Mystus pelusius*).
1986. *Mystus*, Anuradha, *Rev. Suisse Zool.* **93**(6) : 291, figs. 1, 2 (systematic position of *Macrones halepensis colvillii* and description of *Mystus misrai*).
1989. *Mystus*, Roberts, *Mem. Calif. Acad. Sci.* **14** : 120 (revision of Borneo species).
1991. *Mystus*, Talwar and Jhingran, *Inland fishes of India and adjacent countries* **2** : 554 (key and description of 18 species).
1994. *Mystus*, Roberts, *Ichthyol. Explor. Freshwaters* **5**(3) : 241-256 (revision, restriction of generic limits).
1996. *Mystus*, Yazdani, *Proc. I Nat. Symp. Env. Hydrobiol.* : 143 (biodiversity of species in Indian river system).
1999. *Mystus*, Jayaram, *Freshwater fishes of the Indian region* : 234 (diagnosis, 19 species recognised, key).

DESCRIPTION

Body short or moderately elongated. Head compressed or ventrally flattened. Snout obtuse or rounded. Mouth sub-terminal, transverse. Eyes anteriorly situated, not visible from ventral surface of head, moderately large, with free circular margins. Jaws sub-equal, upper jaw slightly longer. Teeth numerous, villiform, in bands on jaws and palate. Two pairs of nostrils, anterior pair tubular, a pair of barbels on the posterior. Upper surface of head smooth or rugose with one or two median longitudinal grooves of varying length. Occipital process long or short, situated superficially or concealed under skin.

Four pairs of barbels : one pair maxillary always longer than head, one pair nasal usually shorter than head, one pair outer mandibular of varying lengths and one pair inner always shorter than head (exception *M. argentivittatus* where all barbels are shorter than head).

Two dorsal fins : an anterior rayed dorsal with seven rays and a spine; a posterior smooth, low adipose fin or varying lengths. Pectoral fins with 6 to 10 rays and a strong spine serrated along inner edge with antrorse teeth. Pelvic fins with six rays and not reaching anal fin. Anal fin with 9 to 15 rays and not reaching root of caudal fin. Caudal fin forked, bilobed with unequal lobes; lobes may be rounded, pointed or sometimes prolonged into filamentous extensions. Lateral simple, complete.

Osteological characters : In respect of *Mystus* species not much osteological details are known. The valuable studies of Bhimachar (1934) on the morphology of skulls of certain Indian catfishes are one of the important contributions for understanding the cranial structure of *Mystus* species. In this work Bhimachar compared the osteocranium of *Rita rita* (Hamilton-Buchanan) and examined the possibility of these characters as an aid in classifying closely related siluroid species. Sarkar (1962) while investigating the nomenclatural status of *Mystus* and *Osteobagrus* Jayaram opined that the interneural shield is present in all species of *Mystus* and not only in *Aorichthys aor* and *A. seenghala*. Raj Tilak (1965) studied in detail, the skeleton of *M. cavasius*, *M. gulio*, *M. oculatus*, *M. vittatus*, *Aorichthys aor* and *A. seenghala*. He prepared a key on the basis of osteological characters for differentiating the species. He confirmed the sub-generic status of *Osteobagrus*. Jayaram (1971) investigated in detail this problem of presence or absence of the interneural shield in species of *Mystus* and showed that Sarkar has confused the basal bone of the dorsal fin as that of the inter-neural shield. Excepting the above, there seems to be no other osteological account of *Mystus* species. In order to know the inter-relationship of the different species, a general account of the osteological make up of the genus is presented here.

The cranium is well ossified and the cephalic shield is absent. The first six anterior vertebrae are modified to form the Weberian apparatus. The skull is platytrabic since the cranial cavity does not extend anteriorly beyond the orbito-sphenoid. The anterior tip of the ethmoid is concave. The nasals are slender which are pressed along their dorso-lateral edge of the ethmoid. The prevomerine band of teeth is simple and is dentigerous. No wing like lateral processes is present. The lacrymal is small and bears a long process anteriorly. There

are two fontanelles enclosed by the frontals, however the posterior one is absent in *M. gulio*, whereas half of the posterior fontanelle is enclosed by the frontals in *M. oculatus* and *M. cavasius*; in *M. vittatus* the posterior fontanelle is almost completely enclosed by the frontals. A supra-temporal bone is present. The post-temporal has only a ligamentous connection with the skull. The descending limb of the post-temporal is developed into a post-temporal plate, which is posteriorly flat with the postero-ventral end grooved. The groove is continuous with a foramen through which the tip of the dorsal process of the cleithrum passes. The sub-temporals are present as a paired bone in *M. vittatus* only. The anterior process of the parasphenoid forms a ridge on the ventral side. The ventro-lateral sides of the cranium have the foramina for the exit of the 2nd to 5th cranial nerves. In *M. gulio* the foramina are separate whereas in *M. vittatus* they come nearer to each other. In *M. cavasius* and *M. oculatus* there is a single mid-ventral foramen enclosed by the pterosphenoventral to which lies the anterior process of the parasphenoid. The infrorbital series of bones comprises of five small tubular weak bones. In *M. gulio* a tri-radiate fossa is formed on the lateral side of the cranium. The frontals, the sphenotics and the supraoccipital form this fossa.

The sphenotics form 3/4th of the articular facet for the hyomandibular and they do not take part in the formation of the foramen for the cranial nerves. The pterotics bear 1/4th of the articular facet for the hyomandibular.

The epiotic is in the form of a bulge in the occipital region, partly covered over by the supratemporal and the epiotic limb of the post-temporal. The supraoccipital does not take part in the formation of the foramen magnum.

The premaxillaries are thin, of uniform width and are dentigerous. The ectopterygoid is bent, rod shaped, edentate and connected to metapterygoid by a ligament. The endopterygoid is small, flat, articulating posteriorly with the quadrate. It does not have a direct connection with the hyomandibular. The quadrate is drawn into a process anteriorly. The cornomeckelian lies embedded as a small bone into the posterior end of the Meckel's cartilage on the mesial side of the mandible.

The urohyal has anteriorly a pair of articular facet on the ventral side and concavity on the dorsal side. Posteriorly it has a dorsal median ridge and a pair of lateral processes. The epihyal mostly bears two branchiostegal rays and the ceratohyal seven. The preoperculum is completely united with the hyomandibular and quadrate in *M. cavasius* whereas a small foramen is present between preoperculum and the hyomandibular in *M. vittatus* and *M. gulio*.

Distribution : Syria in the west through Iran, Iraq, Afghanistan, Pakistan, India, Nepal, Bangladesh, Myanmar, Sri Lanka, Thailand, Malaya Peninsula, Laos, Vietnam, Sumatra, Java, Borneo and China in the east.

Type species : *Mystus pelusius* Solander.

Remarks : Bagrid fishes of the genus *Mystus* Scopoli were previously under the name *Macrones* Dumeril (1857) for a very long time. Since Dumeril's name was preoccupied in *Insecta* (Coleoptera), several other names as *Aoria* Jordan (1919), *Sperata* Holly (1939), *Aorichthys* Wu (1939) and *Macronoichthys* White & Moy Thomas (1940) were proposed. Unfortunately none of these names are available for some reason or other and hence *Mystus* Scopoli 1777, the earliest valid name, was adopted. But, Scopoli had not designated any particular species by name as the type species. Jordan and Evermann (1917) selected *Bagrus halepensis* Valenciennes (*Mystus cirris octo capito longioribus*) Gronow. No. 388 as the type species of *Mystus* Scopoli. Valenciennes (1839) gave the name *Bagrus halepensis* for this fish included by Russell (1756) in his Natural History of Aleppo. Solander (1794) gave binominal names to fishes cited by Russell in his aforesaid work and *Bagrus halepensis* Valenciennes was named *Silurus pelusius*. Since Solander's name and work has precedence over that of Valenciennes (1839), *Silurus pelusius* = *Mystus pelusius* becomes the type species of the genus *Mystus*. However Roberts (1994) opines differently.

Solander's description of *M. pelusius* in Russell's work (1775) is very brief. Gunther (1864) described a specimen from Russell's collection present in the British Museum, London. This description is also poor in details and is only of a preserved, bleached six inches long example. We obtained three specimens in exchange through the kind courtesy of Dr. Munir K. Bunni, Director, Baghdad Natural History Research Center and the present description of the species is drawn from them.

Key to species from India, Bangladesh, Pakistan, Sri Lanka and Nepal

1. Occipital process reaching basal bone of dorsal fin 2
- Occipital process not reaching basal bone of dorsal fin 10
2. Adipose dorsal fin commencing almost after rayed dorsal fin. Interspace between the two fins negligible or equal to or shorter than width of rayed dorsal fin 3
- Adipose dorsal fin commencing after an interspace from rayed dorsal fin. Interspace between the two dorsal fins considerable, greater than width of rayed dorsal fin 6
3. Caudal peduncle constricted, its least height about 3 times in its length. Vomerine band of teeth not continuous *M. horai*
- Caudal peduncle not constricted, its least height about 2 times in its length. Vomerine band of teeth uninterrupted 4
4. Maxillary barbels reach base of pelvic fins *M. tengara*
- Maxillary barbels reach anal fin or beyond 5
5. Maxillary barbels reach anal fin. Interorbital width less than 3.0 (2.0-3.0) in head length. No dark spot at base of dorsal fin. Body with two light longitudinal bands, one each above and below lateral line *M. bleekeri*

- Maxillary barbels reach caudal fin base or beyond. Interorbital space width more than 3.0 (3.0-4.0) in head length. A dark spot at base of dorsal fin. No bands on body ...
..... *M. cavasius*
6. Median longitudinal groove on head short, as two fontanels, reaching base of occipital process. Adipose dorsal fin base longer than anal fin base *M. oculatus*
- Median longitudinal groove on head short, or long, as one or two fontanels, not reaching base of occipital process. Adipose dorsal fin base shorter than anal fin base 7
7. Body plain, without any colour bands 8
- Body with one or two longitudinal colour bands on either side of the lateral line 9
8. Body plain, occipital crest rugose. No blotch at base of caudal fin. Adipose dorsal fin base shorter than or equal to anal fin base. Median longitudinal groove short, extending slightly beyond posterior border of orbit *M. gulio*
- Body plain. Occipital crest smooth. A dark blotch at base of caudal fin. Adipose dorsal fin base longer than anal fin base. Median longitudinal groove extending beyond posterior border of orbit and nearly reaching base of occipital process *M. armatus*
9. Eye diameter 3.5 to 4.0 in head length. Pectoral fin with six rays. Body with a bluish shoulder spot and a silvery line along the side ending in a dark spot at base of caudal; one or two light bands along sides above lateral line *M. montanus*
- Eye diameter 4.5 to 6.0 in head length. Pectoral fin with nine rays. Body with 3 to 4 longitudinal colour bands above and below lateral line. A dark shoulder spot. No spot at base of caudal fin *M. vittatus*
10. Body without any spot, plain coloured 11
- Body with spots 12
11. Eye diameter 6 times in head length *M. maydelli*
- Eye diameter 9 to 10 times in head length *M. krishnensis*
12. Body with a shoulder spot and with a dark streak along lateral line 13
- Entire body with round spots along lateral line; Band along lateral line not continuous
..... 14
13. Occipital process long, 5.0 times longer than wide at base. Body depth about 4.4 to 5.7 times in standard length. A light band above and below lateral line. No spot at caudal fin base
..... *M. oculatus*

- Occipital process 1.0 to 2.0 times longer than wide at base. Body depth 4.5 to 7.0 times in standard length. A dark band along lateral line only, ending with a dark triangular blotch at caudal base *M. malabaricus*
- 14. Ten black rounded spots along lateral line. Body depth 6.4 to 8.9 times in standard length *M. punctatus*
- Several clusters of small vertical spots along anterior half of lateral line. Body depth 4.6 to 5.4 times in standard length *M. menoda*

Key to species from Myanmar

1. Maxillary barbels reach middle of pectoral fins *M. peguensis*
- Maxillary barbels reach pelvic fin or beyond 2
2. Median longitudinal groove on head reaching base of occipital process 3
- Median longitudinal groove on head not reaching base of occipital process 4
3. Caudal fin with 24 rays. A black spot at base of caudal fin. Adipose dorsal fin long and high *M. rufescens*
- Caudal fin with less than 20 rays. No black spot at base of caudal fin. Adipose dorsal fin long and high *M. leucophasis*
4. Occipital process reaching basal bone of dorsal fin. Eye diameter 3.0 to 4.0 times in head length. A black shoulder spot and another at base of caudal fin *M. pulcher*
- Occipital process not reaching basal bone of dorsal fin. Eye diameter 6.0 to 8.0 times in head length. No spot at base of caudal fin *M. microphthalmus*

Key to species from Thailand, Malaya and East Indies

1. Dorsal fin extraordinarily high, dorsal spine smooth and elongated *M. bocourti*
- Dorsal fin short, moderately high 2
2. Eyes lateral, rather than dorso-lateral, equally visible from above or below head. Mouth nearly terminal *M. mysticetus*
- Eyes not lateral, usually cannot be seen from directly below 3
3. Gill rakers on first gill arch 43-65. Basal margin of eye in line with dorsal profile of head *M. multiradiatus*
- Gill rakers on first gill arch less than 40 4

4. Melanophores absent from skin in immediate proximity of lateral line thus creating a thin median white stripe *M. albolineatus*
 No such white or pale stripe 5
5. Colour uniformly gray without stripes or marks *M. singaringan*
 - Colour not uniform. Body with stripes and or marks 6
6. Adipose dorsal fin very long, contiguous with dorsal fin. Maxillary barbels often extending beyond caudal fin *M. nigriceps*
 - Adipose dorsal fin not contiguous with dorsal fin 7
7. Palate band of teeth interrupted in middle *M. olyroides*
 - Palate band of teeth continuous in a single band 8
8. Body with distinct colouration. Dorsal and lateral surfaces of head and body and all fins largely black in colour. Head with well defined white markings, on tips of pectoral and dorsal fins, leading edge of adipose and anal fin, upper and lower margins of caudal peduncle and caudal fin (including filamentous) *M. wyckii*
 Body not coloured as above 9
9. Base of outer mandibular barbels inserted slightly behind, rather in front of line vertical to posterior margin of lateral rictus *M. rhegma*
 Insertion of outer mandibular barbels not as above 10
10. Body chocolate brown over all with a large black humeral spot (round and well defined) and a large black vertical bar on posterior portion of caudal peduncle and base of caudal fin; anterior margin of humeral spot and both margins of caudal bar set off by vertical cream or white bars *M. bimaculatus*
 - Body colour not as above 11
11. A triangular black or dusky mark at base of caudal fin (on caudal peduncle) and body without stripes *M. atrifasciatus*
 No such triangular black mark on caudal peduncle 12
12. Occipital process reaching basal bone of dorsal fin 13
 Occipital process not reaching basal bone of dorsal fin 15
13. Gill rakers on first gill arch less than 20 (12-15). Median longitudinal groove reaching base of occipital process *M. nemurus*

- Gill rakers on first gill arch more than 20 (24-29). Median longitudinal groove not reaching base of occipital process 14
- 14. A black spot on caudal fin base. Maxillary barbels reaching caudal fin *M. microcanthus*
- A black spot on shoulder. Maxillary barbels do not reach pelvic fin *M. sabanus*
- 15. Median longitudinal groove not reaching basal bone of dorsal fin 16
- Median longitudinal groove reaching basal bone of dorsal fin 17
- 16. Maxillary barbels do not reach pelvic fin base *M. pluriradiatus*
- Maxillary barbels extend beyond pelvic fin base; up to caudal fin *M. baramensis*
- 17. Maxillary barbels reach caudal fin base *M. wolfii*
- Maxillary barbels reach pelvic fin base *M. planiceps*

Key to species from China

- 1. Body and fins speckled with black dots *M. chinensis*
- Body plain 2
- 2. Occipital process reaching basal bone of dorsal fin 3
- Occipital process not reaching basal bone of dorsal fin 4
- 3. Gill rakers on first gill arch less than 20(11). Median longitudinal groove reaching basal bone of dorsal fin *M. argentivittatus*
- Gill rakers on first gill arch more than 20(22). Median longitudinal groove not reaching basal bone of dorsal fin *M. macropterus*
- 4. Maxillary barbels extend beyond dorsal fin. Gill rakers on first gill arch not more than 20 *M. amemiyae*
- Maxillary barbels extend just up to dorsal fin or even shorter than that. Gill rakers on first gill arch more than 20(24) *M. elongatus*

Key to species from Syria, Turkey

- 1. Maxillary barbels reaching not beyond pelvic fins. Adipose dorsal fin commencing immediately after dorsal fin. *M. pelusius*

Mystus albolineatus Roberts

1994. *Mystus albolineatus* Roberts, *Ichthyol. Explor. Freshwaters* 5(3) : 245, fig. 1 (type locality Bangpakong basin, Thailand).

Specimen studied : No specimen seen by us.

Description : This species differs from all other *Mystus sensu stricto* in having melanophores absent from skin in immediate proximity of lateral line, thus creating a thin median white or pale stripe. This stripe is emphasized by dense accumulations of melanophores immediately above and below it. Within *Mystus sensu stricto* gill raker counts high, 21-24; vertebral counts low 40-42. Some specimens have a pale semiocellated humeral spot as in *Mystus cavasius* and *Mystus bocourti*. Some have a small dark triangular mid-peduncular spot (Roberts, 1994).

Distribution : THAILAND : Chao Phraya and Bangpakong basin. CAMBODIA : Lower Mekong basin.

Remarks : Roberts (1994) proposed this species for some of the 23 specimens from Prachinburi market identified as *M. nigriceps* by Fowler (1937 : 145). Out of this lot he segregated *M. singaringan* (Bleeker) and this species which is closely related to *M. cavasius*.

Mystus amemiyae (Kimura)

1934. *Aoria amemiyae* Kimura, *J. Shanghai Sci. Inst.* (3)1 : 166-168, pl. 5, fig. 2 (type locality Howchwan, Szechwan province, China).

1966. *Mystus amemiyae*, Jayaram, *Int. Rev. ges. Hydrobiol.* 51(3) : 446 (distribution).

1978. *Mystus amemiyae*, Jayaram, *Proc. Indian Acad. Sci.* 87B (9) : 223 (systematic position clarified).

Specimen studied : No specimen seen by us.

Description : Kimura (1934) gave a good description of this species. The type specimens are deposited in the Museum of the Institute of Hydrobiology, Wu-Han, Hupeh Province, People's Republic of China. The following description is drawn from the original description based on two specimens, 130-205 mm SL.

D.I,7; P.I,9; V.i,5; A.i,10; C.7+8.

Body depth 97.1; head length 23.8; length of adipose dorsal fin 42.9; maxillary barbel length 66.7, all in percent of standard length. Eye 19.0, height of head 37.4, inter-orbital width 25.3, post-orbital width 47.6, width of head 69.9, dorsal spine length 50.0, length of snout 34.4, gape of mouth 59.9, length of dorsal fin base 53.2, length of dorsal fin ray 66.7, length of adipose dorsal fin base 37.7, length of pectoral fin 62.5, length of pelvic fin 50.0,

length of base of anal fin 54.6, length of anal fin ray 47.6, length of caudal fin 62.5, length of outer mandibular barbel 80.0, length of inner mandibular barbel 40.0, length of caudal peduncle 83.3, least depth of caudal peduncle 13.9 all in percent of head length. Adipose dorsal fin base 41.7 in percent of least depth of caudal peduncle. Width of snout 75.2 in its percent of length. Eye 57.1 in percent of length and 80.0 in percent of inter-orbital width. Least depth of caudal peduncle 33.3 in percent of its length. Occipital process 66.7 in percent of its length.

Dorsal profile almost straight with very little rise from the tip of snout to the base of occipital process. Head broad, flat and much depressed. Mouth opening terminal, slightly arched. Upper jaw slightly longer than the lower. Snout thin, spatulate with outer margin rounded. eyes oval, anteriorly situated on top. Post-orbital part of head elongate and well depressed. Upper surface of head smooth, covered by skin. Median longitudinal groove on dorsal surface of head extending up to the base of occipital process. Occipital process short and rudimentary, a considerable interspace present between the process and the basal bone of dorsal fin. Teeth villiform, in simple broad bands on both the jaws; a narrow band of teeth runs parallel across vomer and palatines.

Four pairs of barbels, one pair maxillary long, extending beyond the end of base of dorsal fin; one pair nasal extending up to the center of eye, one pair outer mandibular reaching origin of pectoral fins, one pair inner mandibular shorter, reaching posterior border of eye.

Dorsal fin with a long, stout, slender smooth spine. Adipose dorsal fin very long, low, its base originates almost after the end of base of rayed dorsal fin. Pectoral fins with nine branched rays and a strong spine. Outer surface of pectoral spine serrated, inner surface rough. Pelvic fins inserted just below the level of the end of base of dorsal fin and not reaching anal fin. Anal fin not reaching caudal fin. Caudal fin bifurcated with pointed lobes, upper lobe slightly longer than lower.

Colour : Fresh specimens dark brown on upper surface of body, pale below; belly whitish. Head dark brown yellow, opercle slightly pinkish. Fins dusky place yellow, lower lobe of caudal fin duskier. Body plain without any marks or spots.

Distribution : CHINA : Howchwan, Szechwan province.

Remarks : Bleeker (1870) described *Hemibagrus macropterus* from a specimen 175 mm long from the Yangtze river, China. Nichols (1943) considered this species separately and synonymised *Aoria amemiyae* with this species. From the description of both the species, it is seen that *Mystus macropterus* differs from *M. amemiyae* in having a deeper body, shorter barbels and a longer anal fin. However, *M. macropterus* has not been subsequently recorded from China. A comparison of the two species drawn from the original descriptions is given below :

Table 7 : Comparison of *M. amemiyae* with *M. macropterus*.

Characters	<i>M. macropterus</i>	<i>M. amemiyae</i>
Standard length	175 mm	149-205 mm
SL/Body depth	8.0	10.3
SL/LH	4.8	4.2
LH/Ht. of Head	2.2	2.7
LH/Eye	4.7	5.2
IOW/Eye	1.0	1.2
Surface of head	Smooth	Smooth
Nasal barbel reaching	Posterior border of eye	Centre of eye
Maxillary barbel reaching	Tip of pectoral spine	End of base of dorsal fin
Dorsal spine	Posteriorly serrated	Smooth on both edges
Shape of caudal fin	Deeply forked	Well forked; tip sharply pointed, upper lobe slightly longer
Adipose fin	4.0 times longer than dorsal fin base	Very long, its origin after mid base of dorsal fin
Dorsal spine	Weak	Stout and slender
Dorsal fin shape	Rounded	Elongate

From the above comparison it may be seen that *M. amemiyae* is a distinct species, separable from *M. macropterus* by its lesser body depth, longer head, smaller eye, longer barbels and shorter anal fin.

***Mystus argentivittatus* (Regan)**
(Figure 1)

1905. *Macrones argentivittatus* Regan, *Rev. Suisse Zool.* 13 : 390, pl. 5, fig. 2 (type locality Canton, China).
1928. *Aoria argentivittatus*, Nichols, *Bull. Amer. Mus. nat. Hist.* : 586 (synonymy and distribution).
1943. *Aoria argentivittatus*, Nichols, *Freshw. Fish. China IN : Nat. Hist. Cent. Asia* 9 : 37 (synonymy, description and distribution).
1955. *Mystus argentivittatus*, Jayaram, *Rec. Indian Mus.* 51(4) : 554 (synonymy and distribution).
1966. *Mystus argentivittatus*, Jayaram, *Int. Rev. ges. Hydrobiol.* 51(3) : 445 (distribution).
1974. *Mystus argentivittatus* Jayaram, *Rev. Suisse Zool.* 81(4) : 785 (lectotype designated).
1978. *Mystus argentivittatus*, Jayaram, *Proc. Indian Acad. Sci.* 87B (9) : 222 (generic position discussed).

Specimen studied : Lectotype MHNG 577.99, 40.3 mm SL, China, "Cungkun" (=Ching King), Canton, sur la riviere l'East, Miss Kuhne, 9-01-1903.

Description : D.I, 9; P.I. 6; V.i,5; A.i,12; C. damaged.

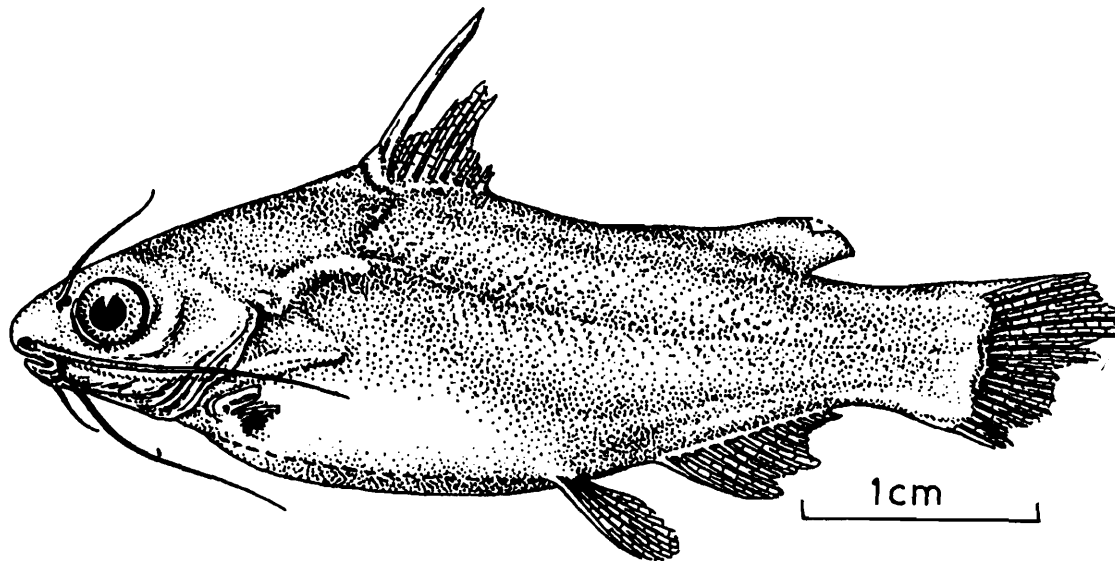


Fig 1. Lateral view drawing of *Mystus argentivittatus* (Regan), Specimen MHNG 677.99.

Body depth 32.0, head length 23.8, width of head 19.1, dorsal spine length 21.6, pre-dorsal length 42.1, post-dorsal length 66.7, length of anal fin base 17.6, all in percent of standard length. Eye 27.9, inter-orbital width 39.4, dorsal spine length 83.6, length of snout 32.7, gape of mouth 38.5, maxillary barbel length 82.5, nasal barbel length 60.6, inner mandibular barbel length 30.8, outer mandibular barbel length 92.9, length of dorsal fin base 49.0, length of anal fin base 68.3, length of caudal peduncle 73.1, height of caudal peduncle 41.3, all in percent of head length. Adipose dorsal fin base 73.2, in percent of anal fin base. Snout length 80.5 in percent of inter-orbital width. Least depth of caudal peduncle 58.1 in percent of its length.

Dorsal profile steeply rising from tip of snout to the base of occipital process. Head flat, almost as broad as long. Snout prominent. Mouth opening crescentic. eyes small, anteriorly placed. Median longitudinal groove on dorsal surface of head extending as a long indistinct single fontanel.

Occipital process subcutaneous, extending to pre-dorsal plate. Teeth villiform, numerous, in a semilunar uninterrupted band on palate, in two deeply curved mesially interrupted bands on lower jaw. Four pairs of barbels. One pair maxillary reaching three-fourths of pectoral

spine, one pair nasal reaching posterior end of median fontanel, one pair outer mandibular reaching one-fourth pectoral spine, one pair inner mandibular shorter.

Dorsal fin with seven branched rays and a weak spine. Longest ray of dorsal fin with feeble serrations. Adipose dorsal fin short with a long inter-space between the two fins. Pectoral fins with one simple and six branched rays, pectoral spines damaged. Pelvic fins just reach anal fin. Anal fin short, not reaching caudal fin. Caudal fin damaged but as per original description forked.

Colour : Pale brown along sides and body, lighter beneath. A faint dark stripe along lateral line indistinctly seen.

Distribution : CHINA : Canton.

Remarks : Jayaram (1974) redescribed the species from three examples all of which are original specimens of Regan (1905) and designated a lectotype. This species resembles *M. vittatus* in having a steep dorsal profile, deep body, prominent snout and short adipose dorsal fin, but may be easily separated by colouration; the parallel stripes on body are absent in this species.

Mystus armatus (Day)
(Figure 2)

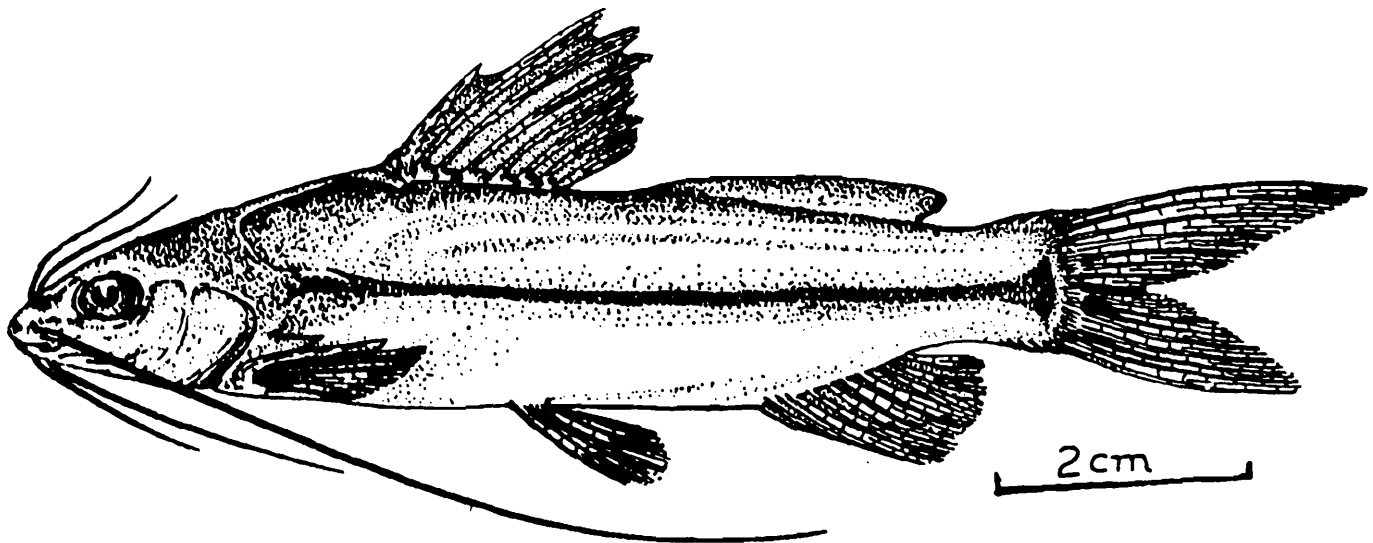


Fig 2. Lateral view drawing of *Mystus armatus* (Day).

1865. *Hypselobagrus armatus* Day, *Proc. Zool. Soc. London* : 289 (type locality Cochin, Malabar).
 1865. *Hypselobagrus armatus* Day, *Fish Malabar* : 187 (description, Malabar).
 1871. *Macrones armatus*, Day, *Proc. Zool. Soc. London* : 706 (diagnostic characters).

1877. *Macrones armatus*, Day, *Fish India* : 450, pl. 101, fig. 3 (synonymy, description; Malabar and the Wayanad range of hills).
1889. *Macrones armatus*, Day, *Fauna Brit. India, Fish 1* : 161 (synonymy, local names, description and distribution).
1931. *Aoria armatus*, Hora, *Rec. Indian Mus.* 33 : 1 (Kyencong river in Cinchona reserve, Mergui district, Lower Burma).
1954. *Mystus armatus*, Jayaram, *Rec. Indian Mus.* 51(4) : 539, fig. 5 (synonymy, description and distribution).
1954. *Mystus armatus*, Chacko, Kuriyan and Thyagarajan, *Contr. Freshw. Fish Biol. Stn. Madras* 22 : (Cauvery river).
1966. *Mystus armatus*, Jayaram, *Int. Rev. ges. Hydrobiol* 41(3) : 446 (distribution).
1969. *Mystus armatus*, Babu Rao and Chattopadhyay, *J. Bengal nat. Hist. Soc.* 35 (2) : 89, pl. 2, fig. 4.
1977. *Mystus armatus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 25, fig. 23B (synonymy, diagnostic characters, colour, distribution, size, fishery value).
1982. *Mystus armatus*, Jayaram, *Rec. Zool. Surv. India, Occ. Paper No. 36* : 74, fig. 21 (synonymy, local names; Wayanad, Cauvery watershed, South India).
1995. *Mystus armatus*, Shaji and Easa, *J. Zool. Surv. Kerala* 5(1&2) : 33 (Vythiri Kallorthoda, Wayanad.)
1998. *Mystus armatus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 160* : 97 (Krishna river system).

Specimens studied : 17 exs. 56.0 mm - 159.2 mm SL in total as below :

ZSI Unreg. Six exs. 56.0-77.5 mm SL Muppiniptti on Punnampuzha, Kerala, K. C. Jayaram and Anuradha coll. 18-02-1985. ZSI unreg. 10 exs. 62.2-84.2 mm SL Puzhakkal, 15 km north of Trichur, Kerala, K. C. Jayaram and Anuradha coll. 20-02-1985. ZSI F 11150/a, one ex. 159.2 mm SL Kenchong River in Cinchona Reserve, Mergui district, Lower Burma, K. Biswas coll.

Description : D.I, 7; P. 1. 7; V. i, 5; A. ii, 8-9; C. 7+8.

Body depth 20.0 (8.45-23.3), head length 25.5 (23.8-26.7); width of head 18.6 (17.8-19.8), dorsal spine length 12.6 (10.5-14.3), pre-dorsal length 39.8 (38.2-41.4), post-dorsal length 65.5 (54.2-68.1), length of anal fin base 13.9 (12.3-15.4) all in percent of standard length. Eye 26.7 (15.4-37.8), inter-orbital width 28.9 (22.3-38.3), dorsal spine length 50.1 (41.0-57.8), pectoral spine length 71.9 (66.1-79.8), length of snout 35.3 (20.2-39.4), gape of mouth 54.6 (49.7-58.4), length of dorsal fin base 65.8(60.3-73.3), length of anal fin base 57.7 (50.0-61.7), length of caudal peduncle 75.5 (70.4-82.8), height of caudal peduncle 45.0 (41.2-48.9) all in percent of head length. Adipose dorsal fin base 45.3 (37.4-52.7) in percent of anal fin base. Snout length 92.4 (86.0-98.6) in percent of inter-orbital width. Least depth of caudal peduncle 59.1 (53.0-66.7) in percent of its length.

Dorsal profile rising gently from the tip of snout to the base of the occiput. Head depressed, upper surface of head rough. Eyes oval. Snout rounded. Jaws equal. Mouth

opening crescentic, cleft not extending half way to orbit. Width of head nearly equaling height of head at occiput. Median longitudinal groove on dorsal surface of head almost reaching base of occipital process which in turn reaches the basal bone of dorsal fin. Teeth on palate and upper jaw in an uninterrupted, semi-lunar crescentic band and in a mesially interrupted band on lower jaw. Teeth numerous and villiform. Four pairs of barbels : one pair maxillary reaching end of pelvic fin, one pair nasal extending to base of occipital process, one pair outer mandibular reaching middle of pectoral spine and one pair inner mandibular shorter.

Dorsal fin with a weak spine finely serrated on posterior edge. Length of base of adipose dorsal fin greater than of rayed dorsal fin and also the inter-space between the two. Pectoral fins with nine branched rays and strong spine having 10-14 retrorse teeth. Pelvic fins nearly as long as pectoral fins and do not reach anal fin. Anal fin does not reach caudal fin. A small anal papilla present in front of anal fin. Caudal fin forked, upper lobe longer.

Colour : Brownish on top, becoming lighter beneath. A dark spot at base of caudal may be present. In freshly collected specimens a dark band on sides along the lateral line ending in a dark blotch at base of caudal fin and a dark band along anal fin and upper half of dorsal fin also seen.

Distribution : INDIA : Malabar and Wayanad range of hills, Kerala, Manipur. MYANMAR : Cinchona reserve, 10 miles off La-poke-Chong, Mergui district, Lower Myanmar.

Remarks : Day (1865) described this species under the genus *Hypselobarus* Bleeker. Bleeker (1862) characterised his genus as below : "Caput conicum compressum, Scuto granosa. Crista interparietalis or interspinosum attingens. Vitta dentium vomero palatinorum semilunaris indivisa. Cirri inframaxillares rictum approximali. Oculi liberi subverticales. Dorsum compressum. Spinae osseae dentatae. Adipose anali aequalis vel analilongior. Caudatis biloba. B 8 vol. 9. D.I/7. Spec. Type *Hypselobagrus macronema* Blkr = *Bagrus macronema* Blkr."

Later in 1871 Day synonymised this species under the genus *Macrones*. In conformity with the then prevalent opinion, Day considered the characters of *Hypselobagrus* as insufficient for a generic rank. The species is mainly confined to the Western Ghats, India the type locality being Cochin, Kerala. Hora (1931) identified a single large specimen 159.2 mm SL from Kyenchong River in Cinchona reserve, Mergui district in Lower Burma collected by K. Biswas as referable to this species. For a number of years this record from Burma was doubted. Jayaram (1955) also doubted its occurrence in that country. We have examined this specimen and it confirms to the description and data of *M. armatus* in all aspects. Zoogeographically it is curious that a species, which is endemic in Western Ghats should be found so far in Myanmar also. Recently we had the opportunity to identify five specimens of *M. armatus* 92.2 to 125.6 mm SL collected from Manipur. Considering that *M. microphthalmus*, another Burmese species occurring in Manipur and other northern areas, it seems possible that *M. armatus* is also found in Myanmar. It may be noted that the specimen under reference is the so far largest recorded size for this species.

M. armatus comes closer to *M. malabaricus* in possessing low dorsal profile, flattened head and a broad caudal peduncle. However, the longer median longitudinal groove and occipital process reaching the basal bone of the dorsal fin differentiates it.

Mystus atrifasciatus Fowler

1937. *Mystus atrifasciatus* Fowler, *Proc. Acad. Nat. Philad.* **89** : 146, figs 35-37 (type locality Pitsanulok, Thailand).

Specimen studied : No specimen seen by us.

Description : Previously synonymised under *M. vittatus* by Smith (1945), Roberts (1992) has resurrected this species and differentiated it by its colouration, longer barbels and fewer gill rakers. It differs from *M. rhegma* also in having more gill rakers, fewer vertebrae, longer head and shorter adipose dorsal fin. According to Roberts the species is close to *M. micracanthus* but differs from it also strikingly in colouration.

Distribution : THAILAND : Mekong Chao Phraya and Meklong basins.

Mystus baramensis (Regan)

(Figure 3)



Fig 3. Photograph of specimen ZSI FF 2268 *Mystus baramensis* (Regan).

1906. *Macrones baramensis* Regan, *Ann. Mag. Nat. Hist.* **18** : 68 (type locality Baram River, North Borneo).
1913. *Macrones baramensis*, Weber and Beaufort, *Fish Indo-Austral. Archipel.* **2** : 338. (Regan's description cited; Baram River, Borneo).
1937. *Mystus baramensis*, Herre and Myers, *Bull. Raffles Mus.* No. **13** : 68 (Chin Chin Lake, Jasin, Malacca and Singora, Thailand).
1954. *Mystus baramensis*, Jayaram, *Rec. Indian Mus.* **51**(4) : 554 (synonymy and distribution).
1972. *Mystus baramensis*, Gosse, *Bull. K. Belg. Inst. Nat. Wet. Brussel* **48**(3) : 3 (foothills of Kinabalu, North Borneo)

1989. *Mystus baramensis*, Roberts, *Mem. Calif. Acad. Sci.* **14** : 122-124 (Borneo, Affinity with *M. nemurus* discussed).

Specimen studied : One ex. ZSI FF 2268, 131.8 mm SL. Kabili river, British north Borneo, 31-01-1937.

Description : D. I, 7; P. I. 9; V. i. 5; A. ii, 9; C. 7+8

Body depth 19.3, head length 27.9, width of head 20.2, dorsal spine length 14.8, pre-dorsal length 42.3, post-dorsal length 61.4 and length of anal fin base 13.5 all in percent of standard length. Eye 17.7, inter-orbital width 34.0, dorsal spine length 53.0, length of snout 35.6, gape of mouth 50.0, length of dorsal fin base 60.6, length of anal fin base 48.4, length of caudal peduncle 71.2, height of caudal peduncle 33.7 all in percent of head length. Adipose dorsal fin base 57.8 in percent of anal fin base. Snout length 95.4 in percent of inter-orbital width. Least depth of caudal peduncle 47.3 in percent of its length.

Dorsal profile rising steadily from tip of snout to the base of occipital process. Head flat, anteriorly depressed, longer than broad. Snout not prominent. Mouth opening crescentic. Eyes not subcutaneous, lateral margin of eyes free. Median longitudinal groove on dorsal surface of head short and does not reach base of occipital process. Occipital process subcutaneous, slender and does not reach the basal bone of dorsal fin. Teeth on palate in a horseshoe shaped continuous band, on lower jaw in two deeply curved mesially interrupted bands, all teeth villiform.

Four pairs of barbels : one pair maxillary reaching end of anal fin base, one pair nasal reaching almost posterior border of eye, one pair outer mandibular reaching middle of pectoral fin length, one pair inner mandibular extending up to isthmus.

Dorsal fin with seven branched rays and a strong spine with five small retrorse teeth. Adipose dorsal fin short with a long interspace between the two dorsal fins. Pectoral fins with nine branched rays and a strong spine. Pelvic fins do not reach anal fin. Anal fin short, not reaching caudal fin. Caudal peduncle slightly constricted in the middle. Caudal fin forked, bilobed.

Colour : Uniformly light brown above and on sides. Fins lighter in shade.

Distribution : MALAYA : Chin Chin Lake, Jelau river, Johore, Singora, Sungilumpat, Ulu Jelai. BORNEO : Baram and Kabili rivers.

Remarks : Jayaram (1968) erroneously considered this species as belonging to *Leiocassis* Bleeker. We have re-examined the material and have no reason to believe this species as belonging to *Leicassis*. The orbital rims are completely free from the eyes and the barbels are also longer than the head, the two chief characters by which *Leiocassis* is differentiated from *Mystus*. *M. baramensis* closely resembles *M. nemurus* but can be distinguished by the shorter median longitudinal groove, slender, short and subcutaneous occipital process, less prominent snout, colouration, adipose fin shape and gill raker count. Roberts (1989) discussed

the affinities and stated that this species may be a smaller species as compared to *M. nemurus* although this is not reflected by marked decrease in vertebral counts.

Mystus bimaculatus (Volz)

1904. *Macrones bimaculatus* Volz, *Rev. Suisse Zool.* **12** : 466 (Nugei russu, Djapura, Nebenaram in Kwantan river, Djapuri, Indragiri, Sumatra).
1913. *Macrones bimaculatus*, Weber and Beaufort, *Fish Indo-Austral. Archipel.* **2** : 339 (*M. bimaculatus* synonymised).
1989. *Mystus bimaculatus*, Roberts, *Mem. Calif. Acad. Sci.* **14** : 121 (species resurrected).

Specimen studied : no specimen seen by us.

Description : Closely related to *M. micracanthus* (Bleeker) but differing in its striking colouration, which is overall chocolate brown with a large black humeral spot (round and well defined) and a large black vertical bar on posterior portion of caudal peduncle and base of caudal fin. Anterior margin of humeral spot and both margins of caudal bar set off by a vertical cream or white bar. Gill rakers 23 or 24, vertebrae 33-35.

Distribution : Sumatra.

Remarks : Previously considered a synonym of *M. micracanthus* (Bleeker).

Mystus bleekeri (Day)
(Figure 4)

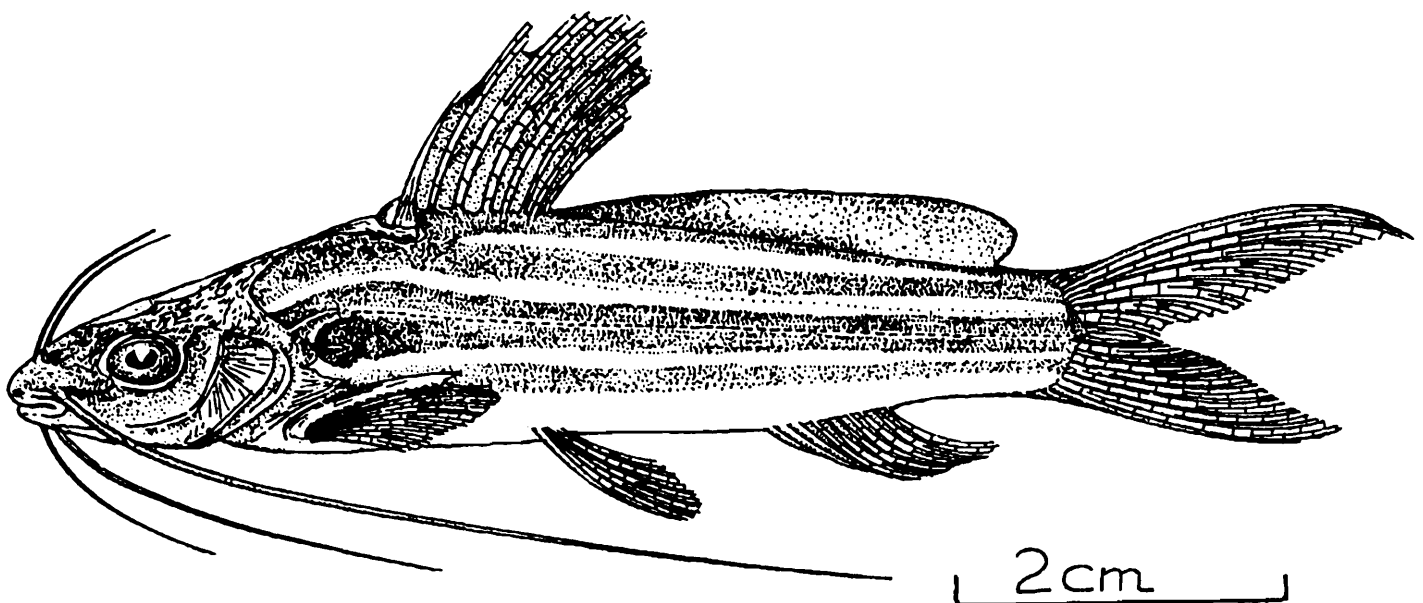


Fig 4. Lateral view drawing of *Mystus bleekeri* (Day).

1846. *Bagrus keletius* (nec Valenciennes) Bleeker, *Nat. & Genesk. Arch. Ned. Ind.* 3(2) : 135 (type locality "Bengal").
1859. *Bagrus keletius*, Bleeker, *Acta. Soc. Sci. Indo-Neerl.* 6 : 257 (Calcutta, Bengal).
1864. *Macrones keletius*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 84 (Bleeker's description repeated, Hooghly river).
1877. *Macrones bleekeri*, Day, *Fish India* : 451, pl. 101, fig. 1 (synonymy, description, Sind, Jamuna, upper waters of the Ganges and Burma. It descends the rivers as low as Bengal).
1889. *Macrones bleekeri*, Day, *Fauna Brit. India Fish* 1 : 162 (synonymy, description and distribution).
1904. *Macrones bleekeri*, Volz, *Rev. Suisse. Zool.* 12 : 468 (description, relationship with *M. planiceps* indicated; Indragiri, Ober Lankat, Sumatra).
1921. *Macrones bleekeri*, Hora, *Rec. Indian Mus.* 22 : 166 (description; Loktak Lake, Sikmai stream at Vabgai, Manipur).
1936. *Mystus bleekeri*, Hora, *Rec. Indian Mus.* 38(3) : 331 (pools in the bed of a rocky stream at Chang Chang, Naga Hills).
1938. *Mystus bleekeri*, Shaw and Shebbeare, *J. roy. Asiat. Soc. Bengal* 3, Article 1 : 91, text-fig. 89, pl. 3, fig. 6 (brief description; all streams in the Terai and Duars).
1951. *Mystus bleekeri*, Menon, *Proc. Nat. Inst. Sci. India* 17(6) : 486 (distribution, Eastern Ghats).
1953. *Mystus bleekeri*, Chauhan and Ramkrishna, *Rec. Indian Mus.* 51(3) : 396 (name only) : 411 (synonymy, local names, Ang river at Agarpur, Bolangir dist. Orissa, reported for the first time).
1954. *Mystus bleekeri*, Jayaram, *Rec. Indian Mus.* 51(4) : 530-532 (synonymy, description, and distribution).
1954. *Mystus bleekeri*, Menon, *Rec. Indian Mus.* 52(1) : 22 (Manipur).
1962. *Mystus bleekeri*, Motwani, Jayaram and Shegal, *Tropical Ecology* 3(1) Brahmaputra river, Assam : Panchali-Amraghughat landing center on the Brahmaputra river in Dibrugarh town, Jinar river near Jinari road bridge, Assam).
1966. *Mystus bleekeri*, Jayaram, *Int. Rev. ges. Hydrobiol.* 51(3) : 446 (name only, distribution).
1970. *Mystus bleekeri*, Mirza, *Fishes of Lahore* 29 : 31 (colour, synonymy, description and distribution).
1970. *Mystus bleekeri*, Datta and Majumdar, *Rec. zool. Surv. India* 62(1&2) : 70, pl. vi, fig. 6 (key, Rajasthan).
1973. *Mystus bleekeri*, Mirza and Kashmiri, *Biologia* 19(1&2) : 180 (Soan river at Morgah, Soan camp and Daghah, Pakistan).
1974. *Mystus bleekeri*, Aaur Rahman, *Bangladesh J. Zool.* 2(1) : 2, fig. 14 (key to species, synonymy, local names, description; rivers, canals, bheels and similar water areas in Bangladesh).
1974. *Mystus bleekeri*, Mirza and Ahmad, *Biologia* 20(1) : 101 (Dera Ismaili Khan distr., NWFP, Pakistan).
1975. *Mystus bleekeri*, Asghar Bashir and Mirza, *Bull. Hydrobiol. Res. Gordon College* ser. 1, no. 9 : 101 (Gudasinghwala, Pakistan).
1975. *Mystus bleekeri*, Dey, *J. Assam Sci. Soc.* 18(1) : 4 (Pagladi river at Nabasti Murikonaghat survey station, Kamrup dist., Assam).
1976. *Mystus bleekeri*, Srivastawa and Venkateswarlu, *Indian J. Zootomy* 17(3) : 182 (local names, Terai plains of U. P.).

1976. *Mystus bleekeri*, Venkateswarlu, *Acta Ichthyol. et Piscatoria* 6(1) : 95 (synonymy; Ganges river at Haldi Chapra, Baikatpur, Gandak river at Hazipur, Bihar).
1977. *Mystus bleekeri*, Jayaram and Singh, *Rec. zool. Surv. India* 72 : 262 (synonymy, Bulbulchandi fish market, Tengan and Purnabhava river at Gangarampur, Atri river at Pugleeganj, Jalpaiguri dist., North Bengal).
1977. *Mystus bleekeri*, Venkateswarlu, *Acta Ichthyol. et Piscatoria* 7(1) : 51 (synonymy, Jamhor, Ghora, Siris, Tetaria, Reur, Sonaura, Itwa, Bihar).
1977. *Mystus bleekeri*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No 8* : 23, fig, 21B (key to species, diagnostic characters, colour, distribution, fishery value).
1979. *Mystus bleekeri*, Dutt and Sharma, *Mem. Soc. Zool. Guntur* 1 : 111 (homonymy discussed, diagnostic characters; central coastal Andhra Pradesh).
1980. *Mystus bleekeri*, Mirza, *Proc. 1st Pakistan Congr. Zool* : 25 (synonymy : NWFP, Punjab, Sind, Pakistan).
1984. *Mystus bleekeri*, Hussain and Tilak, *Rec. zool. Surv. India* 81 : 275 (Faizabad, U. P.).
1985. *Mystus bleekeri*, Singh and Singh, *Intl. J. Acad. Ichthyol* 6 : 87 (Tengnoupal dist., Manipur, local names).
1986. *Mystus bleekeri*, Sharma and Rajput, *J. Bombay nat. Hist. Soc.* 83 : 566 (Ramganga, Bijnor dist., U. P.).
1988. *Mystus bleekeri*, Barman, *Rec. zool. Surv. India, Occ. Paper No. 119* : 48 (Amarpur, South Tripura).
1992. *Mystus bleekeri*, Ghate, Wagh and Lokhande, *Proc. I Nat. Symp. Env. Hydraulics* : 116 (Mula-Mutha river, Pune) : 119 (Neera river near Veneer Dam, Pune).
1995. *Mystus bleekeri*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 160* (Krishna river system).
1997. *Mystus bleekeri*, Mirza, *Biodiversity of Pakistan* : 330 (Indus, Kabul and Soan rivers, Pakistan).

Specimens studied : 35 exs. 40.9-123.8 mm SL in total as below :

ZSI F 11495, two exs. 54.7 and 70.1 mm SL no details. ZSI F 12445/1, three exs 71.5-123.6 mm SL no details. ZSI F 1733/2, one ex. 61.5 mm SL Bizarre, M. P. Survey coll. ZSI 2122/2, one ex. 67.1 mm SL Naga Hills, Assam, J. H. Hutton coll. March 1927. ZSI F 2190/1 one ex. 40.9 mm SL no details. ZSI 4236/2, 55.5 and 70.6 mm SL Iril river, Moirang Kambu, 4 miles east of Imphal, A. G. K. Menon and party coll. 25.01.1953. ZSI F 4293/2, one ex. 65.7 mm SL 2 miles down stream of river from Morae dak bungalow, Morae, A. G. K. Menon and party coll. 13.02.1953. ZSI F 4346/2, one ex. 66.1 mm SL, Lolchand, Moria, Manipur, A. G. K. Menon and party coll. 13.02.1953. ZSI 4420/1, one ex, 117.1 mm SL Gandak river, Saran district, Bihar, M. Mackenzie coll. October, 1909. ZSI unregd. Four exs. 60.9-81.1 mm SL Terai and Duars, north Bengal. ZSI unregd. 10 exs. Narrow stream in Bagram village, West Dinajpur. A. K. Dutta and party coll. 26.10.1984. ZSI 7010 eight exs. 58.7-90.7 mm SL Meghalaya, A. Hussain coll. 28.09.1983.

Description : D. I, 7; P. I, 9-10; V. i. 5; A. iii, 6-7; C. 7+8.

Body depth 21.68 (15.6-25.4), head length 26.2 (23.3-29.8), width of head 38.2 (16.8-

22.6), dorsal spine length 14.3 (12.2-16.7), pre-dorsal length 41.0 (37.6-43.0), post-dorsal length 64.3 (60.9-68.1), length of anal fin base 12.3 (9.2-15.9) all in percent of standard length. Eye 24.1 (17.9-29.6), inter-orbital width 32.1 (26.7-40.8), dorsal spine length 32.4 (48.1-61.2), length of snout 38.3 (33.3-44.6), gape of mouth 40.2 (32.9-48.3), length of dorsal fin base 56.5 (49.7-65.8), length of anal fin base 46.1 (36.5-53.3), length of caudal peduncle 79.5 (58.7-91.2), height of caudal peduncle 39.5 (32.5-52.1) all in percent of head length. Adipose dorsal fin base 29.4 (23.8-44.6) in percent of anal fin base. Snout length 82.1 (67.5-96.3) in percent of inter-orbital width. Least depth of caudal peduncle 51.0(37.2-70.4) in percent of its length.

Dorsal profile arched with considerable rise from tip of snout to the base of occipital process. Head depressed. Upper surface of head rough. eyes nearly oval, lateral margins of eyes free. Snout obtuse, jaws almost equal. Cleft of mouth not extending to orbit. Median longitudinal groove on upper surface of head shallow, reaching base of occipital process. Occipital process long, reaching basal bone of dorsal fin. Teeth villiform, in an uninterrupted crescentic band across palate, in three rows on upper jaw and a mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary reaching anal fin, one pair nasal reaching posterior border of eye, one pair outer mandibular reaching base of pectoral fin and one pair inner mandibular shorter.

Dorsal fin with a short spine. Outer and inner surface of dorsal spine usually smooth, but may be slightly in some cases. Adipose dorsal fin long, commencing immediately behind the rayed dorsal fin without any inter-space between the two, its breadth almost twice the length of base of anal fin. Pectoral fins small and nearly as long as height of body with 9-10 branched rays and a strong spine. Pectoral spine with 10-15 strong retrorse teeth. Pelvic fins not reaching anal fin. Anal fin not reaching caudal fin. Caudal fin forked, upper lobe longer than the lower.

Colour : Brownish, becoming lighter towards ventral side. Three broad conspicuous dark bands separated by two narrow pale lines on either side of lateral line and parallel to it. A large tympanic, not shoulder, spot present.

Distribution : INDIA : upper waters of Ganga and Yamuna in Uttar Pradesh, Assam, Manipur, Meghalaya, North Bengal, West Dinajpur, Bihar, Orissa. PAKISTAN : Sind, Soan river, Morgah, Daghah, NWFP. BANGLADESH : Dakatia river, Hajiganj, Chandpur. NEPAL : Rapti river and tributaries.

Remarks : Bleeker (1846) described this species under the name *Bagrus keletius* with specimens from "Bengal" He was perhaps not aware that Valenciennes in 1839 had already used this name *keletius* for specimens obtained from Pondicherry, south India. Valenciennes's specimens were later described as *M. keletius*. Gunther (1864) transferred this species to the genus *Macrones* but continued to call it as *keletius*. Day (1876) for the first time clarified this confusion and named the species as *M. bleekeri*. It may be mentioned here that

the reported occurrence of *M. keletius* from Bengal, Calcutta (Bleeker, 1853, 1959) and Yamuna, Ganges and Punjab (Day, 1873) are in fact referable to *M. bleekeri* since *M. keletius* is confined to southern India and Sri Lanka only.

From the distribution pattern of this species it is apparent that *M. bleekeri* is a species of northern India (Ganga, Yamuna systems) and Indus system of Pakistan. It has not been recorded from Thailand or from south India below the Krishna River System. The only record from "coastal" Andhra Pradesh is by Dutt and Sharma (1979) who however reported the freshwater catfishes sold at the fish market at Guntur. It is known that most of these catches come from Krishna River system and it appears that the southern most limit is only this river. It may be mentioned that there are no subsequent records from south India. Jayaram (1995) included this species in his list of Krishna River fishes thus confirming its southernmost limit. Roberts (1994) referred the Myanmar populations to *M. rufescens* thus restricting its distribution.

Mystus bocourti (Bleeker)

1864. *Heterobagrus bocourti* Bleeker, *Nat. Genesk. Arch. Ned. Ind.* : 355 (type locality Chao Phrya, Siam).
1924. *Prajadhipokia rex* Fowler, *Proc. Acad. Nat. Sci. Philad.* **86** : 399, figs. 3 & 4 (type locality Bangkok).
1968. *Heterobagrus bocourti*, Jayaram, *Treubia* **27** (123) : 369-371, fig. 10 (description).
1989. *Mystus bocourti*, Roberts, *Mem. Calif. Acad. Sci.* **14** : 123-124 (systematic position).
1994. *Mystus boucourti*, Roberts, *Ichthyol. Explor. Freshwaters* **5** (3) : 246, fig. 2 (diagnosis).

Specimens studied : No specimen seen by us.

Description : (After Jayaram, 1968) D. I, 8; P. I, 8; V. i. 5; A. ii, 8; C. 7+8.

Body depth 20.7 (19.7-24.7), head length 25.8 (22.6-29.1), width of head 13.8 (12.0-17.0), pre-dorsal length 38.5 (34.8-41.3), post-dorsal length 66.7 (65.8-68.0) all in percent of standard length. Eye 23.1 (18.8-31.1) in percent of head length. Adipose dorsal fin base longer than anal fin base. Least depth of caudal peduncle 38.0 (36.2-40.0) in percent of its length.

Dorsal profile at about 30° to body axis. Head compressed. Occipital process exposed, 3.0 or 4.0 times longer than wide at base, extending to basal bone of dorsal fin. Premaxillary band of teeth produced laterally, 5.0 or 6.0 times as long as broad, teeth on palate in a horseshoe shaped band, separated in the middle.

Four pairs of barbels : one pair maxillary extending beyond base of caudal fin, one pair nasal reaching anterior margin of orbit, one pair outer mandibular reaching half of pectoral fins and one pair inner mandibular as long as head.

Dorsal fin high, the smooth dorsal spine and first three or four soft rays greatly elongated. Adipose dorsal fin long, commencing immediately after rayed dorsal fin without any inter-

space between the two. Pectoral spine with 17-20 strong antrorse teeth over posterior margin. Pelvic fins not reaching anal fin. Longest anal ray not extending to caudal fin. Caudal fin forked with upper lobe produced into filaments. Lateral line nearly straight.

Colour : In preserved examples dark brown above and on sides, lighter beneath; spines and osseous plates tinged green. According to Roberts (1994 : 247) colouration highly variable. Some are overall intense silver or platinum, a few with head and upper part of body brilliant bronze with greenish reflections dorsally, lower part of body dull silvery and all fins black.

Distribution : THAILAND : Chao Phrya and Mekong basins. Considered as becoming rare.

Remarks : Closely related to *M. cavasius* in which the soft rays only may be elongated and not the spine, but to a lesser degree.

Mystus cavasius (Hamilton-Buchanan)
(Figure 5)

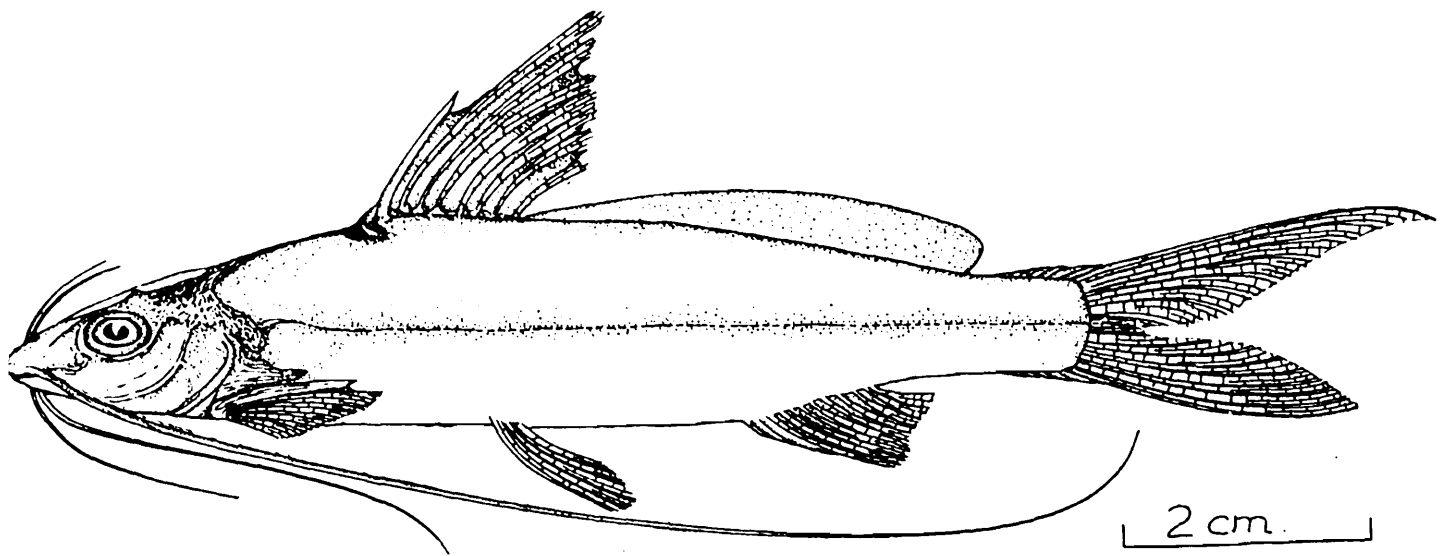


Fig 5. Lateral view drawing of *Mystus cavasius* (Hamilton-Buchanan).

1822. *Pimelodus cavasius* Hamilton-Buchanan, *Fish Ganges* : 203, 379, pl. 11, fig. 67 (type locality : Gangetic provinces).
1839. *Bagrus cavasius*, Valenciennes, *Hist. nat. Poiss.* **14** : 469, 412 (brief description, Java).
1841. *Pimelodus seengtee* Sykes, *Trans. Zool. Soc. London* **2** : 374, pl. 66, fig. 2 (description, local names, affinity with the African species *Porcus bayad* Geoffroy St. Hillaire indicated, Bhima river at Pairgaon).
1847. *Bagrus cavasius*, Bleeker, *Verh. Bat. Gen.* **21**(1) : 133 (Java).

1849. *Bagrus cavasius*, Jerdon, *Madras J. Lit. Sc.* 15(2) : 337 (description, throughout India north of Bengal to south of Karnataka. Not known from Malabar).
1853. *Bagrus cavasius*, Bleeker, *Verh. Bat. Gen.*, 25 : 56 (synonymy, Bengal, China) : 113 (description, local names, notes on synonymy).
1859. *Bagrus cavasius*, Bleeker, *Act. Soc. Indo-Neerl.* 6 : 257 (synonymy, local names; Calcutta, Bengal).
1860. *Bagrus cavasius*, Blyth, *J. Asiat. Soc.* 29 : 149 (description, Tenasserim, Burma).
1864. *Macrones cavasius*, Gunther, *Cat. Fish, Brit. Mus.* 5 : 76 (synonymy, description of a specimen from Sykes' collection; Deccan, Mysore, Pondicherry, Bengal).
1865. *Macrones cavasius*, Day, *Proc. Zool. Soc. London* : 290 (brief description; Cochin, Malabar).
1865. *Hypselobagrus cavasius*, Day, *Fish Malabar* : 188 (description; "freshwaters of Hindusthan").
1877. *Macrones cavasius*, Day, *Fish India* : 447, pl. 100, fig. 1 (synonymy, local names, description; from Sind throughout India, Assam and Burma).
1889. *Macrones cavasius*, Day, *Fauna Brit. India Fish* 1 : 153 (synonymy, local names, description and distribution).
1923. *Macrones cavasius*, Hora, *J. nat. Hist. Soc. Siam*, 6(2) : 171 (local names; Nontaburi, Thailand).
1927. *Aoria cavasius*, Hora, *J. Asiat. Soc. Bengal (N.S.)*, 22(3) : 96, pl. 16 (coloured drawing fish drawings in Mackenzie and Burner collection, No. 12 drawing in the collection referable to this species, vernacular names; Tungabhadra river) : 125 (local names, No. 16 drawing in Mackenzie and Burner collection referable).
1928. *Mystus cavasius*, Hora, *Nature*, 122 : 682 (details of Hamilton-Buchanan's drawing of Indian fishes).
1929. *Pimelodus cavasius*, Hora, *Mem. Indian Mus.* 9(4) : 188 (manuscript drawing in Asiatic Society of Bengal collection indicated as pl. IV, fig. 21; No. 160 in British Museum of Natural History).
1929. *Aoria cavasius*, Prashad and Mukerji, *Rec. Indian Mus.* 31 : 162 (Indawgyi Lake, Burma).
1930. *Aoria cavasius*, Chu, *Biol. Bull. St. John's Univ.* : 76 (synonymy; Chusan, Yunnan).
1933. *Aoria cavasius*, Mukerji, *J. Bombay nat. Hist. Soc.* 37(1) : 815 (description; Mali river, "Phungin Hka = Gawk Kyik" Burma).
1934. *Mystus cavasius*, Smith, *J. nat. Hist. Soc. Siam* 9 : 294 (Thailand).
1936. *Mystus cavasius*, Hora, *Rec. Indian Mus.* 38 : 1 (Chitradurg district, Mysore).
1937. *Mystus cavasius*, Hora, *Rec. Indian Mus.* 39 : 17 (Thunga river at Shimoga, Cauvery river at Coorg).
1937. *Mystus cavasius*, Hora and Mukerji, *J. Bombay nat. Hist. Soc.*, 39(3) : 508 (Darna river near Sewnsuri village) : 510, 512 (Aounda river) : 515 (Darna river, one furlong from Ghote Railway station) : 517 (Channel below Beale lake dam) : 518 (Darna river, Lahavit).
1938. *Mystus cavasius*, Shaw and Shebbeare, *J. Asiat. Soc. Bengal* 3 : 91, fig. 90 (north Bengal).
1938. *Mystus cavasius*, Hora and Misra, *J. Bombay nat. Hist. Soc.* 40(1) : 23 (local names and distribution in Deolali given).
1938. *Mystus cavasius*, Hora, *Rec. Indian Mus.* 40(2) : 171 (Sakrigali Ghat, Santhal Parganas).
1938. *Mystus cavasius*, Misra, *Rec. Indian Mus.* 40 : 256 (Cuddapah district, Kodur and Nallamalai hills, south India).

1940. *Mystus cavasius*, Hora, *Rec. Indian Mus.* **42**(2) : 366 (biweekly market at Sihawa) : 369 (Dhamtari bazaar, catch reported from Mahanadi river) : 370 (Mahanadi irrigation canal, Rudru, Madhya Pradesh).
1941. *Mystus cavasius*, Hora and Nair, *Rec. Indian Mus.* **43**(3) : 368 (Narbada river, Sandia) : 369 (Satpara range).
1941. *Mystus cavasius*, Hora and Law, *Rec. Indian Mus.* **43** : 236 (Urinogenital papilla; Kulathupuzha, Travancore).
1942. *Mystus cavasius*, Hora and Misra, *J. Bombay nat. Hist. Soc.* **43**(2) : 221 (vernacular names, Poona).
1943. *Aoria cavasius*, Nichols, *Freshw. Fish China IN : Nat. Hist. Cent. Asia* **9** : 11, 36 (questionably Chinese).
1943. *Mystus cavasius*, Ahmad, *Bull. Dept. zool. Punjab Univ.*, **1**(3) : 322, fig. 32 (synonymy, local names) : 323 (description) : 324 (India, Burma and Thailand. Resemblance with *M. bleekeri* Day with regard to the length of barbels indicated).
1945. *Mystus cavasius*, Smith *Bull. U. S. Nat. Mus.* **188** : 389 (synonymy, brief description, local names; Nakon Sritamarat, Tapti river, Mekong river, Menam Chao river, Sikak and Chao Chet tributaries of Menam Chao Phya, Mekong river at Kemarat and Pong river at Pong in the Mekong drainage).
1947. *Mystus cavasius*, Chauhan, *Rec. Indian Mus.* **45**(2&3) : 276 (Kudal Darh in Belagaon, Patna, Orissa).
1948. *Mystus cavasius*, Hora, *Rec. Indian Mus.* **46** : 65 (synonymy, local names, Gangetic provinces).
1949. *Mystus cavasius*, Hora, *J. zool. Soc. India* **1**(1) : 2 (Rihand river, U. P. geographical distribution).
1951. *Mystus cavasius*, Menon, *Proc. Nat. Inst. Sci. India* **17**(6) : 480 (Eastern Ghats).
1952. *Mystus cavasius*, Chacko, *Contrib. Freshw. Fish Biol. Stn. Madras*, No. **4** : 4 (upper Anicut, Godavari, Nellore and Sangam Anicut).
1953. *Mystus cavasius*, Chauhan and Ramkrishna, *Rec. Indian Mus.* **51**(3) : 396 (Balangir district, Orissa) : 411 (synonymy, Kudal Darh, Tel river at Belagaon, Orissa).
1954. *Mystus (Mystus) cavasius*, Jayaram, *Rec. Indian Mus.* **51**(4) : 532-534, fig. 2 (synonymy, description and distribution).
1954. *Mystus cavasius*, Chacko, Kuriyan and Thyagarajan, *Contrib. Freshw. fish. Biol. stn. Madras*, No. **12** (Cauvery river).
1955. *Mystus cavasius*, Rajan, *J. Bombay nat. Hist. Soc.* **53**(1) : 45 (Bhavani river, south India).
1956. *Mystus cavasius*, David, *Proc. Nat. Inst. Sci. India* **22B**(3) : 153 (Bhadra river, Bhadravati, Mysore).
1957. *Mystus cavasius*, Motwani and David, *J. zool. Soc. India* **9**(1) : 11 (Sone river, Bihar).
1962. *Mystus cavasius*, Motwani, Jayaram and Sehgal, *Tropical Ecology* **3**(1&2) : 21 (Brahamaputra river, Assam) : 31 (Dhansiri river near Golaghat town bridge, Gabharu river, Dhing ghat on the Brahmaputra, Hariamukh near Raha village, Jinari river near Jingri road bridge).
1962. *Mystus cavasius*, Karamchandani, *Tropical Ecology* **3**(1&2) : 80 (Ganga river at Dighwara, Bihar).
1964. *Mystus cavasius*, Bhuiyan, *Asiat. Soc. Pakistan, Publ. no. 13* : 63 (synonymy) : 64 (local names, description, sexual dimorphism, economic importance, fishing gear and distribution).
1966. *Mystus cavasius*, Jayaram, *Int. Rev. ges. Hydrobiol.* **51**(3) : 446 (distribution).

1967. *Mystus cavasius*, Mirza and Naik, *Pakistan J. Sci. Res.* **19**(2&3) : 114 (Bolan dam, Pakistan).
1967. *Mystus cavasius*, Jayaram and Bhimachar, *Bull. Nat. Inst. Sci. India* **34** : 283 (osteocranial characters).
1969. *Mystus cavasius*, Babu Rao and Chattopadhyay, *J. Bengal nat. Hist. Soc.* **35**(2) : 887, pl. 2, fig. 1 (key, description).
1970. *Mystus cavasius*, Sidhimunka, *Inld. fish. Div. Dept. Fish, Bangkok* : 14 (Thai, local and English common names, economic importance, Mekong river, Thailand).
1970. *Mystus cavasius*, Sen, Das Gupta and Rama Rao, *Seafd. Export. J.* **2**(1) : 3 (local names, Calcutta).
1970. *Mystus cavasius*, Datta and Majumdar, *Rec. zool. Surv. India* **62**(1&2) : 70, pl. 6, fig. 3 (key, Rajasthan).
1971. *Mystus cavasius*, Jayaram, *Proc. Zool. Soc. Calcutta*, **24** : 152, fig. 2A and fig. 3A (absence of interneural shield indicated).
1971. *Mystus cavasius*, Jayaram, *Rec. zool. Surv. India* **63**(1-4) : 186, fig. 3B (osteological features).
1972. *Mystus cavasius*, Mirza, *Biologia* **19**(1&2) : 125 (Mardan district, Pakistan).
1974. *Mystus cavasius*, Mirza and Ahamd, *Biologia* **20**(1) : 100 (Dera Ismail Khan district, NWFP, Pakistan).
1974. *Mystus cavasius*, Aatur Rahman, *Freshw. Fish. Res. Stn. Chandipur. Bull. No. 1* : 11 (local names in Bangladesh).
1974. *Mystus cavasius*, Aatur Rahman, *Bangladesh J. zool.* **2**(1) : 2, fig. 1G (checklist, distinguishing features, osteological characters, key; Bangladesh).
1975. *Mystus cavasius*, Desoutter, *Bull. Mus. Nat. Hist. Naturelle No. 296* : 444 (synonymy, description, Tonle Sap, Kampuchea).
1975. *Mystus cavasius*, Asghar Bashir and Mirza, *Bull. Hydrobiol. Res. Gordon College ser. 1, No. 9* : 101 (Kanganpur and Gundasighwala, Pakistan).
1975. *Mystus cavasius*, Dey, *J. Assam Sci. Soc.* **8**(1) : 4 (Pagladia river at Mori Konaghat survey station and at Bijulighat survey station, Kamrup district, Assam).
1975. *Mystus Mukherjii*, Ganguli and Datta, *Dr. B. S. Chauhan Comm. Vol.* : 293 (type locality, rockpool below waterfalls at Hindru, Ranchi district, Bihar).
1976. *Mystus cavasius*, Sriwastawa and Venkateswarlu, *Indian J. Zootomy* **17**(3) : 182 (local names; plains of U. P.).
1976. *Mystus cavasius*, Mirza, *Biologia* **22**(1) : 117 (common names; northern Montane and sub-montane regions of Pakistan).
1976. *Mystus cavasius*, Jayaram and Majumdar, *Rec. zool. Surv. India* **69** : 309 (synonymy; Mahanadi river at Narsinghpur, Kamlibazar, Sambalpur, Raigarh, M. P.).
1976. *Mystus cavasius*, Venkateswarlu., *Acta Ichthyol et. Piscatoria* **6**(1) : 95 (synonymy, Gandak river at Daniawan, Hazipur, Poonpun river at Fatwah, Ganges at Haldi Chapra, Bihar).
1977. *Mystus cavasius*, Jayaram and Singh, *Rec. Zool. Surv. India* **72** : 262 (synonymy; Tengan river, Bulbulchandi fish market, Aihoo village fish market, Mahanadi river at Adampur village, Jamuna river at Hill village, Purnabhava river at Gangarampur, Atrai river at Pogleganj, Teesta river, Jalpaiguri fish market).

1977. *Mystus cavasius*, Pillai and Yazdani, *Rec. Zool. Surv. India* 72 : 5 (synonymy, Gingiram river, Someswar river at Baghmara, Meghalaya).
1977. *Mystus cavasius*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 23 (key to species) : 29 (synonymy, diagnostic characters, colour, distribution, size, fishery value).
1978. *Mystus cavasius*, Dutt and Murthy, *Mem. Soc. Zool. Guntur* 1 : 23 (local names; 1.5% composition by weight in the total annual landings from Kolleru lake, Andhra Pradesh).
1979. *Mystus cavasius*, Dutt and Sharma, *Mem. Soc. Zool. Guntur*, 1 : 110 (diagnostic characters, central coastal Andhra Pradesh).
1980. *Mystus cavasius*, Mirza, *Proc. 1st Pakistan Congr. Zool.* : 25 (synonymy; NWFP, Punjab, Sind, Pakistan).
1981. *Mystus cavasius*, Dutt and Mirza, *Biol. vi* 27(2) : 158 (Madran and Peshawar).
1982. *Mystus cavasius*, Dutt, Sharma and Desoutter, *Cybiurn* 6(4) : 27 (synonymy, taxonomic position).
1982. *Mystus cavasius*, Mirza, *Fishes of Lahore* : 30 (synonymy, colour and distribution).
1983. *Mystus cavasius*, Sharma and Dutt, *Rec. zool. Surv. India* 81(1&2) : 334 (synonymy, description, *M. nigriceps* synonymised).
1984. *Mystus cavasius*, Venkateswarlu, *Rec. zool. Surv. India, Occ. Paper No. 56* : 20 (common and vernacular names).
1984. *Mystus cavasius*, Anuradha, *Bull. zool. Surv. India* 5(2&3) : 109 (description of 3 abnormal specimens).
1984. *Mystus cavasius*, Husain and Tilak, *Rec. zool. Surv. India* 81 : 275 (Faizabad, U. P.).
1986. *Mystus cavasius*, Sharma and Rajput, *J. Bombay nat. Hist. Soc.* 83 : 566 (Bijnor district, U. P.).
1988. *Mystus cavasius*, Barman, *Rec. zool. Surv. India Occ. Paper No. 119* : 49 (Amarpur, Udaypur, South Tripura; Sonamura, West Tripura).
1992. *Mystus cavasius*, Ghate Wagh and Lokhande, *Proc. 1st Nat. Symp. Env. Hydraulics* : 116 (Mula-Mutha river, Pune).
1995. *Mystus cavasius*, Shaji and Easa, *J. zool. Soc. Kerala* 5(1&2) : 33 (Nulpuzha, Kabani, Kanthanpara, Vandikavu, Perikallur, Mananthawady, Panamaram and Wayanad).
1995. *Mystus cavasius*, Shaji and Easa, *J. Bombay nat. Hist. Soc.* 92(3) : 361 (Cheenkannipuzha, Arambalam Wildlife sanctuary).
1995. *Mystus cavasius*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 160* : 97 (Krishna river system).
1997. *Mystus cavasius*, Mirza, *Biodiversity in Pakistan* : 330 (Indus, Kabul and Soan rivers).

Specimens studied : 41 exs. 65.4-158.9 mm SL in total as below :

ZSI F.2563/2, one ex. 76.1 mm SL Tezpur fish market. Derrang, Assam, B. Prashad and S. L. Hora coll. 4.11.1933. ZSI F.4956/2, six exs. 66.4-77.6 mm SL Shakher bazar, Barisha, West Bengal, T. K. Sen coll. 3.6.1964. ZSI F.2870/2, three exs. 66.5-101.2 mm SL Tangla,

Danang, Assam, S. L. Hora coll. 14.11.1939. ZSI 425, one ex. 107.1 mm SL Bassein, Burma, purchased from F. Day. ZSI unreg. five exs. 68.7-125.3 mm SL Darna river near village Sewnsuri. ZSI unreg. six exs. 93.6-158.9 mm SL Manchar lake, Sind, Pakistan. ZSI unreg. eight exs. 71.2-111.8 mm SL Hooghly river at Goalpara, 12 miles from Nawadwip, Hooghly survey party. ZSI unreg. 10 exs 65.4-102.9 mm SL fish market, Sakrigalighat, Santal Parganas. USNM Cat No. 205615, one ex. Paratype of *M. mukherjii* Ganguli & Datta, 77.2 mm SL Subarnarekha river, Ranchi district, Bihar, Dec. 1967.

Description : D.I, 7; P.I, 8-10; V.i, 5; A.iii, 7-9; C. 7+8.

Body depth 23.0 (18.9-28.0), head length 25.6 (23.0-29.8), width of head 18.2 (15.4-21.6). Dorsal spine length 14.5 (11.2-18.7), pre-dorsal length 41.8 (37.2-46.8), post-dorsal length 63.4 (56.1-67.4), length of anal fin base 12.2 (9.9-15.9) all in percent of standard length. Eye 28.2 (22.2-35.3), inter-orbital width 31.5 (25.8-36.4), dorsal spine length 55.8 (46.1-63.7), length of snout 37.2 (28.7-42.9), gape of mouth 37.6 (32.3-44.9), length of dorsal fin base 58.3 (49.7-62.4), length of anal fin base 47.7 (40.3-55.2), length of caudal peduncle 67.6 (43.3-97.8), height of caudal peduncle 39.1 (33.0-45.4) all in percent of head length. Adipose dorsal fin base 32.7 (23.2-51.6) in percent of anal fin base. Snout length 84.5 (68.6-100.0) in percent of inter-orbital width. Least depth of caudal peduncle 63.7 (33.7-96.2) in percent of its length.

Dorsal profile arched with a steep rise from tip of snout to the base of occipital process. Head compressed upper surface of head slightly rough. Snout almost rounded upper jaw slightly longer than lower. Eyes oval and prominent, lateral margins free. Median longitudinal groove on dorsal surface of head wide and long, reaching base of occipital process. Occipital process long, narrow reaching basal bone of dorsal fin. Teeth villiform in a narrow semi-lunar uninterrupted band across the palate; three to four rows of teeth on upper jaw and an interrupted band of five to six rows on lower jaw.

Four pair of barbels : one pair maxillary extending beyond base of caudal fin; one pair nasal almost as long as head, one pair outer mandibular reaching nearly base of pelvic fins and one pair inner mandibular as long as nasal barbels.

Dorsal fin with a short, smooth weak spine. Adipose dorsal fin long, commencing immediately after rayed dorsal fin without any inter-space between the two. Pectoral fins with eight branched rays and strong spine. Outer surface of pectoral spine smooth, inner surface having 11-14 strong teeth. Pelvic fins do not reach anal fin. Anal fin short, not reaching caudal fin. Pre-anal papilla absent. Caudal fin deeply forked, upper lobe longer than lower; longest outer ray extending like a filament.

Colour : Pale yellowish brown. Usually a black spot on base of dorsal fin present in fresh specimens.

Distribution : INDIA : Widely distributed throughout from north of Bengal including Assam, Orissa, Bihar to south of Karnataka, upper plains of Uttar Pradesh, Rajasthan, Punjab, Madhya Pradesh, Maharashtra, Kerala and Tamil Nadu. SRI LANKA. PAKISTAN : Sind, Nari-Bolan dam, Baluchistan, Marden, Dera-Ismael Khan, NWFP, Kanganpur, Gudasinghwala, Northern montane and sub-montane regions, Peshawar. NEPAL. BANGLADESH : Chandpur. MYANMAR : Tenasserim, Indawgyi lake. JAVA : Batavia, Perdana, Surabaya, Tijiringan, Kedri, Bekasi. SUMATRA : Sungei Mahe, Indragiri, Djapura, Benkulen, Padang, Lahat, Palembang, Taluk, Ringat, Djambi, Serdang, Priaman. BORNEO : Kahajan, Kapuas, Mahakam, Barito, Sambas and Baram rivers. MALAYA : Malacca, Jasin, Ayer Hittam, Johore and Perak, Chin Chin Lake.

Remarks : Hamilton-Buchanan (1822) described this species under the genus *Pimelodus*. This genus as constituting today is a South American catfish under the family Pimelodidae. However, Hamilton-Buchanan used this as a catchall for almost all the catfishes he described from the Gangetic basin. Hora (1949) clarified the systematic position of siluroids in Hamilton-Buchanan's Gangetic fishes and demonstrated that many of the species described by the author under *Pimelodus* belong to different siluroid genera. Valenciennes (1839) considered *M. cavasius* as belonging to *Bagrus* which opinion seems to have been followed by subsequent workers like Jacquemont (1841), Bleeker (1846, 1847, 1853, 1859), Blyth (1858, 1860) and Jerdon (1849). Gunther (1864) placed this species under *Macrones* for the first time.

Mystus cavasius is a widely distributed species, yet it does not seem to be having much of a geographic variation as can be seen from the synonymy. Only two species (*Pimelodus seengtee* Sykes and *Mystus mukherjii* Ganguli & Datta) have been synonymised under *M. cavasius*. The last cited species was described from eight specimens. The holotype 112 mm in total length, collected from rock pool of the waterfalls in Subarnarekha river at Hudru, Ranchi district, Bihar preserved in Zool. Dept. Fish Lab. Calcutta university; paratypes 7 exs, 2 in USNM No. 205615 and 5 in Calcutta as above. The species was differentiated from *M. cavasius* and *M. oculatus*. The later species is a peninsular one not so far recorded from north India and is mostly confined to the southern Western Ghats, notably Wayanad, Nilgiris, Mysore and adjacent hill areas. Moreover, the species is clearly distinguished from all others by its large eyes which is one diameter from end of snout and also apart. From *M. cavasius* its having a narrower head and a low body depth has separated it. Considering the fact that *M. cavasius* is widely distributed and also after examining the paratype present in USNM we consider *M. mukherjii* as a juvenile of *M. cavasius*. Further, this is evidenced from the published illustration of the species and also its colouration. It is stated that at the base of dorsal spine has a black mark besides the shoulder spot. These are very characters of *M. cavasius* and Roberts (1994) opined that the colour pattern is common to all specimens of *M. cavasius*.

Mystus chinensis (Steindachner)
(Figure 6)

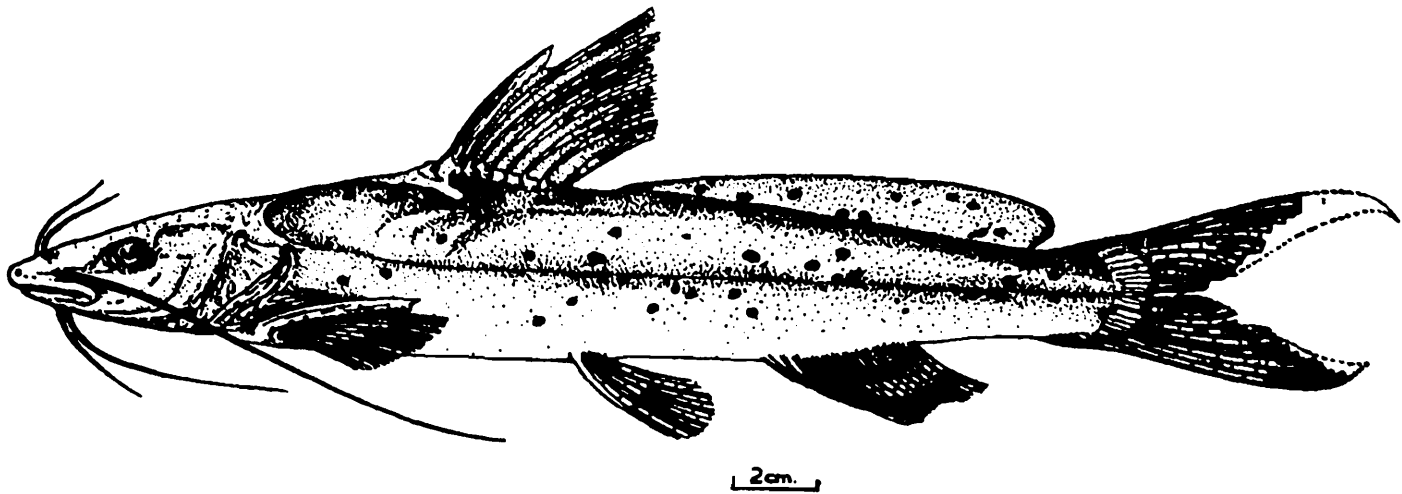


Fig 6. Lateral view drawing of *Mystus chinensis* (Bleeker).

1883. *Macrones chinensis* Steindachner, *S. B. Akad. Wiss. Wien. Math. Nat.* **88**(1) : 1111, pl. 8 (type locality Canton China).
1930. *Pseudobagrus chinensis*, Wu, *Zool. Ser.* **8**(1) : 53, fig. 4 (Szechuan).
1931. *Aoria chinensis*, Chu, *Biol. Bull. St. John's Univ.* : 77 (synonymy, Canton, China).
1932. *Hypselobagrus chinensis*, Herre, *Lignan Sci. J. Canton* **11** : 433 (Canton, China as a synonym of *Hemibagrus elongatus*).
1933. *Aoria chinensis*, Rendahl, *Ark. Zool. (A)* **24** : 88 (description).
1934. *Hypselobagrus chinensis*, Herre, *Lignan Sci. J. Canton* **13** : 327 (Fu river and west river at Wuchow, China).
1943. *Macrones chinensis*, Nichols, *Freshw. Fish. China* **13** : 327 (as a synonym of *Hemibagrus elongatus* : Herre's field notes given).
1954. *Macrones chinensis*, Jayaram, *Rec. Indian Mus.* **51**(4) : 555 (treated as a synonym of *Hemibagrus elongatus*).
1966. *Mystus chinensis*, Jayaram, *Int. Rev. ges. Hydrobiol.* **51**(3) : 446 (confined to China).
1978. *Mystus chinensis*, Jayaram, *Proc. Indian Acad. Sci.* **87B**(9) : 222, fig. 3 (justification for retaining under *Mystus*).

Specimens studied : Two exs. 269.4 and 398.0 mm SL in total as below :

USNM 094596, one ex. 269.4 mm SL Wuchow, Kwangsi province, China, A. W. C. T. Herre coll. S. Y. Lin, 12.02.1934. NHMV 4583, one ex. 398 mm SL, Canton, China.

Description : D.I, 7; P.I, 9-10; V.i, 5; A.i-iii, 11-12; C. 7+8.

Body depth 14.9 (14.8-14.9), head length 24.9 (24.1-25.8), width of head 18.5 (16.3-18.5), dorsal spine length 14.6 (13.3-15.8), pre-dorsal length 37.0 (35.2-38.8), post-dorsal length 61.2 (59.3-63.1), length of anal fin base 13.3 (13.1-13.6) all in percent of standard length. Eye 13.9 (13.5-14.2), inter-orbital width 29.5 (26.8-32.3), dorsal spine length 58.2 (55.2-61.3), length of snout 36.6 (35.4-37.7), gape of mouth 48.8 (42.7-55.0), length of dorsal fin base 44.8 (44.7-44.9), length of anal fin base 53.5 (50.8-56.2), length of caudal peduncle 79.4 (79.2-79.6), height of caudal peduncle 31.2 (29.1-33.3) all in percent of head length. Adipose dorsal fin base 41.9 (37.7-46.1) in percent of anal fin base. Snout length 81.1 (71.0-91.2) in percent of inter-orbital width. Least depth of caudal peduncle 39.3 (36.5-42.1) in percent of its length.

Dorsal profile rising steadily from tip of snout to the base of occipital process. Head flat, depressed and longer than broad. Snout broad and rounded. Mouth opening crescentic. Median longitudinal groove on head long and reaching base of occipital process. Occipital process short and not reaching basal bone of dorsal fin, the latter being prolonged into a bony process. A short inter-space present between the top of the occipital process and the prolongation of the basal bone dorsal fin. Teeth on pa late, villiform, in a semi-lunar uninterrupted band, on lower jaw in two deeply curved mesially interrupted bands.

Four pairs of barbels : one pair maxillary reaching almost end of base of dorsal fin, one pair nasal reaching middle of eye, one pair outer mandibular reaching origin of pectoral spine and one pair inner mandibular shorter.

Dorsal fin with a strong spine outer surface of dorsal spine rough and inner surface with seven small teeth. Adipose dorsal fin long with a short inter-space between the two fins. Pectoral fins with 10 branched rays and a strong spine shorter than dorsal spine, with 14 retrorse teeth; outer surface also finely serrated. Pelvic fins do not reach anal fin. Anal fin short, not reaching caudal fin. Caudal peduncle broad and flattened. Caudal fin bifurcated.

Colour : Light yellowish brown being lighter near the opercles and the fins. Body covered with uneven sized black spots all over. Fins also dotted with scattered black spots.

Distribution : CHINA : Canton, Wuchow, Kwangsi province.

Remarks : Steindachner (1883) described this species from a specimen 462 mm in total length. The holotype preserved under No. 4583 in Naturhistorisches Museum, Wien, Austria. The first author examined the holotype in 1973 and the data obtained by him have been incorporated in the description. The chief diagnostic feature of this species is that it is mottled all over the body with large number of scattered black dots. These dots are not in a regular pattern. Even the fins are similarly marked. Excepting *M. punctatus* and *M. menoda* no other species of *Mystus* possess such colouration.

Herre (1932) transferred this species to the genus *Hypselobagrus*. He stated in 1934 that the fish was abundant in the Fu river and West river at Wuchow. It was reported to weigh more than 25 kgs and attain a length of over a meter. Surplus catch was reported to be shipped to Canton and occasionally to Hongkong. It appears that the holotype may be one such market example.

Rendahl (1933) gave description of this species but under *Aoria* = *Mystus*. He considered the species allied to *Hemibagrus macropterus* Bleeker and differing in respect of the eyes. Nichols (1943) synonymised the species under *Hemibagrus elongatus* (Gunther). As stated earlier this is the only species of the Chinese *Mystus*, which has a mottled body with peculiar colouration. It is entirely different from *H. elongatus* and as such Nichols' treatment is not valid.

Jayaram (1978) having examined the holotype gave a photograph of the species and justified its retention under *Mystus*.

Mystus elongatus (Gunther)
(Figure 7)

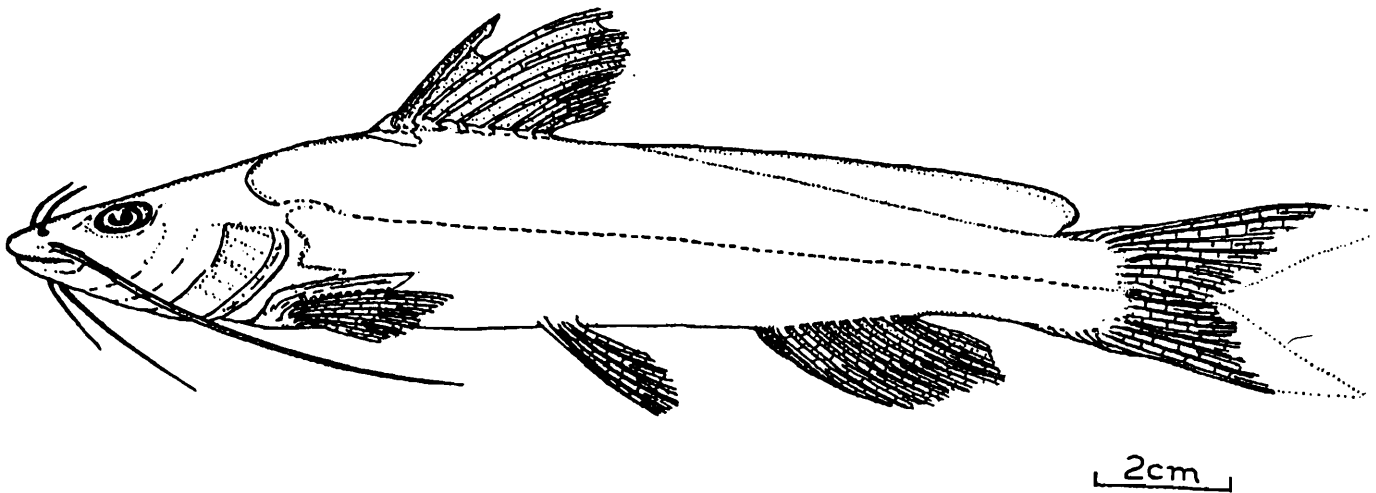


Fig 7. Lateral view drawing of *Mystus elongatus* (Gunther).

1864. *Macrones elongatus* Gunther, *Cat. Fish. Brit. Mus.* 5 : 77 (type locality Singapore).
 1927. *Macrones elongatus*, Koller, *Ann. Naturhist. Mus. Wien* 41 : 28 (Hainan).
 1941. *Mystus elongatus*, Hora and Gupta, *Bull. Raffles Mus.* 17 : 22 (Singapore).
 1943. *Macrones elongatus*, Nichols, *Freshw. Fish. China* 9 : 50 (as a synonym of *Hemibagrus elongatus*).
 1954. *Macrones elongatus*, Jayaram, *Rec. Indian Mus.* 51(4) : 355 (as a synonym of *Hemibagrus elongatus*).
 1966. *Mystus elongatus*, Jayaram, *Int. Rev. ges. Hydrobiol* 51(3) : 446 (distribution).
 1978. *Mystus elongatus*, Jayaram, *Proc. Indian Acad. Sci.* 87B(9) : 225, fig. 2 (systematic position clarified).

Specimens studied : Five exs. 164.5-236.0 mm SL in total as below :

BMNH 1855.9.19.1099. Holotype, 236 mm SL Singapore, ex-Hassler's collection (type examined by Dr. P. J. Whitehead in Nov. 1975 for Dr. Jayaram; data as supplied by him).
 VNHM 10347 three exs. 107-172 mm SL ZSI FF 1108. One ex. 164.5 mm SL Kankong river, Hainan, Owston coll. 1906.

Description : D.I, 7; P.I, 8-10; V.i, 5; A.i-iii, 10-11; C. 7+8.

Body depth 15.8 (13.7-18.3), head length 24.9 (23.3-26.2), width of head 17.7 (N=1), dorsal spine length 13.6 (12.0-15.2), pre-dorsal length 35.2 (34.4-38.0), post-dorsal length 63.9 (N=1), length of anal fin base 12.9 (N=1) all in percent of standard length. Eye 17.6 (14.6-21.4). inter-orbital width 26.4 (22.7-29.9), dorsal spine length 54.9 (50.1-61.0), length of snout 36.9 (34.1-39.3), gape of mouth 43.4 (N=1), length of dorsal fin base 51.1 (N=1), length of anal fin base 53.7 (N=1), length of caudal peduncle 87.3 (N=1), height of caudal peduncle 33.2 (N=1) all in percent of head length. Adipose dorsal fin base 30.9 (N=1), in percent of anal fin base. Snout length 75.3 (63.6-81.4) in percent of inter-orbital width. Least depth of caudal peduncle 38.0 (N=1) in percent of its length.

Dorsal profile gently rising from tip of snout to base of occipital process. Head flat, longer than broad and rugose. Snout rounded, slightly prominent. Mouth opening crescentic. Median longitudinal groove on head long, but not reaching the base of occipital process. Occipital process short slender and not reaching basal bone of dorsal fin. Teeth villiform and in bands on jaws and palate; a slightly curved continuous band on upper jaw, a deeply curved mesially interrupted band on lower jaw and a semi-lunar continuous band on vomer.

Four pairs of barbels : one pair maxillary extending up to middle of base of dorsal fin, one pair nasal reaching middle of eye, one pair inner mandibular extending beyond outer border of eye and one pair outer mandibular reaching end of operculum.

Dorsal fin inserted vertically above end of pectoral fin with seven rays and a slender spine, half as long as head and finely serrated behind. Outer surface of dorsal spine smooth. Adipose dorsal fin long, more than three times longer than dorsal base and commencing with a short inter-space. Pectoral fins not reaching pelvic fins, with 8-10 branched rays and a strong spine longer than dorsal spine and with 12 strong retrorse teeth. Pelvic fins do not reach anal fin. Anal fin not reaching caudal fin. Caudal peduncle broad, no pre-anal papilla. Caudal fin forked, upper lobe longer.

Colour : Yellowish brown.

Distribution : SINGAPORE. HAINAN. CHINA.

Remarks : Gunther (1864) described this species from a large specimen nearly 280 mm long from Hasslar's collection from Singapore. Koller (1927) recorded this species from Hainan. Nichols (1943) considered it as belonging to the genus *Hemibagrus* and described it on the basis of specimens from Kwangtung, China. He felt that Gunther's locality Singapore as an error. Also he synonymised *M. chinensis* Steindachner (1883) under this species.

A comparison of *M. elongatus* and *M. chinensis* clearly indicates that the two are different. *M. elongatus* has smaller eyes, shorter barbels, shorter dorsal spine besides a more anterior insertion of pelvic fin. Further, the characteristic colouration of *M. chinensis* is absent in this species, although the dorsal and caudal fins may be tinged with a black margin.

Mystus gulio (Hamilton-Buchanan)
(Figure 8)

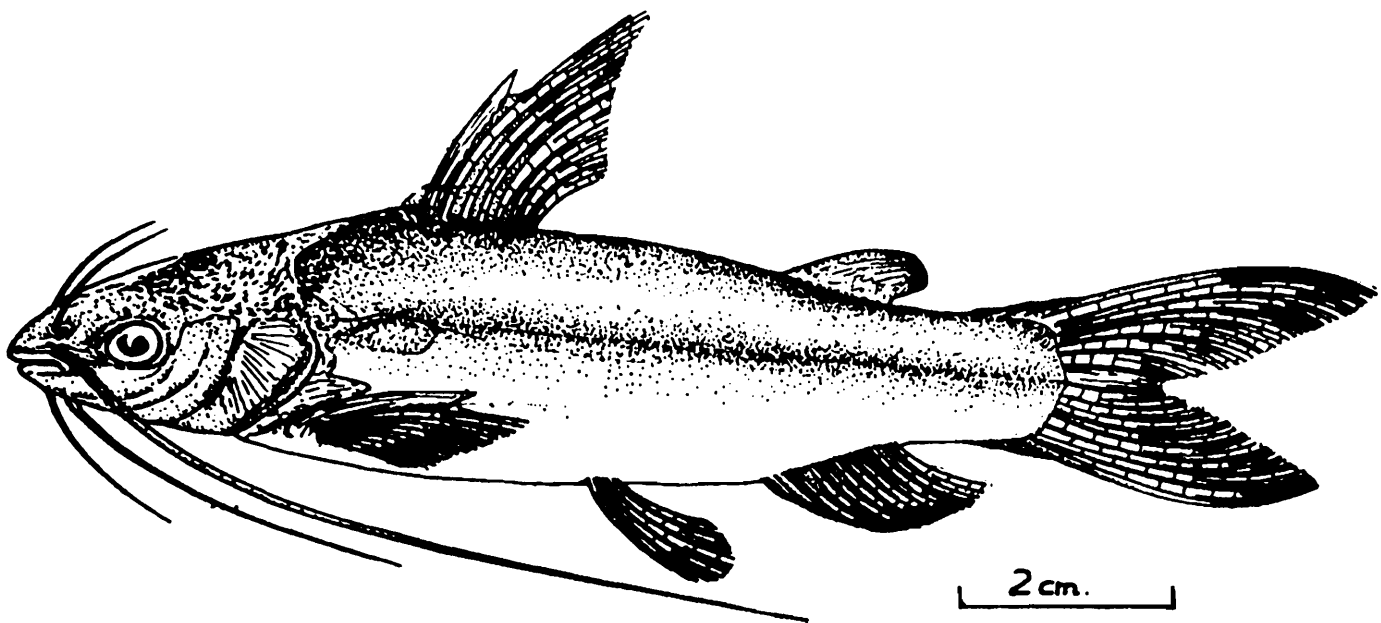


Fig 8. Lateral view drawing of *Mystus gulio* (Hamilton-Buchanan).

1822. *Pimelodus gulio* Hamilton-Buchanan, *Fish Ganges* : 201, pl. 23, fig. 66 (type locality upper parts of "Gangetic estuaries").
1839. *Bagrus albilbaris, fuscus, gulio, birmannus* Valenciennes, *Hist. Nat. Poiss.* **14** : 416, 417, 418, 419 (brief description).
1846. *Bagrus abbreviatus, gulioides, melas, rhodopterigiis, schlegelli*, Bleeker, *Nat. Geneesk Arch. ned. Ind.* **3(2)** : 133, 152, 153 (name only) : 285 (diagnosis).
1849. *Bagrus albilabris*, Jerdon, *Madras J. Lit. Sci.* **15(12)** : 338 (brief description, rivers and backwaters of Madras).
1850. *Bagrus gulioides*, Bleeker, *Verh. Bat. Gen.* **23(12)** : 10 (Surabaya in fresh and saltwater, Central Java).
1853. *Bagrus gulio*, Bleeker, *Verh. Bat. Gen.* **25** : 56, 57 (synonymy : Pondicherry, Cannanore, Bengal, Ceylon, Indo-Australian Archipelago) : 116 (description, notes on synonymy, Hooghly river, Calcutta).
1858. *Bagrus gulio*, Bleeker, *Ichth. Arch. Ind. Prodr.* **1** : Siluri : 163, 164 (description, synonymy, local names, Java, Sumatra, Borneo).
1862. *Aspidobagrus gulio*, Bleeker, *Atlas Ichth. Siluri* **2** : 60, pl. 74, fig. 2 (description, synonymy, local names, Java, Sumatra, Borneo).
1864. *Macrones gulio*, Gunther, *Cat. Fish. Brit. Mus.* **5** : 79 (synonymy, description; East Indies).
1877. *Macrones gulio*, Day, *Fish India* : 445, pl. 99, fig. 2 (synonymy, local name, description; seas and estuaries and tidal waters from Sind and Bombay, throughout India and Burma to the Malay Archipelago).

1880. *Macrones gulio*, Vinciguerra, *Ann. Mus. Stor. Nat. Genova* **16** : 169 (synonymy : Java, Sumatra, Borneo, Penang, Ceylon, Calcutta and Madras in India).
1889. *Macrones gulio*, Day, *Fauna Brit. India, Fish* **1** : 151, fig. 64 (synonymy, local name, description and distribution).
1890. *Macrones gulio*, Vinciguerra, *Ann. Mus. Stor. Nat. Genova* **9(2)** : 229 (Burma).
1913. *Macrones gulio*, Weber and Beaufort, *Fish. Indo-Austral. Archipel.* **2** : 344 (synonymy, description, local names; Java, Sumatra, Borneo, Penang, Malacca, Burma to India and Ceylon. Seas, estuaries and tidal rivers).
1916. *Macrones gulio*, Chaudhuri, *Mem. Indian Mus.* **5** : 434 (synonymy, brief description. List of catch to show its distribution in Chilka Lake; seas, estuaries and tidal waters of Sind, Bombay, Madras, Orissa, Bengal, Assam, Burma, Ceylon and Malay Archipelago).
1917. *Macrones gulio*, Kemp, *Rec. Indian Mus.* **13** : 234 (under family Siluridae; abundantly found in Matlah river, Bengal).
1923. *Macrones gulio*, Hora, *J. nat. Hist. Soc. Siam* **6** : 171 (local name, two young specimens in collection; Nontaburi, Thailand).
1923. *Macrones gulio*, Hora, *Mem. Indian Mus.* **5** : 765 (outer channel of Chilka Lake).
1929. *Aoria gulio*, Prashad and Mukerji, *Rec. Indian Mus.* **31** : 162 (name only) : 179 (brief description; Indawgyi lake, Burma).
1932. *Aoria gulio*, Deraniyagala, *Spolia Zeylanica* **16** : 285 (local name, description, Ceylon, India, Burma, Malay Peninsula, Java, Madura, Sumatra, Borneo).
1934. *Mystus gulio*, Smith, *J. nat. Hist. Soc. Siam* **9(3)** : 294 (Thailand).
1936. *Mystus gulio*, Hora and Mukerji, *Rec. Indian Mus.* **38** : 18 (Rangoon, Burma).
1937. *Mystus gulio*, Herre and Myers, *Bull. Raffles Mus.* **13** : 69 (Ayer Hitam, Johore).
1941. *Mystus gulio*, Hora and Gupta, *Bull. Raffles Mus.* **17** : 22 (Malay Peninsula).
1943. *Mystus gulio*, Hora, *J. Bombay nat. Hist. Soc.* **43(4)** : 667 (Sunderbans).
1944. *Mystus gulio*, Hora and Nair, *Fishery development pamphlet* **1** : 7 (local names, Sisirgunge, Bengal).
1945. *Mystus gulio*, Smith, *Bull. U. S. nat. Mus.* **188** : 384 (synonymy, local names, Gulf of Thailand, Patani river, Gulf at Pakpoon, Peninsular Thailand, Chantabun and Krat, S. E. Thailand, Menam Chao Phya).
1948. *Mystus gulio*, Hora, *Rec. Indian Mus.* **46** : 65 (name only) : 72 (synonymy, local name, Gangetic estuaries).
1950. *Mystus gulio*, Hora, *Bull. Bot. Soc. Bengal* **4(11)** : 3 (Bengal).
1951. *Mystus gulio*, Menon, *Proc. Nat. Inst. Sci. India* **17(6)** : 480 (distribution in Eastern Ghats).
1952. *Mystus gulio*, Silas, *Nat. Inst. Sci. India Bull. No.* **7** : 251 (Sri Lanka).
1954. *Mystus (Mystus) gulio*, Jayaram, *Rec. Indian Mus.* **51(4)** : 543, 543, fig. 7 (synonymy, description and distribution).
1961. *Mystus gulio*, Menon, *Rec. Indian Mus.* **59(4)** : 380 (synonymy, Poraiyar, Tranquebar, Ponnaiyar, Madukkarai).

1969. *Mystus gulio*, Babu Rao and Chattopadhyay, *J. Bengal nat. Hist. Soc.* **35**(2) : 88, pl. 1, fig. C, Pl. 2, fig. 7 (key to species).
1970. *Mystus gulio*, Sen, Dasgupta and Rama Rao, *Seafd. Export J.* **2**(1) : 3 (local and English names, Calcutta).
1970. *Mystus gulio*, Sidthimunka, *Inld. Fish. Divn. Dept. Fish Bangkok* : **14** (Thai name, local names English common name, economic importance; Mekong river, Thailand).
1971. *Mystus gulio*, Aaur Rahman, *Bangladesh J. Zool.* **2**(1) : 1, fig. 1D & E (Checklist, key to species, osteological characters, local name, description, estuaries of Bangladesh, Bay of Bengal).
1972. *Mystus gulio*, Mirza, *Biologia* **18**(2) : 156, 179 (synonymy, Baluchistan, Bela only).
1972. *Mystus gulio*, Menon, Rama Rao and Sen, *Sci. & Cult.* **38** : 5 (Hooghly river at Pulta stretch).
1974. *Mystus gulio*, Venkateswarlu and Rama Rao, *Indian J. Zootomy* **15**(1) : 54 (Telugu and common names; Andhra coast).
1974. *Mystus gulio*, Aaur Rahman, *Freshw. Fish. Res. Stn. Chandpur Bull No. 1* : 11 (local name, Bangladesh).
1975. *Mystus gulio*, Mirza, *Bijdr. Dierkunde* **45** : 161 (distribution).
1976. *Mystus gulio*, Venkateswarlu, *Acta Ichthyol. et Piscatoria* **6**(1) : 95 (synonymy, Poonpun, Ganges river at Fatwah, Bihar).
1977. *Mystus gulio*, Jayaram, *Rec. zool. Surv. India Occ. Paper No. 8* : 24, fig. 23A (key to species) : 30 (synonymy, diagnostic characters, colour, distribution, size, fishery value).
1979. *Mystus gulio*, Dutt and Murthy, *Mem. Soc. Zool. Guntur* **1** : 24 (local names; Kolleru lake, Andhra Pradesh) : 111 (diagnostic characters, Central coastal Andhra Pradesh).
1984. *Mystus gulio*, Venkateswarlu, *Rec. zool. Surv. India, Occ. Paper No. 56* : 20 (common and vernacular names).
1991. *Mystus gulio*, Pethiyagoda, *Freshwater fishes of Sri Lanka* : 147 (Sri Lanka) : 148 (photo of live specimen).
1995. *Mystus gulio*, Jayaram, *Rec. zool. Surv. India Occ. paper No. 160* : 97 (Krishna River system).

Specimens studied : 50 exs. 53.3-141.1 mm SL in total as below :

ZSI F. 470/2 one ex. 53.3 mm SL Maungmagan, Burma. ZSI F 5520/2 one ex. 55.4 mm SL Matlah river, Gangetic delta S. W. Kemp coll. December 1916. ZSI F. 5209/2 two exs. 57.5 & 62.2 mm SL Chilka Lake, Chilka Lake Survey. ZSI F. 9138/1 two exs. 58.2 & 58.6 mm SL Nalbano, Chilka Lake Survey. ZSI F. 5455/2 two exs. 63.7 & 63.8 mm SL Chilka Lake, Orissa, K. S. Misra coll. ZSI F. 4962/2 one ex. 63.9 mm SL Hooghly river near Barrakpore, Hooghly Survey, September 1954. ZSI F 1387/2 one ex. 64.5 mm SL Uppanar river, about 1 mile west of Tranquebar, A. G. K. Menon and party coll. 30.1.1957. ZSI F 9282/1 one ex. 64.4 mm SL Satpara Lake, Chilka Survey, ZSI Cat. Dup. 127 one ex. 65.6 mm SL Sittang, Burma, F. Day coll. ZSI FF 1323, three exs. 66.2-76.6 mm SL Muthukadu near Mahabalipuram, Madras, S. Michael coll. March 1979. ZSI 10552/1 one ex. 68.9 mm SL Nontaburi, Malcolm Smith coll. ZSI F. 9271/1 two exs. 69.1 & 73.5 mm SL Satpara, Lake Chilka, Chilka survey. ZSI F. 6169/1 one ex. 72.2 mm SL Tollygunge fish market,

Calcutta. B. L. Chaudhuri coll. ZSI F 5519/2 two exs. 74.1 & 78.6 mm SL Cox Bazaar, Bangladesh. ZSI Cat 536 one ex. 79.3 mm SL Calcutta bazaar, Asiatic Society of Bengal. ZSI F 5456/2 one ex. 83.7 mm SL Kalupara ghat, Chilka, Orissa, H. C. Ray coll. 15.1.1955. ZSI 1983 one ex. 85.6 mm SL Irrawaddy, Burma, purchased from F. Day. ZSI Cat Dup. 387 two exs. 85.7 & 85.8 mm SL Akyab, Burma, F. Day coll. ZSI 780 one ex. 96.7 mm SL Bombay, purchased from F. Day. ZSI FF 295 one ex. 98.4 mm SL Adyar river, Madras 25.10.1961. ZSI F 933/2 two exs. 103.6 & 204.6 mm SL about 3 miles south of Kalidai island, Lake Chilka, Orissa. K. S. Misra and M. A. S. Menon coll. 2.2.1954. ZSI F 9264/1 one ex. 109.6 mm SL Satpura Lake Chilka, Chilka survey. ZSI F 9290/1 one ex. 120.2 mm SL Rambha Bay, Chilka Lake, Chilka Survey. ZSI F 5456/2 two exs. 127.6 & 141.1 mm SL Kalupara ghat, Lake Chilka, Orissa, H. C. Ray coll 15.1.1955. ZSI Unregd. seven exs. 57.2-81.3 mm SL Bugmara block, Sunderban, C. K. Mitra coll. 18.9.1983. ZSI Unregd. three exs. 91.6-93.8 mm SL Rushipulya canal of Gopalpur, Ganjam district, Orissa, C. A. N. Rao and party coll. 13.12.1983. ZSI Unregd five exs. 58.7-136.5 mm SL Palur canal, Ganjam district, Orissa, C. A. N. Rao and party coll. 18.11.1983.

Description : D.I, 7; P.I, 8-9; V.i, 5; A.iii, 9-11; C. 7+8.

Body depth 23.6 (18.6-27.2), head length 27.2 (26.1-30.1), width of head 19.6 (15.2-22.2), dorsal spine length 16.5 (13.9-19.8), pre-dorsal length 42.2 (41.2-43.8), post-dorsal length 58.4 (50.3-66.0), length of anal fin base 14.9 (10.2-19.5) all in percent of standard length. Eye 21.1 (17.3-27.7), inter-orbital width 36.6 (34.6-41.5), dorsal spine length 59.5 (51.5-70.1), length of snout 34.8 (33.1-38.7) gape of mouth 49.6 (37.1-61.8), length of dorsal fin base 43.1 (38.1-48.8), length of anal fin base 58.5 (41.1-70.3), length of caudal peduncle 64.6 (58.9-72.8), height of caudal peduncle 40.0 (36.0-47.7) all in percent of head length. Adipose dorsal fin base 70.5 (56.5-98.4) in percent of anal fin base. Snout length 92.1 (85.2-99.1) in percent of inter-orbital width. Least depth of caudal peduncle 61.5 (54.5-75.8) in percent of its length.

Dorsal profile slightly arched with a gentle rise from tip of snout to the base of occipital process. Head flat, slightly depressed and blunt. Upper surface of head granulated. Snout, upper jaw, eyes rounded. Median longitudinal groove on upper surface of head shallow, lanceolate and does not reach base of occipital process. Occipital process not reaching basal bone of dorsal fin. Teeth villiform, numerous, in an uninterrupted semi-lunar band across palate; about four rows on upper jaw and five or six of mesially interrupted band on lower jaw.

Four pairs of barbels : One pair maxillary reaching middle or sometimes almost end of pelvic fins; one pair nasal reaching beyond posterior end of median longitudinal groove; one pair outer mandibular reaching more than half length of pectoral spine; one pair inner mandibular shorter.

Dorsal fin with a strong spine serrated posteriorly. Adipose dorsal fin short with a long inter-space equaling about twice the length of its base from the rayed dorsal fin. Pectoral fin with eight or nine branched rays and strong spine. Outer surface of pectoral spine smooth, inner surface having 9-12 retrorse teeth. Pelvic fins not reaching anal fin. Anal fin

not reaching caudal fin. Caudal fin bilobed; lobes rounded, upper slightly longer than lower.

Colour : Dark grayish brown on top, turning lighter beneath. In fresh specimens dark silvery gray on top and sides of body turning dull white beneath. All fins dotted with black spots.

Distribution : Widely distributed in India, Pakistan, Bangladesh, Myanmar, Thailand, Sri Lanka, Malayasia, Java, Sumatra and Borneo. It is found in the sea, estuaries and tidal waters.

Remarks : Hamilton-Buchanan (1822) described this species from the upper parts of the Gangetic estuaries. Valenciennes (1839) described *Bagrus albilabris*, *B. fuscus* and *B. birmannus* which are closely related to *M. gulio* and which have all been merged subsequently by Bleeker (1853). In a like manner Bleeker himself (1846, 1847) described five species : *B. abbreviatus*, *B. gulioides*, *B. melas*, *B. rhodopterygius* and *B. schlegelli* which have also been merged. All the above species were based on some trivial characters such as shorter barbels, different colour pattern or varying body proportions.

It must be stated here that *M. gulio* and *M. vittatus* are two species which have been recorded from the seas. Moreover, this species is widely distributed and is known to occur in almost all types of habitats excepting higher altitudes. During the course of our study of this species, we have come across several variations in individuals of the same population. It is worth mentioning here that Hamilton-Buchanan's (1822) original description of *Pimelodus gulio* in Fish Ganges differs considerably from his published illustration as detailed below :

Published description (201, 379)	Published figure (Pl. 23, fig. 66)
1. Head short, flat and blunt	Head conical, pointed and longer than broad
2. Maxillary barbels extend beyond end of dorsal fin.	Maxillary barbels extend almost up to end of adipose fin.
3. Caudal fin divided into two rounded lobes	Caudal fin bifurcates into two pointed lobes.

Bleeker (1862, 1863) provided a new generic name *Aspidobagrus* for accommodating *M. gulio* which was however synonymised under *Macrones* (= *Mystus*) by Gunther (1864). It has already been stated elsewhere (see p. 19 & 20) that with a re-definition and restriction of the generic composition of *Mystus* it may be necessary to resurrect some of the available earlier Bleekerian names; if so *Aspidobagrus* qualifies for *M. gulio* aptly.

Mystus horai Jayaram

1954. *Mystus (Mystus) vittatus horai* Jayaram, *Rec. Indian Mus.* 51(4) : 536, fig. 4 (type locality Indus River, Kalabagh, Pakistan).
1966. *Mystus vittatus horai*, Jayaram, *Int. Rev. ges. Hydrobiol.* 51(3) : 446 (distribution).

1975. *Mystus horai*, Mirza, *Bijdr. Dierk.* 45(2) : 161 (endemic to Pakistan).
1976. *Mystus horai*, Mirza, *Biologia* 22(1) : 117 (local names, northern Montane and sub-montane region of Pakistan).
1977. *Mystus horai* Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 23, fig. 20C, D (key, synonymy, diagnostic characters).
1980. *Mystus horai*, Mirza, *Proc. I Pakistan Congr. Zool.* : 25 (synonymy and distribution).
1999. *Mystus horai*, Mirza, *Biodiversity in Pakistan* : 330 (Indus River).

Specimen studied : No specimen seen by us.

Description : (After Jayaram, 1954). The original description was based on four exs. 59.5-84.5 mm SL from Indus River, Kalabagh, Pakistan, S. L. Hora coll. (All type specimens lost).

D.I, 7; P.I, 8; V.i, 5; A.iii,8; C. 17.

Body depth 25.4 (24.8-26.1), head length 35.3 (33.7-36.5), width of head 22.7 (21.5-23.4), length of anal fin base 11.8 (10.9-12.8) all in percent of standard length. Eye 15.9 (14.0-17.5), inter-orbital width 29.9 (27.2-32.3), length of snout 24.5 (22.8-26.3), length of anal fin base 33.4 (30.9-36.0), length of caudal peduncle 11.8 (8.8-18.2), height of caudal peduncle 34.7 (30.7-38.6) all in percent of head length. Adipose dorsal fin base 43.9 (42.9-44.8) in percent of anal fin base. Snout length 82.3 (72.2-88.7) in percent of inter-orbital width. Least depth of caudal peduncle 33.6 (28.6-47.3) in percent of its length.

Dorsal profile arched with a steep rise from tip of snout to base of occipital process. Head depressed, longer than broad. Upper surface of head rough. Snout obtuse, eyes rounded, laterally placed above angle of mouth. Jaws equal. Median longitudinal groove on upper surface of head not reaching base of occipital process. Occipital process reaches basal bone of dorsal fin and is twice as long as broad at base. Teeth numerous and villiform, in two specimens teeth on palate in narrow continuous band while in the other two teeth on palate interrupted. Three to four rows of teeth on upper jaw, lower jaw having about five rows, interrupted.

Four pairs of barbels : one pair maxillary reaching pelvic fins; one pair nasal long, almost as long as head; one pair outer mandibular extending up to middle of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a short spine having five or six small teeth on upper half of inner edge, outer edge smooth. Adipose dorsal fin long, commencing immediately after rayed dorsal fin without any inter-space. Pectoral fins with eight branched rays and a strong spine with 12 retrorse teeth. Pelvic fins not reaching anal fin. Anal fin does not reach caudal fin. Caudal peduncle very much constricted immediately after adipose fin and anal giving the posterior end a tapering appearance. Caudal fin bilobed.

Colour : Brownish yellow on top with gray on undersurface. Body plain without any parallel stripes or bands. A faint black shoulder spot.

Distribution : PAKISTAN : Indus River system.

Remarks : It is close to *M. vittatus* in having steep dorsal profile, prominent snout and long occipital process, but differs chiefly in the character of dentition. Moreover, the two species are quite different in body colouration : *M. vittatus* possess two parallel stripes on either side of lateral line which is absent in this species. *M. olyroides* Roberts has the palatal teeth band interrupted as in this species.

Mystus keletius (Valenciennes)

(Figure 9)

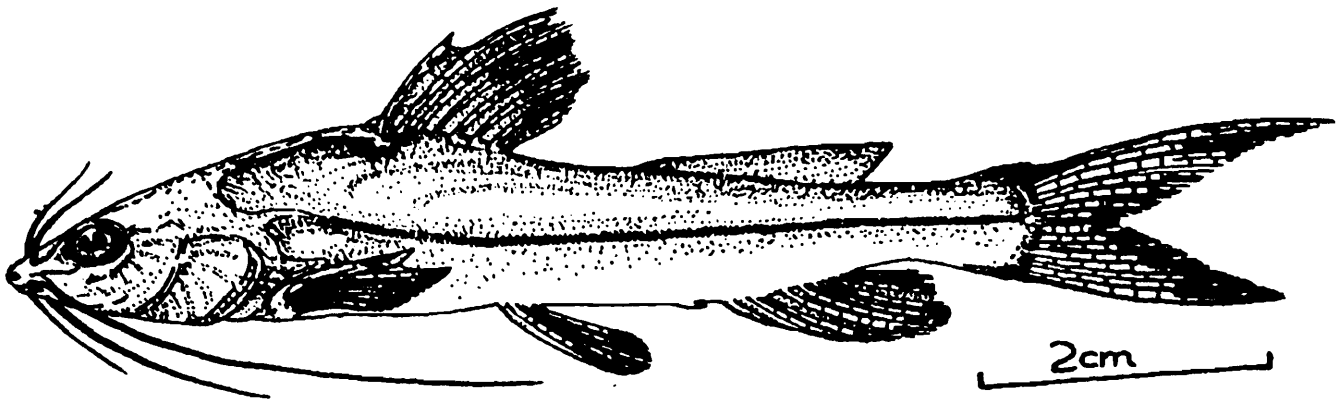


Fig 9. Lateral view drawing of *Mystus keletius* (Valenciennes).

1839. *Bagrus keletius* Valenciennes, *Hist. Nat. Poiss.* **14** : 411 (type locality Pondicherry, south India).
1849. *Bagrus keletius*, Jerdon, *Madras J. Lit. Sci.* **15**(2) : 337 (difference from *Mystus cavasius* indicated; Mysore).
1877. *Macrones keletius*, Day, *Fish. India* : 449, pl. 98, fig. 5 (in text, number of figure stated as 3 erroneously; synonymy, description, Madras to Pondicherry and inland to Coimbatore, Mysore and also Ceylon).
1889. *Macrones keletius*, Day, *Fauna Brit. India Fish* **1** : 160 (synonymy, local name, description and distribution).
1916. *Macrones keletius*, Raj, *Rec. Indian Mus.* **12** : 251 (name only) : 265 (Red Hills tank, Madras).
1932. *Aoria keletius*, Deraniyagala, *Spolia zeylanica* **16**(3) : 284 (local name, description, south India, Ceylon).
1942. *Mystus keletius*, Hora, *Rec. Indian Mus.* **44** : 197 (Mysore and adjoining hill ranges).
1946. *Mystus keletius*, Herre, *Spolia Zeylanica* **24**(3) : 174 (Colombo, Galata bendiyaya and Yakuala in Ceylon).

1952. *Mystus keletius*, Silas, *Nat. Inst. Sci. India Bull.* No. 7 : 25 (Sri Lanka).
1954. *Mystus (Mystus) keletius*, Jayaram, *Rec. Indian Mus.* 51(4) : 540 (synonymy, description and distribution).
1966. *Mystus keletius*, Jayaram, *Int. Rev. ges. Hydrobiol.* 51(3) : 466 (distribution).
1969. *Mystus keletius*, Babu Rao and Chattopadhyay, *J. Bengal nat. Hist. Soc.* 35(2) : 89, 93, pl. 2, fig. 3 (description, key).
1977. *Mystus keletius*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No.* 8 : 27, fig. 26A (synonymy, key, diagnostic characters).
1982. *Mystus keletius*, Dutt, Sharma and Desoutter, *Cybiium* 6(4) : 28 (synonymy, diagnostic features).
1991. *Mystus keletius*, Pethiyagoda, *Freshwater Fishes of Sri Lanka* : 149 (Sri Lanka) : 150 (photo of live specimen).

Specimens studied : 12 exs. 39.8-70.2 mm SL in total as below :

ZSI Unregd. 12 exs. 39.8-70.2 mm SL Nainakulam tank, Tirunelveli, south India, G. Santhanakumar coll. 3.4.1976.

Description : D.I, 7; P.I, 9; V.i,5; A.ii-iii, 7-8; C. 7+8.

Body depth 19.1 (16.8-22.1), head length 27.7 (26.6-29.4), width of head 19.2 (17.2-20.4), dorsal spine length 12.9 (11.9-14.4), pre-dorsal length 41.9 (40.3-42.9), post-dorsal length 64.7 (62.3-67.1), length of anal fin base 12.7 (10.8-14.5) all in percent of standard length. Eye 20.3 (18.9-22.2), inter-orbital width 32.8 (30.3-34.3), dorsal spine length 46.8 (44.8-53.6), length of snout 34.0 (30.4-37.9), gape of mouth 47.1 (42.0-51.0), length of dorsal fin base 56.4 (51.8-64.1), length of anal fin base 46.0 (38.8-52.9), length of caudal peduncle 70.1 (61.7-75.7), height of caudal peduncle 36.1 (32.3-38.8) all in percent of head length. Adipose dorsal fin base 61.3 (50.0-78.5) in percent of anal fin base. Snout length 94.6 (89.1-98.1) in percent of inter-orbital width. Least depth of caudal peduncle 52.2 (43.0-61.4) in percent of its length.

Dorsal profile arched with a gentle rise from tip of snout to the base of occipital process. Head small, depressed. Eyes circular, prominent, placed above angle of mouth. Snout rounded, prominent, jaws equal. Median longitudinal groove on dorsal surface of head extending little beyond eyes but does not reach base of occipital process. Occipital process narrow, reaching basal bone of dorsal fin and about three times as long as broad at base. Teeth numerous, villiform, in semi-lunar crescentic bands across upper jaw and palate, lower jaw having deeply curved mesially interrupted bands.

Four pairs of barbels : one pair maxillary reaching nearly end of pelvic fins, one pair nasal extending to opercle, one pair outer mandibular reaching origin of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a weak spine finely serrated posteriorly, outer surface smooth. Adipose dorsal fin short and placed at a small inter-space from rayed dorsal fin. Pectoral fins with nine branched rays and a strong spine having 10-12 retrorse teeth. Pelvic fins do not reach anal fin. Anal fin short, not reaching caudal. Pre-anal papilla conspicuous well developed. Caudal fin forked upper lobe slightly longer.

Colour : Brownish turning dull white beneath. A dark shoulder spot and a light band along lateral line present. Dorsal and caudal fin tips tinged black, anterior portions of anal fin black.

Distribution : INDIA : Madras, Pondicherry, Coimbatore, Mysore, Tirunelveli. SRI LANKA : Colombo, Yakuala and Galata bendiyaya.

Remarks : Valenciennes (1839) described *Bagrus keletius* from Pondicherry out of Leschenault's collection. This species is confined to south India only and has not been found anywhere in India above the Krishna River system. Bleeker (1853, 1859) Day, (1873) referred some specimens collected from Calcutta, Bengal, Yamuna, Ganges and Punjab respectively to this species. These specimens have been wrongly identified and they are referable to *M. bleekeri*. We have already clarified this confusion between *M. bleekeri* and *M. keletius* elsewhere (see p. 44).

A specimen 90.9 mm SL under Reg. No. CAS 30556 has the adipose dorsal fin commencing after the rayed dorsal fin; the intervening space is very short. The rayed dorsal fin is also very high as in *M. bocourti*. The maxillary barbels extend up to the end of anal fin. Upper lobe of caudal fin longer and shoulder spot translucent. The specimen apparently resembles *M. cavasius* but is only *M. keletius* in view of other body proportions etc.

Dutt *et al.* (1982) examined the systematic status of this species and compared it with *M. cavasius*. Madam Desoutter who provided the following data examined the two syntypes of *M. keletius* MHNM 4369 and A9011 in Paris Museum.

This species has a shorter adipose fin which is not contiguous with the rayed dorsal; the maxillary barbels extend only to the ventral and the median fontanel does not reach the base of occipital process.

On the basis of the above observations Dutt *et al.* opined that *M. keletius* is distinct from *M. cavasius*. It may be mentioned here that *M. keletius* is distinctly characterised by its slender body, narrow caudal peduncle unlike *M. cavasius*. Further the range of distribution of the two species is also different in the sense that *M. cavasius* has a wider distribution than *M. keletius*.

Mystus krishnensis Ramakrishnaiah
(Figure 10)



Fig 10. Photograph of specimen ZSI Unreg. 322.1 mm SL *Mystus krishnensis* Ramakrishnaiah.

1987. *Mystus krishnensis* Ramakrishnaiah, *Matsya* 12 & 13 : 139 (type locality Nagarjunasagar reservoir, Andhra Pradesh).
1995. *Mystus krishnensis*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 160* : 97 (Krishna River system).

Specimens studied : Four exs. 322.1-419.9 mm SL in total as below :

ZSI unreg. three exs. 322.1-388.5 mm SL Hyderabad, Andhra Pradesh, A. N. T. Joseph coll. 1984. ZSI unreg. one ex. 419.9 mm SL Nagarjunsagar reservoir, Andhra Pradesh, M. Ramakrishnaiah coll. November 1983.

Description : D. I, 7; P. I, 8-9; V. i, 5; A. iii, 10-11; C. 7+8.

Body depth 17.8 (16.4-18.7), head length 30.3 (29.2-31.2), width of head 19.7 (18.8-20.5), dorsal spine length 14.3 (13.3-15.6), pre-dorsal length 44.3 (43.6-45.2), post-dorsal length 53.7 (42.9-58.8), length of anal fin base 12.3 (10.3-13.8) all in percent of standard length. Eye 10.3 (9.8-11.1), inter-orbital width 30.9 (30.3-31.6), dorsal spine length 49.4 (42.7-53.3), length of snout 33.9 (32.7-34.4), gape of mouth 47.4 (46.4-48.5), length of dorsal fin base 49.1 (48.4-50.0), length of anal fin base 40.4 (35.4-44.1), length of caudal peduncle 50.8 (46.8-53.2), height of caudal peduncle 26.6 (25.5-28.2) all in percent of head length. Adipose dorsal fin base 74.2 (65.7-82.1) in percent of anal fin base. Snout length 90.8 (88.1-96.8) in percent of inter-orbital width. Least depth of caudal peduncle 52.4 (48.8-55.9) in percent of its length.

Dorsal profile rising gently from tip of snout to base of occipital process. Head flat, broad and anteriorly depressed. Snout rounded. Mouth opening crescentic. Eyes oval,

anteriorly situated. Median longitudinal groove on head long, almost reaching base of occipital process. Occipital process short, not reaching basal bone of dorsal fin. Teeth numerous, villiform and in bands on upper and lower jaws.

Four pairs of barbels : one pair maxillary reaching end of base of anal fin, one pair nasal extending up to posterior border of eye, one pair outer mandibular reaching end of base of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a strong spine; outer surface of spine smooth, inner surface finely serrated towards tip. Adipose dorsal fin short, with a small inter-space from rayed dorsal fin. Pectoral fins with a strong spine and eight or nine branched rays. Outer surface of pectoral spine smooth, inner having 13-22 strong retrorse teeth. Pelvic fins do not reach anal fin. Anal fin not reaching caudal fin. Caudal fin forked, upper lobe longer.

Colour : Dark brownish black on top, becoming pale yellow beneath. In fresh specimens, upper surface of body dark silvery gray, turning pale white beneath. Fins dull whitish, body without any colour bands.

Distribution : INDIA : Gadwal, Nagarjunasagar Reservoir, Krishna River system, Andhra Pradesh.

Remarks : *Mystus krishnensis* attains a very large size and is of considerable commercial importance at the Nagarjunasagar reservoir. This species bears close resemblance to *M. maydelli* Rossel as shown under remarks for *M. maydelli* (see p. 74 infra).

Mystus leucophasis (Blyth)

(Figure 11)

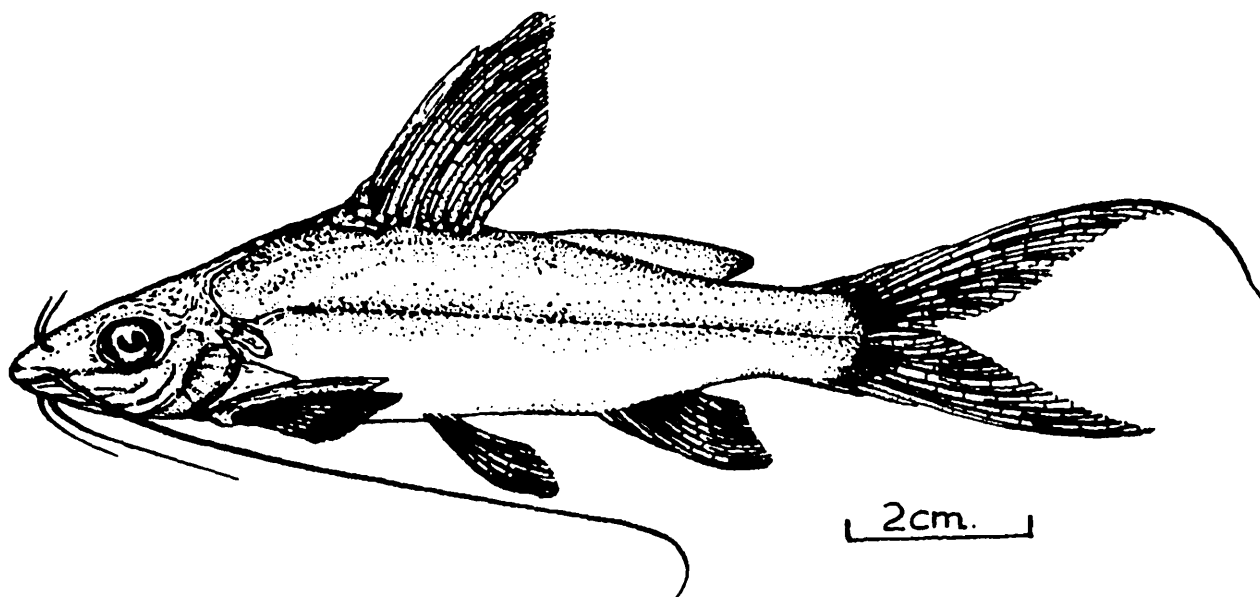


Fig 11. Lateral view drawing of *Mystus leucophasis* (Blyth).

1860. *Bagrus leucophasis* Blyth, *J. Asiat. Soc. Bengal* **29** : 148 (type locality Sittang and other Burmese rivers).
1864. *Macrones leucophasis*, Gunther, *Cat. Fish. Brit. Mus.* **5** : 78 (Blyth's original description repeated; Burma).
1877. *Macrones leucophasis*, Day, *Fish India* : **449**, pl. 100, fig. 2 (synonymy, description, local names; Tenasserim, Bassein rivers, Burma).
1883. *Macrones leucophasis*, Vinciguerra, *Ann. Mus. Stor. Nat. Genova* **18** : 657 (Burma).
1889. *Macrones leucophasis*, Day, *Fauna Brit. India Fish* **1** : 158 (synonymy, local names, description, rivers of Burma).
1921. *Macrones leucophasis*, Hora, *Rec. Indian Mus.* **22** : 179 (comparative description).
1929. *Aoria leucophasis*, Prashad and Mukerji, *Rec. Indian Mus.* **31** : 179 (brief description; Indawgyi and Nam Ting Rivers, Burma).
1954. *Mystus (Osteobagrus) leucophasis*, Jayaram, *Rec. Indian Mus.* **51(4)** : 550, fig. 11 (synonymy, description and distribution).
1966. *Aorichthys leucophasis*, Jayaram, *Int. Rev. ges. Hydrobiol.* **51(3)** : 442 (distribution).
1977. *Mystus leucophasis*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 27, fig. 27 (diagnostic characters, colour, distribution).

Specimens studied : 11 exs. 44.5-210.3 mm SL in total as below :

ZSI F 4828/1 44.5 mm SL one ex. Bassein district, Irrawaddy division, Burma, Lt. Col. F. D. Maxwell coll. 28.4.1910. ZSI F 4829/1 one ex. 44.9 mm SL, ZSI F 4830/1 one ex. 47.1 mm SL, ZSI F 4831/1 one ex. 47.3 mm SL details same as for 4828/1. ZSI 424 one ex. 83.7 mm SL Bassein, Lower Burma, F. Day purchased. ZSI Cat. 530 one ex. 95.1 mm SL Burma, F. Day coll. ZSI Cat. 526 one ex. 96.1 mm SL Moulmein, Burma, F. Day coll. ZSI Cat. 527 one ex. 97.9 mm SL Moulmein, Burma, F. Day coll. ZSI Cat. 527 one ex. 97.9 mm SL Moulmein, Burma, F. Day coll. ZSI Dup. Cat. 198 one ex. 156.8 mm SL Mandalay, Burma, Major Sladen coll. ZSI Dup. Cat. 304 one ex. 157.5 mm SL Moulmein, Burma, F. Day coll. ZSI Cat. 531 one ex. 210.3 mm SL Burma, F. Day coll.

Description : D. I, 7; I, 8-10; V. i, 5; A. ii-iii, 9-10; C. 17.

Body depth 24.4 (20.8-29.1), head length 27.8 (25.2-30.2), width of head 18.1 (16.9-19.9), dorsal spine length 23.6 (17.3-34.9), pre-dorsal length 47.0 (44.1-50.7), post-dorsal length 48.4 (43.6-61.1), length of anal fin base 14.2 (12.2-17.1) all in percent of standard length. Eye 25.0 (15.0-29.8), inter-orbital width 28.2 (20.6-37.8), dorsal spine length 79.9 (58.0-94.4), length of snout 41.7 (33.6-49.0), gape of mouth 43.2 (39.8-50.0), length of dorsal fin base 58.3 (46.4-78.5), length of anal fin base 50.4 (44.4-56.6), height of caudal peduncle 33.7 (28.4-39.8) all in percent of head length. Adipose dorsal fin base 68.8 (44.6-93.0) in percent of anal fin base. Snout length 68.0 (47.1-100.0) in percent of inter-orbital width. Least depth of caudal peduncle 50.8 (39.9-60.0) in percent of its length.

Dorsal profile arched with a steep rise from tip of snout to the base of occipital process. Head prominent, anteriorly depressed, longer than broad. Snout almost rounded upper jaw

slightly longer than the lower. Mouth opening crescentic. eyes large, oval-shaped. Median longitudinal groove on head consists of two fontanelles, which do not reach base of occipital process. Occipital process twice as long as broad at base and does not reach basal bone of dorsal fin. Upper surface of head rugose. Teeth numerous and villiform in an uninterrupted crescentic band across palate and upper jaw, a mesially interrupted deeply curved band on lower jaw.

Four pairs of barbels : one pair maxillary extending up to anal fin, one pair nasal reaching middle of eye one pair outer mandibular reaching middle of pectoral fins and one pair inner mandibular shorter. Dorsal fin with a moderately strong spine; outer surface smooth, inner surface posteriorly serrated. Adipose dorsal fin long, commencing just behind the rayed dorsal fin. Pectoral fins with 8-10 branched rays and a strong spine having 11-20 retrorse teeth. Pelvic fins do not reach anal fin. Anal fin not reaching caudal fin. Anal papilla absent. Caudal fin deeply forked with filamentous prolongations.

Colour : Dark brown on top becoming lighter beneath. Upper surface of head and fins pale yellowish in colour.

Distribution : MYANMAR : Mandalay, Moulmein, Tenasserim, Bassein, Irrawaddy and Tenasserim Rivers.

Remarks : Jayaram (1954) erroneously thought that an inter-neural shield was present in this species also and considered it belonging to the sub-genus *Osteobagrus*. Later in 1966 he placed it under *Aorichthys* which however he rectified in 1967. In none of the 11 examples we have examined no inter-neural shield was found. *M. leucophasis* is allied to *M. cavasius* but differs from it in having shorter median longitudinal groove and occipital process and in possessing filamentous prolongations of the caudal fin.

Mystus macropterus (Bleeker)

1870. *Hemibagrus macropterus* Bleeker, *Versl. Med. Kon. Amsterdam* 4(2) : 257 (type locality Yang-tse-Kiang, China).
1930. *Aoria macropterus*, Wu, *Zoological Series* 6(1) : 51 (synonymy; Pao-Chin, China).
1931. *Aoria macroptera*, Chu, *Biol. Bull. St. John's Univ. Shanghai* No 1 : 77 (synonymy, Yang-tse-Kiang, Ichang, Hankau, Ningkwo, Thugting Lake, China).
1934. *Hemibagrus macropterus*, Tchang and Shih, *The Science Quarterly Nat. Univ. Peking* 4(3) : 345 (synonymy, description of specimen No. 9711 from Szechuan, China).
1943. *Hemibagrus macropterus*, Nichols, *Freshw. Fish. China* : 50, pl. 3, fig. 2 (specimen examined from Tungting Lake, Hunan, Anhwein, Hokou, Kiangsi).
1954. *Aoria macroptera*, Jayaram, *Rec. Indian Mus.* 51(4) : 555 (synonymised with *Hemibagrus macropterus*).
1978. *Mystus macropterus*, Jayaram, *Proc. Indian Acad. Sci.* 87B(9) : 226 (specific status clarified).

Specimen studied : No specimen seen by us.

Description : After Bleeker (1870) and Nichols (1943). Total length of specimen 175 mm.

D. I. 7; P. I. 9; V. i, 5; A. v, 10; C. 7+8.

Body depth 10.8, head length 18.2, both in percent of total length; 12.5 and 20.8 in percent of standard length respectively. Eye 21.3, width of head 76.9 height of head 45.4, length of dorsal spine 50.0, length of pectoral fin 80.3 all in percent of head length.

Dorsal profile gently rising from tip of snout to the base of occipital process. Body elongated, antero-laterally, long and posteriorly compressed. Head depressed, median longitudinal groove on dorsal surface of head short, narrow and triangular. Occipital process long, Cleithral process acute, rugose. Teeth numerous, villiform. Maxillary band of teeth curved, longer than broad. Premaxillary band and vomero-palatine band longer than broad.

Four pairs of barbels : one pair maxillary reaching anterior end of pectoral fins; one pair nasal reaching posterior margin of eye, one pair outer mandibular equal in length to inner mandibular pair, both of which reach base of pectoral fins.

Dorsal fin convex with a long base and seven branched rays. Dorsal spine posteriorly serrated. Adipose dorsal fin longer than rayed dorsal fin but not reaching base of caudal fin. Pectoral fins with nine branched rays and a strong, laterally compressed spine, serrated posteriorly. Pelvic fins obtusely rounded. Anal fin long. Caudal fin deeply forked, with equal lobes.

Colour : Dorsal surface of body olive, ventral surface whitish. Eyes red. Dorsal fin margin, pectoral and pelvic fins tinged orange.

Distribution : CHINA : Yang-tse-Kiang basin

Remarks : This species is distinguished from its allies by its long adipose dorsal fin which is four times the width of the rayed dorsal fin. It differs from its close ally *M. amemiyae* mainly in having a deeper body, shorter barbels and a longer anal fin. Other differences have been clarified elsewhere (table 7 p. 34). Chu (1931) described certain specimens from Shanghai, which are referable to this species.

***Mystus malabaricus* (Jerdon)**
(Figure 12)

1849. *Bagrus malabaricus* Jerdon, *Madras J. Lit. Sci.* 15(2) : 338 (type locality "Mountain streams of Malabar").
1865. *Hara malabarica* Day, *Fish Malabar* : 184, pl. 13, fig. 3 (description, mountain streams of Malabar).
1877. *Macrones malabaricus*, Day, *Fish India* : 450, pl. 101, fig. 2 (synonymy, description; Malabar coast of India and Wayanad).
1889. *Macrones malabaricus*, Day, *Fauna Brit. India Fish* 1 : 160 (synonymy, description and distribution).
1937. *Mystus malabaricus*, Hora, *Rec. Indian Mus.* 39 : 19 (Cauvery river, Coorg state).

1941. *Mystus malabaricus*, Hora and Law, *Rec. Indian Mus.* **43** : 238, fig. 3 (synonymy, description of urino-genital structures in male and female specimens; Travancore, Malabar and Wayanad).
1942. *Mystus malabaricus*, Hora, *Rec. Indian Mus.* **44** : 197 (Mysore and adjoining hill-ranges).
1954. *Mystus (Mystus) malabaricus*, Jayaram *Rec. Indian Mus.* **51(4)** : 544, fig. 8 (synonymy, description and distribution).
1955. *Mystus malabaricus*, Rajan, *J. Bombay nat. Hist. Soc.* **53(1)** : 45 (Bhavani river, south India) : 47 (synonymy, Ratnagiri district, Travancore).
1966. *Mystus malabaricus*, Jayaram, *Int. Rev. ges. Hydrobiol.* **51(3)** : 446 (distribution).
1969. *Mystus malabaricus*, Babu Rao and Chattopadhyay, *J. Bengal nat. Hist. Soc.* **35(2)** : 88, pl. 1, fig. D. Pl. 2, fig. 8 (key, description).
1977. *Mystus malabaricus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 27, fig. 26B (key, synonymy, diagnostic characters, colour, distribution, size, fishery value).
1984. *Mystus malabaricus*, Venkateswarlu, *Rec. zool. Surv. India, Occ. Paper No. 56* : 20 (common and vernacular names).
1995. *Mystus malabaricus*, Shaji and Easa, *J. zool. Soc. Kerala* **5(1&2)** : 33 (Mananthavady, Panamaram and Wayanad).
1995. *Mystus malabaricus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 160* (Krishna River system).

Specimens studied : 26 exs. 68.6-107.1 mm SL in total as below :

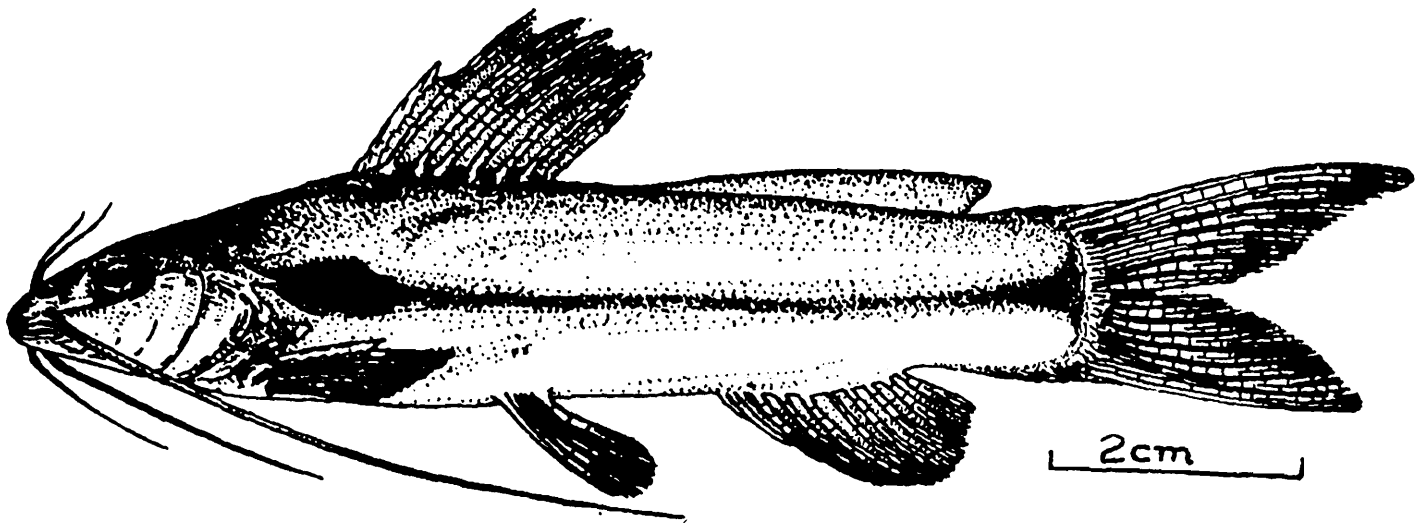


Fig 12. Lateral view drawing of *Mystus malabaricus* (Jerdon).

ZSI F. 1214/1 one ex. 107.1 mm SL Pune. ZSI F. 1357/1 three exs. 68.6-84.3 mm SL Chittar river. Palode, Travancore, C. C. John coll. 10.2.1940. ZSI F. 13569/1 one ex. 90.3 mm SL Achankovil river, 7 miles south of Konni, Travancore, C. C. John coll. ZSI Unreg. two exs. 93.8 & 99.8 mm SL Chandragiri river and tributaries near Mangalore 1983. ZSI unreg. 2 exs. 94.8 & 100.3 mm SL Travancore. ZSI unreg. three exs. Cauvery river, G. M. Natarajan coll. 1984. ZSI unreg. five exs. 81.3-100.2 mm SL Travancore, 1946. ZSI unreg. 2 exs. 83.5 & 100.5 mm SL Manimala river, C. C. John 1940. ZSI unreg. seven

exs. 68.8-98.8 mm SL Mananthavady river at Chootha kadavu near Kaniyaram, K. C. Jayaram and Anuradha coll. 14.2.1985.

Description : D. I, 7; P. I, 7-8; V. i. 5; A. ii-iii, 8-9; C. 7+8

Body depth 18.0 (14.3-22.6), head length 24.3 (22.7-28.0), width of head 17.4 (15.7-20.1), dorsal spine length 11.4 (9.9-13.6), pre-dorsal length 39.0 (36.2-42.9), post-dorsal length 63.1 (60.8-68.4), length of anal fin base 15.7 (14.3-18.1) all in percent of standard length. Eye 21.6 (18.8-24.5), inter-orbital width 33.6 (30.5-36.4), dorsal spine length 46.7 (38.6-58.7), pectoral spine length 59.0 (48.4-78.0), length of snout 35.2 (31.8-39.9), gape of mouth 53.8 (48.8-58.7), length of dorsal fin base 66.2 (56.9-76.3), length of anal fin base 64.6 (55.4-69.9), length of caudal peduncle 83.3 (62.7-95.3), height of caudal peduncle 54.9 (46.9-61.7) all in percent of head length. Adipose dorsal fin base 53.4 (43.6-68.9) in percent of anal fin base. Snout length 92.0 (82.1-100.0) in percent of inter-orbital width. Least depth of caudal peduncle 66.6 (59.4-96.6) in percent of its length.

Dorsal profile almost straight with very little rise from tip of snout to base of occipital process. Head flat and depressed. Snout broad, upper jaw longer. Median longitudinal groove on head short, not reaching base of occipital process. Occipital process twice as long as wide and does not reach the basal bone of dorsal fin, a considerable inter-space present between the two. Teeth villiform and in bands on jaws and palate, a slightly curved continuous band on upper jaw and a deeply curved mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary reaching middle or end of pelvic fin, one pair nasal extending slightly beyond orbit, one pair inner mandibular reaching base of pectoral spines and one pair outer mandibular reaching nearly end of pectoral fins.

Dorsal fin with slender spine, nearly equal to length of pectoral spine and finely serrated behind, outer surface smooth. Adipose dorsal fin base almost three times length of base of rayed dorsal fin or the inter-space between the two. Pectoral fins with seven or eight branched rays and a strong spine articulated anteriorly with eight to ten teeth and equaling nearly height of head at occiput. Pelvic fins nearly as long as pectoral fins and does not reach anal fin. Anal fin not reaching caudal fin. Anal papilla may or may not be present. Caudal fin bilobed, upper lobe longer.

Colour : Light brownish on top becoming dull white beneath; a dark blotch on shoulder another at the base of caudal fin and a dark band along the lateral line.

Distribution : INDIA : Malabar coast, Wayanad hills and the hill ranges of Travancore. The range is now extended by one specimen from Pune, Maharashtra.

Remarks : Jerdon (1849) described this species from "mountain streams of Malabar" Day (1865, 1869) erroneously placed this species under the genus *Hara* Blyth; this genus belongs to the family Sisoridae. However in 1873, he placed the species under the genus *Macrones* = *Mystus* correctly. We have examined through the kind courtesy of Dr. Barbara Herztwig, Curator of Fishes, Naturhistorisches Museum, Wien, Austria the photographs of NMW 45228, one of the topotypes of *Hara malabarica* Day. The morphometric data

furnished by Dr. Herztwig and the figures clearly indicate that the species is referable to the genus *Mystus*. The broad caudal peduncle is very characteristic of this species, although the caudal spot, which is prominently seen in fresh specimens, is faintly seen. The identity of the species is unmistakable.

During a field survey of the type localities in February 1985 we collected seven specimens of this species. Fresh live specimens are gray coloured with a dark streak along the lateral line ending in a triangular black patch at the base of the caudal fin. In the night, when a torchlight is focussed on live specimens the eyes reflect glowing red in the dark. The fishes do not seem to grow to a large size. The largest example was 107.1 mm SL.

M. malabaricus resembles *M. armatus* in having low dorsal profile, flattened head and a broad caudal peduncle but it is separated from it by its short median longitudinal groove and a short occipital process not reaching the basal bone of dorsal fin.

Mystus maydelli Rossel
(Figure 13)



Fig 13. Photograph of *Mystus maydelli* (Rossel).

1964. *Mystus maydelli* Rossel, *Mitt. Hamburg zool. Mus.* 61 : 149, fig. 1 (type locality Wadgaon, Bima Falls, Maharashtra).
1966. *Mystus maydelli*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(1) : 446 (distribution).
1971. *Mystus maydelli*, Jayaram, *Rec. zool. Surv. India*, 63(1-4) : 187 (absence of inter-neural shield and occipital process not reaching basal bone of dorsal fin indicated).
1977. *Mystus maydelli*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 32 (name only).

Specimen studied : No specimen seen by us.

Description : (Drawn from data of Holotype H. 2180 preserved in Zoological Museum, Hamburg given by Dr. Rossel). Total length 94.0, standard length 81.4 mm.

D. I, 7; P. I, 9; V. 6; A. 12.

Head length 29.7, width of head 20.5, height of head 12.4, snout length 9.8, eye diameter 4.9, inter-orbital width 9.2 all in percent of standard length. Eye diameter 16.5, inter-orbital width 31.0, snout length 33.1, width of head 69.0, height of head 41.7 all in percent of head length. Snout length 93.8 in percent of inter-orbital width.

Dorsal profile gently rising from tip of snout to base of occipital process. Head broad, flat, depressed and longer than broad. Snout rounded. Mouth opening crescentic. Eyes somewhat oval, situated anteriorly. Median longitudinal groove on head very long, reaching base of occipital process. Occipital process very short, about as long wide at base and not reaching basal bone of dorsal fin.

Four pairs of barbels : one pair maxillary reaching origin of anal fin, one pair nasal extending beyond posterior border of eye, one pair inner mandibular reaching opercular end and one pair outer mandibular extending beyond base of pectoral fin.

Dorsal fin rounded with a strong spine. First ray of dorsal fin slender, smooth, its distal end soft and pliable, last rays reaching origin of adipose fin. Adipose dorsal fin short with a small inter-space from the rayed dorsal fin. Pectoral fin with a strong spine and nine branched rays. Pelvic fins inserted at right angle to base of last ray of dorsal fin and not reaching anal fin. Anal fin short and not reaching caudal fin. Caudal fin deeply forked, upper lobe almost twice as long as lower.

Colour : Dorsal surface of head chocolate brown, body brighter, ventral surface dull white, fins brownish.

Distribution : INDIA : Bhima falls, Wadgaon, Maharashtra State.

Remarks : It is one species of this genus which is with a plain body without any colour markings. Rossel (1964) considered the species close to *M. malabaricus* from which it was differentiated by the broad flat head and the length of caudal fin. This species is reported to attain a large size, although subsequent records are not known.

The only other close species is *M. krishnensis* Ramakrishnaiah, a giant *Mystus* which is caught in large numbers from the Krishna River system. We have examined four examples from the Nagarjunasagar reservoir (see p. 65) and the data obtained are below :

Characters	<i>M. maydelii</i>	<i>M. malabaricus</i>	<i>M. krishnensis</i>
SL/LH	3.4	4.1(3.6-4.4)	3.3 (3.2-3.4)
SL/Body depth	5.8	5.2 (4.4-7.0)	5.6 (5.4-6.1)
SL/Width of head	4.9	5.9 (5.0-7.8)	5.1 (4.9-5.3)
SL/Height of head	8.1	7.1 (6.0-7.8)	7.4 (6.8-8.1)
LH/Eye	6.1	4.7 (4.1-5.3)	9.7 (9.0-10.2)
LH/Inter-orbital width	3.2	3.1 (2.7-3.3)	3.26 (3.2-3.3)
LH/Snout length	3.0	2.9 (2.6-3.2)	3.0 (2.9-3.1)
Snout length/Int. orb. width	1.1	1.1 (1.0-1.2)	1.1 (1.0-1.1)

From the above comparison it may be seen that *M. krishnensis* closely resembles *M. maydelii*. Considering that Nagarjunasagar reservoir is formed on the river Krishna and that

M. maydelli is also known from the upper reaches of this river, it appears possible that *M. maydelli* may only be a juvenile of this species. It may also be stated that so far no juvenile of *M. krishnensis* or grown up examples of *M. maydelli* are known. If the above thesis is proved at a later date, *M. maydelli* will have priority.

Mystus menoda (Hamilton-Buchanan)

1822. *Pimelodus menoda* Hamilton-Buchanan, *Fish Ganges* : 203, pl. 1, fig. 72 (type locality "Kosj, Mahananda, north Bihar and Bengal").
1839. *Bagrus corsula* Valenciennes, *Hist. Nat. Poiss.* 14 : 408.
1839. *Bagrus trachacanthus* Valenciennes, *Hist. Nat. Poiss.* 14 : 419 (type locality Bengal).
1853. *Bagrus corsula*, Bleeker, *Verh. Bat. Gen.* 25 : 56-57 (synonymy, Bengal).
1864. *Pimelodus menoda*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 74 (synonymy, Hamilton-Buchanan's reference cited).
1877. *Macrones corsula*, Day, *Fish India* : 446, pl. 100, fig. 5 (synonymy, local names, description; Orissa through Bengal and Assam).
1889. *Macrones corsula*, Day, *Fauna Brit. India Fish* 1 : 153 (synonymy, local name, description and distribution).
1890. *Macrones menoda*, Vinciguerra, *Ann. Mus. Stor. Nat. Genova* 9(2) : 223 (Burma).
1929. *Pimelodus menoda*, Hora, *Mem. Indian Mus.* 9 : 183 (manuscript name in Hamilton-Buchanan's drawing *Pimelodus telagra menoda* identified as *Pimelodus menoda*; vernacular name : 188 (details regarding Hamilton-Buchanan's manuscript and published drawings).
1931. *Aoria corsula*, Chu, *Biol. Bull. St. John's Univ.* : 76 (synonymy, western Yunnan).
1938. *Mystus menoda*, Shaw and Shebbeare, *J. Roy. Asiatic Soc. Bengal* 3 : 92, fig. 91, Pl. 3, fig. 2 (north Bengal).
1943. *Aoria corsula*, Nichols, *Freshw. Fish China* 9 : 36 (name only, questionably Chinese).
1948. *Mystus menoda*, Hora, *Rec. Indian Mus.* 46 : 65 (synonymy, local name; northern Bengal, Bihar).
1951. *Mystus corsula*, Menon, *Proc. Nat. Inst. Sci. India* 17(6) : 480 (Western Ghats).
1954. *Mystus (Mystus) menoda*, Jayaram, *Rec. Indian Mus.* 51(4) : 546, fig. 9 (synonymy, description and distribution).
1962. *Mystus menoda*, Motwani, Jayaram and Sehgal, *Tropical Ecology* 3(1&2) : 21 (Brahmaputra river).
1966. *Mystus menoda menoda*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1974. *Mystus menoda*, Aatur Rahman, *Bangladesh J. Zool.* 2, fig 1F (checklist, key, local name, description).
1974. *Mystus menoda*, Aatur Rahman, *Freshw. Fish Res. Stn. Chandpur Bull No.* 11 (local name; Bangladesh).
1976. *Mystus menoda*, Venkateswarlu, *Acta Ichthyol et Piscatoria* 6(1) : 96 (synonymy; Gandak river at Hazipur).
1976. *Mystus menoda*, Sriwastawa and Venkateswarlu, *Indian J. Zootomy* 17(3) : 182 (local name; plains of U. P.).

1977. *Mystus menoda*, Jayaram and Singh, *Rec. zool. Surv. India*, 72 : 263 (synonymy, distribution in north Bengal, Tengan river, Bulbulchandi fish market, Aihoo village fish market, Jamuna river at Hilli village).
1977. *Mystus menoda*, Jayaram, *Rec. zool. Surv. India Occ. Paper No. 8* : 26, fig. 25B (key, diagnostic characters, colour, distribution, size, fishery value).
1978. *Mystus menoda*, Jayaram, *Proc. Indian Acad. Sci.* 87B(9) : 225 (synonymy, distribution and taxonomic status).
1982. *Mystus menoda*, Jayaram *et al.* *Rec. zool. Surv. India, Occ. Paper No. 36* : 84 (two examples recorded from Hemavathi river at Hulivala village, Hole Narsipur town, Karnataka).
1984. *Mystus menoda*, Venkateswarlu, *Rec. zool. Surv. India, Occ. Paper No. 56* : 20 (common and vernacular names).
1984. *Mystus menoda*, Hussain and Tilak, *Rec. zool. Surv. India*, 81 : 275 (Faizabad, U. P.).
1986. *Mystus corsula*, Sharma and Rajput, *J. Bombay nat. Hist. Soc.* 83 : 566 (Bijnor dist., U. P.).

Specimens studied : 11 exs. 150.1-287.1 mm SL in total as below :

Cat 550 one ex. 244.6 mm SL Tagoung, Burma Dr. J. Anderson coll. Cat 551 one ex. 287.1 mm SL Tagoung, Burma Dr. Anderson coll. Cat 554 one ex. 228.7 mm SL Calcutta. ZSI F 1223 two exs. 198.1 & 224.7 mm SL Hulivala, Hemavathy river, Karnataka, K. C. Jayaram coll. 7.5.1977. ZSI F 1403/1 one ex. 150.1 mm SL Saraghat, Ganges river R. A. Hodgart coll. ZSI unreg. five exs. 204.5-282.2 mm SL Calcutta fish market, catch reported from the Ganges. S. Anuradha coll. 3.2.1985.

Description : D. I, 7; P. I, 9; V. i, 5; A. iii-v, 8; C. 7+8.

Body depth 20.2 (18.6-21.6), head length 29.2 (27.6-31.6), width of head 21.0 (18.2-21.3), dorsal spine length 12.9 (11.5-15.0), pre-dorsal length 45.1 (43.5-47.7), post-dorsal length 57.8 (53.5-62.0), length of anal fin base 13.6 (11.8-14.6) all in percent of standard length. Eye 13.6 (12.4-13.4), inter-orbital width 34.1 (32.4-38.9), dorsal spine length 44.4 (36.2-50.6), length of snout 38.9 (37.0-42.3), gape of mouth 51.6 (45.6-57.2), length of dorsal fin base 50.1 (47.8-56.0), length of anal fin base 45.9 (38.9-51.8), length of caudal peduncle 55.9 (52.5-60.5), height of caudal peduncle 31.9 (26.3-35.1) all in percent of head length. Adipose dorsal fin base 55.6 (49.6-65.9) in percent of anal fin base. Snout length 87.6 (84.0-92.0) in percent of inter-orbital width. Least depth of caudal peduncle 57.1 (45.8-60.1) in percent of its length.

Dorsal profile rising steadily from tip of snout to base of occipital process. Head prominent, depressed and longer than broad. Upper surface of head rough with tubercular ridges. Snout obtuse, upper jaw longer. Eyes small, lateral margins free. Median longitudinal groove on head not reaching base of occipital process. Occipital process long and narrow with a slight inter-space between it and the basal bone of dorsal fin. Teeth villiform, numerous; five or six rows of an uninterrupted semi-lunar band across palate and upper jaw; six to seven rows of a mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary reaching base of anal fin, one pair nasal reaching below middle of eye, one pair outer mandibular extending to base of pectoral fin and one pair inner mandibular shorter.

Dorsal fin with a slender spine, outer surface of spine smooth, inner serrated anteriorly towards tip with two or three teeth. Adipose dorsal fin long, its base almost as long as or longer than base of rayed dorsal fin with a considerable inter-space between the two. Pectoral fins with nine branched rays and a strong internally serrated spine with 20-23 teeth. Pelvic fins not reaching anal fin. Anal fin does not reach base of caudal. Anal papilla absent. Caudal fin forked, bilobed, upper lobe longer.

Colour : Light brown on top with a grayish tinge, turning dull white beneath. All paired fins grayish or stained black. A number of black spots along anterior portion of lateral line present.

Distribution : INDIA : West Bengal, Assam, Orissa, Karnataka. MYANMAR : Tagoung.

Remarks : Hamilton-Buchanan (1822) described *Pimelodus menoda* from the Kosi, Mahananda rivers in north Bihar and Bengal respectively. He published a figure of the species (pl. 1, fig. 72) but by a misprint the name below the figure appeared as *P. corsula* although in the original drawing the name *Pimelodus telagra menoda* is found written in Hamilton-Buchanan's own hand writing. Day confused this with *Mugil corsula* and called Hamilton-Buchanan's fish as *P. corsula* erroneously, which error had crept into his Fauna volume also.

Valenciennes (1839) described *Bagrus corsula* independently, which has been synonymised under this species. *B. corsula* was characterised by its depressed head and body depth which is 6 times in total length, eyes 4.5 times in head length, upper lobe of caudal fin longer than lower.

It will be seen from the above that all these characters inter-grade with *Mystus menoda*. Subsequent workers as Bleeker (1853), Day (1869, 1877, 1889), Chaudhury (1911, 1913), Chu (1931), Nichols (1943), Menon (1951), Jayaram (1954) have all used the name *corsula* as an independent taxa. Chaudhuri (1913) while describing a new variety *trachacanthus* cleared the confusion and corrected the name as *M. menoda*.

M. menoda is mainly confined to north India and its record elsewhere is few. Jayaram et al (1982) recorded it from the Cauvery drainage which is a new record. The species closely resembles *M. microphthalmus* and *M. trachacanthus* but differs from them in possessing clusters of small vertical black spots along the anterior portion of lateral line, pectoral spine having 20-23 teeth and upper or lower lobe of caudal fin not prolonged as a filament.

Mystus micracanthus (Bleeker)
(Figure 14)

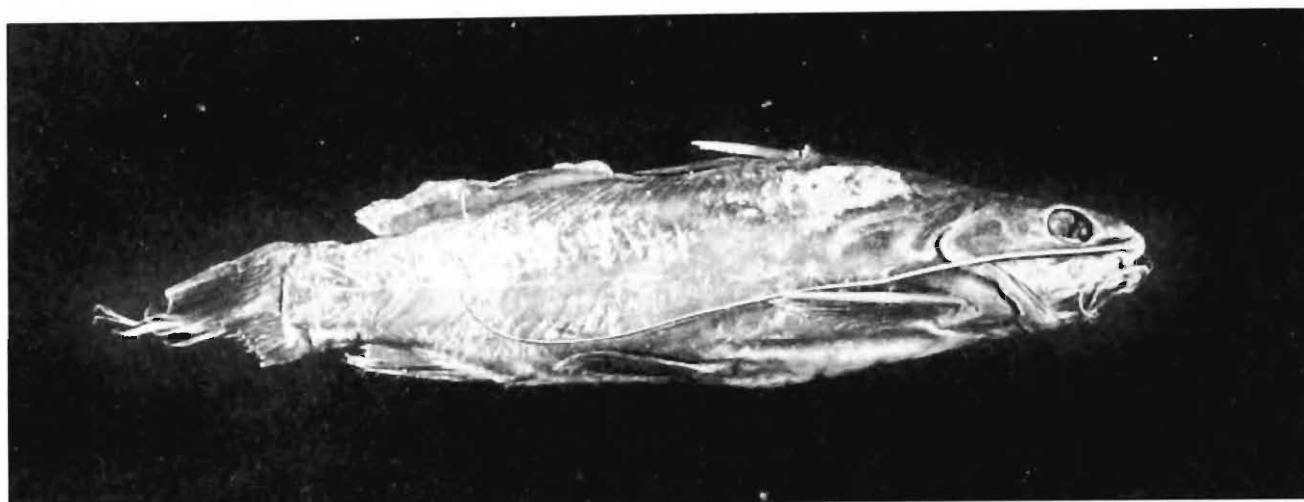


Fig 14. Photograph of specimen ZSI F 131/2 *Mystus micracanthus* (Bleeker).

1846. *Bagrus micracanthus* Bleeker, *Nat. & Geneesk. Arch. Ned. Ind.* **3**(2) : 151 (type locality Batavia, Java).
1847. *Bagrus micracanthus*, Bleeker, *Verh. Bat. Gen.* **21**(1) : 151 (description).
1850. *Bagrus micracanthus*, Bleeker, *Verh. Bat. Gen.* **23**(12) (Banjumas, Surabauya, Central Java).
1858. *Bagrus micracanthus*, Bleeker, *Ichth. Arh. Ind. Prodr.* **1**, *Siluri* : 150 (brief description) : 161-162 (local name, description, Java, Sumatra, Borneo).
1862. *Hypselobagrus micracanthus*, Bleeker, *Atlas Ichth.* **2** : 59, pl. 74, fig. 3 (description, synonymy, local names; Java, Sumatra, Borneo in rivers).
1864. *Macrones micracanthus*, Gunther, *Cat. Fish. Brit. Mus.* **5** : 76 (synonymy, description of a typical specimen from Bleeker's collection).
1901. *Macrones (Hypselobagrus) micracanthus*, Steindachner, *Abh. Senkenb. Natur. Ges.* **25** : 446 (description, Baram river, Borneo).
1913. *Macrones micracanthus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* **2** : 339 (synonymy, description, local names).
1934. *Mystus micracanthus*, Smith, *J. nat. Hist. Soc. Siam* **9**(3) : 294 (Thailand).
1937. *Mystus micracanthus*, Herre & Myers, *Bull. Raffles Mus.* **13** : 69 (Mawai district, Johore, Chin Chin Lake, Jasin, Malacca, Telok Anson, Perak, Malaya, Singora, Thailand).
1937. *Mystus micracanthus*, Fowler, *Proc. Acad. Nat. Sci. Philad.* **89** : 146 (description, Kemrat, differs a little from Bleeker's figure as the dorsal spine is slender, pungent, entire, about 1/3 length of head).

1941. *Mystus micracanthus*, Hora & Gupta, *Bull. Raffles Mus* No. 17 : 26 (synonymy, distribution, recorded from Perak and Perlin, Malaysia).
1945. *Mystus micracanthus*, Smith, *Bull. U. S., nat. Mus.* No. 188 : 391 (synonymy, Chantabun river in south-east Thailand, Tadi river, Nakon Sritamarat, Meping and Mekong rivers, Thailand. Johore, Malacca and Perak, Malaya. first citation for Malaya from Singora market, probably caught in Tale Sap, Peninsular Thailand).
1954. *Mystus (Mystus) micracanthus*, Jayaram, *Rec. Indian Mus.* 51(4) : 554 (synonymy and distribution).
1966. *Mystus micracanthus*, Jayaram, *Int. Rev. Ges. Hydrobiol* 51(3) : 446 (distribution).
1970. *Mystus micracanthus*, Sidthimunka, *Inld. Fish. div. Bangkok* : 14 (Thai names, English common name; Mekong river, Thailand).
1975. *Mystus micracanthus*, Desoutter, *Bull. Mus. Nat. Hist. Naturelle* No. 296 : 446 (synonymy, description; Tonle Sap, Kampuchea).
1989. *Mystus micracanthus*, Roberts, *Mem. Calif. Acad. Sci.* 14 : 120 (Western Borneo; neotype designated).

Specimens studied : Two exs. 78.3 & 151.5 mm SL as below :

ZSI F 131/2 one ex. 78.3 mm SL Kaki Buki, Perak, Malayasia, Raffles Museum. F. 130/2 one ex. 151.5 mm SL Bukit Merah, Perak, Malaysia, Raffles Museum.

Description : D. I, 7; P. I, 9; V. i, 5; A. ii-iii, 8-9; C. 7+8.

Body depth 24.5 (23.3-25.9), head length 27.8 (27.6-27.9), width of head 20.1 (19.5-20.8), dorsal spine length 12.5, pre-dorsal length 41.95 (41.9-42.0), post-dorsal length 62.0 (60.8-65.3), length of anal fin base 14.4 (13.5-15.3) all in percent of standard length. Eye 22.2 (21.7-22.7), inter-orbital width 34.7 (34.5-35.2), dorsal spine length 44.7, pectoral spine length 77.5 (77.3-77.8), length of snout 35.8 (34.0-37.5), gape of mouth 44.8 (42.8-46.8), length of dorsal fin base 57.9 (55.6-60.2), length of anal fin base 52.0 (48.5-55.6), length of caudal peduncle 63.5 (60.8-66.2), height of caudal peduncle 39.6 (39.5-39.8) all in percent of head length. Adipose dorsal fin base 46.7 (44.8-49.6) in percent of anal fin base. Snout length 102.9 (99.3-106.6) in percent of inter-orbital width. Least depth of caudal peduncle 62.6 (60.1-65.0) in percent of its length.

Dorsal profile rising steadily from tip of snout to base of occipital process. Head flat, broader than long and rugose. Snout rounded, slightly prominent. Mouth opening crescent. Median longitudinal groove on head short, does not extend up to base of occipital process. Occipital process slender, finely rugose and reaching basal bone of dorsal fin. Teeth villiform and in bands on jaws and palate; a slightly curved continuous band on upper jaw, a deeply curved mesially interrupted band on lower jaw, a semi-lunar continuous band on vomer.

Four pairs of barbels : one pair maxillary extending to caudal fin, one pair nasal reaching anterior border of operculum, one pair inner mandibular reaching origin of pectoral fins and one pair outer mandibular extending to end of pectoral fin.

Dorsal fin inserted vertically above end of pectoral fin with a slender spine, half as long as head and finely serrated behind, outer surface smooth. Adipose dorsal fin much longer than dorsal and anal; more or less contiguous with dorsal. Pectoral fins not reaching pelvic

fins with nine branched rays and a strong spine much longer than dorsal spine with 8-14 strong retrorse teeth along inner edge. Pelvic fins do not reach anal fin. Anal fin not reaching caudal fin. No pre-anal papilla. Caudal fin forked, upper lobe longer.

Colour : Yellowish brown. A dark spot at base of caudal fin present.

Distribution : THAILAND : Kemrat, Singora, Nakon Sritamarat, Meping and Mekong rivers. CAMBODIA : Tonle Sap. MALAYA : Johore, Jasin, Malacca, Perak, Perlis and Chin Chin Lake. JAVA : Batavia, Banjumas and Surabaya. SUMATRA : Indragiri and Kwantan rivers. BORNEO.

Remarks : *Mystus micracanthus* resembles closely *M. nigriceps* but differs from it in having shorter median longitudinal groove, broader caudal peduncle with a dark triangular spot at base of caudal fin. The outer mandibular barbels extend posteriorly to pelvic fin origin.

Mystus microphthalmus (Day)
(Figure 15)



Fig 15. Photograph of specimen ZSI unreg. 247.1 mm SL *Mystus microphthalmus* (Day).

1877. *Macrones microphthalmus* Day, *Fish India* : 446, pl. 100, fig. 4 (type-locality Irrawaddy, Burma).
1889. *Macrones microphthalmus* Day, *Fauna Brit. India Fish* 1 : 154 (local name, description and distribution).
1890. *Macrones microphthalmus* Vinciguerra, *Ann. Mus. Stor. Nat. Genova* 9(2) : 225 (Burma).
1954. *Mystus menoda microphthalmus*, Jayaram, *Rec. Indian Mus.* 51(4) : 547 (synonymy, description and distribution).
1966. *Mystus menoda microphthalmus*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1977. *Mystus microphthalmus*, Jayaram, *Rec. zool. surv. India, Occ. Paper No. 8* : 28 fig. B (key, synonymy, diagnostic characters, colour, distribution, size, fishery value).

1986. *Mystus microphthalmus*, Singh and Singh. *Jap. J. Ichthyol.* 33(2) : 197 (record from Manipur valley, India).

Specimens studied : Two exs. 139.9 and 247.1 mm SL as below :

ZSI 2592 one ex. Holotype, 139.6 mm SL Irrawaddy river, Burma, F. Day coll. ZSI unreg. one ex. 247.1 mm SL Manipur, Vishwanath Singh coll.

Description : D. I, 7; P. I, 8-9; V. i. 5; A. ii-iii. 9; C. 7+8.

Body depth 16.1 (12.5-19.7), head length 29.5 (29.2-29.7), width of head 18.8 (18.2-19.3), length of dorsal spine 11.9 (8.8-15.0), pre-dorsal length 43.0 (42.2-43.7), post-dorsal length 57.9 (57.8-58.1), length of anal fin base 13.4 (12.7-14.0) all in percent of standard length. Eye 9.7 (8.3-11.1), inter-orbital width 29.7 (28.2-31.2), dorsal spine length 40.3 (30.1-50.6), pectoral spine length 43.8 (42.9-44.7), length of snout 33.3 (32.0-34.5), gape of mouth 45.6 (42.4-48.8), length of dorsal fin base 48.2 (47.0-49.5), length of anal fin base 45.5 (43.7- 47.2) all in percent of head length. Adipose dorsal fin base 76.1 (71.9-80.3) in percent of anal fin base. Snout length 89.6 (81.82-97.4) in percent of inter-orbital width. Least depth of caudal peduncle 39.5 (34.3-44.5) in percent of its length.

Dorsal profile almost straight with very little rise from tip of snout to base of occiput. Head small, depressed. Eyes small. Snout spatulate, upper jaw longer. Width of head equals length of head excluding snout. Teeth villiform in an uninterrupted band across palate and upper jaw and an interrupted band on lower jaw. Upper surface of head smooth. Median longitudinal groove on head reaching base of occipital process. Occipital process short, narrow, scarcely longer than width at base and not reaching basal bone of dorsal fin.

Four pairs of barbels : one pair maxillary reaching anal fin or beyond, one pair nasal extending to middle of orbit, one pair outer mandibular equal to length of head and one pair inner mandibular shorter.

Dorsal fin with a weak, slender spine; osseous at base and serrated on upper half. Adipose dorsal fin small, broader than anal fin base. Pectoral fins with eight or nine branched rays and a strong spine serrated with 11-13 retrorse teeth. Pelvic fins not reaching anal fin which in turn does not reach caudal fin. Anal papilla absent. Caudal fin forked, upper lobe with a filamentous prolongation.

Colour : Brownish on top turning dull white beneath.

Distribution : INDIA : Manipur. MYANMAR : Along Irrawaddy valley.

Remarks : V. Singh and H. T. Singh (1986) recorded *M. microphthalmus* from Manipur valley. We have examined this specimen (plate 1) and it corresponds with Day's original description. It is reported that this fish grows to a considerable size and forms a good fishery in Manipur. The occurrence of a Burmese species north in Manipur valley is zoogeographically interesting since it is normally to be expected in the drainages of Chindwin only. *M. microphthalmus* closely resembles *M. menoda* from which it can be distinguished

by the possession of plain body without any spot, pectoral spine having 11-13 retrorse teeth and the upper lobe of caudal fin prolonged into a filament.

Mystus montanus (Jerdon)
(Figure 16)

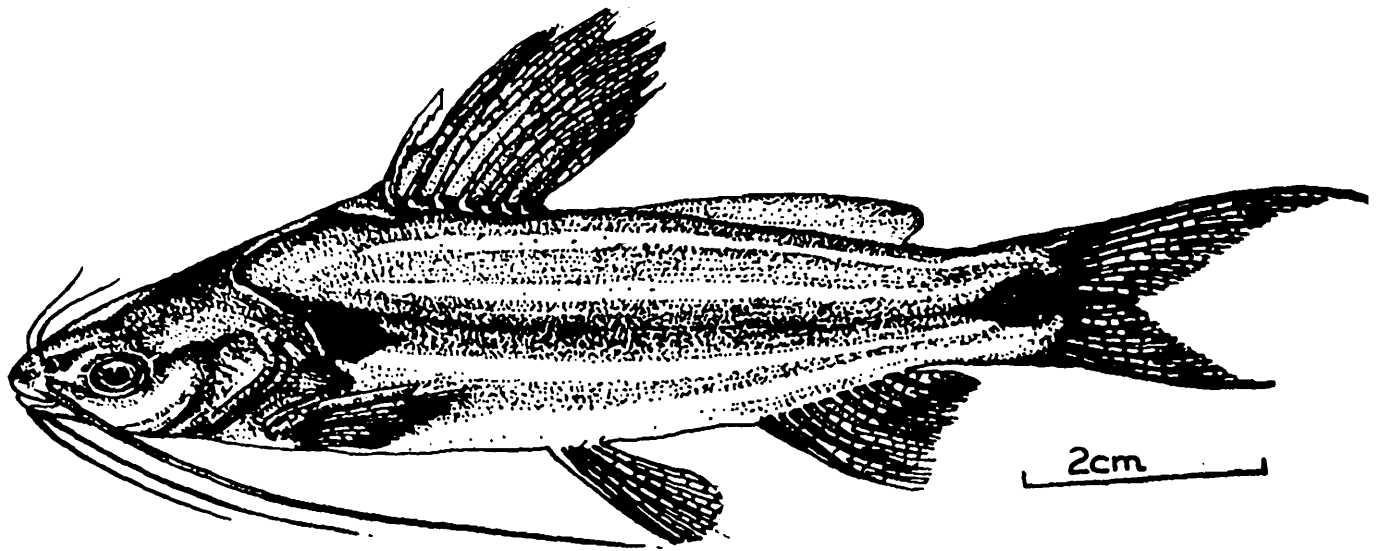


Fig 16. Lateral view drawing of *Mystus montanus* (Jerdon).

1849. *Bagrus montanus* Jerdon, *Madras J. Lit. Sci.* 15(2) : 337 (type locality Manantoddy, Wayanad).
1871. *Bagrus montanus*, Day, *Proc. Zool. Soc. London* : 706.
1877. *Macrones montanus*, Day, *Fish India* 449, pl. 101, fig. 4 (synonymy, description; Manantoddy, Waynaad range of hills).
1889. *Macrones montanus*, Day, *Fauna Brit. India* 1 : 159 (synonymy, description and distribution).
1913. *Macrones montanus* var *dibrugarhensis*, Chaudhuri, *Rec. Indian Mus.* 8 : 254, pl. 9, fig. 2, 2a, 2b (type locality Dibrugarh, Assam).
1937. *Macrones montanus*, Hora, *Rec. Indian Mus.* 39 : 19 (Cauvery river, Coorg).
1941. *Macrones montanus*, Hora and Law, *Rec. Indian Mus.* 43 : 238 (Travancore, Western Ghats and associated hills).
1942. *Mystus montanus*, Hora, *Rec. Indian Mus.* 44 : 197 (Mysore and adjoining hill ranges).
1954. *Mystus (Mystus) montanus*, Jayaram, *Rec. Indian Mus.* 51(4) : 542 (synonymy, description and distribution).
1966. *Mystus montanus montanus*, Jayaram, *Int. Rev. ges. Hydrobiol* 51(3) : 466 (distribution).
1971. *Mystus montanus*, Jayaram, *Proc. zool. Soc. Calcutta* 24 : 152 (absence of inter-neural shield indicated).
1977. *Mystus montanus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No 8* : 25, fig. 24B (synonymy, diagnostic characters, colour, distribution, size, fishery value).

1992. *Mystus montanus*, Rema Devi, *Rec. zool. Surv. India*, **91** : 357 (Amerdi, Pinnathurai, Javadi hills).
1992. *Mystus montanus*, Rema Devi, *Rec. zool. Surv. India*, **92** : 207 (Pachayar near Thalaiaru, Arualtheetiodai, Kodamati estate, Kalakad Wildlife Sanctuary).
1995. *Mystus montanus*, Shaji and Easa, *J. Zool. Soc. Kerala* **5**(1&2) : 33 (Mananthavadi, Panamaram, Wayanad).

Specimens studied : 54 exs. 59.4-79.8 mm SL in total as below :

ZSI unreg. seven exs. 59.7-78.1 mm SL Malampuzha dam, right bank canal, Kerala, K. C. Jayaram and Anuradha coll. 22.2.1985. ZSI unreg. 11 exs. 59.6-77.8 mm SL Palayamkottai, Tamil Nadu, A. G. Murugesan coll. 1984. ZSI unreg. eight exs. 65.8-79.6 mm SL Sholayar dam, near Pollachi, on way to Munnar, G. M. Natarajan coll. ZSI unreg. eight exs. 65.6-76.9 mm SL Chitoorpuzha at Tathamangalam road bridge about 17 km south of Palghat town, K. C. Jayaram and Anuradha coll. 20.2.1985. ZSI unreg. 13 exs. 59.5-79.8 mm SL purchased from fish market, Coimbatore, Tamil Nadu, catch reported from Vallanur Tank fed by Noyyal river, K. C. Jayaram and Anuradha coll. 23.2.1985. ZSI unreg. seven exs. 59.6-75.4 mm SL Valankunam tank on road from Coimbatore to Trichy, K. C. Jayaram and Anuradha coll. 23.2.1985.

Description : D. I, 7; P. I, 6; V. i, 5; A. iii, 8-9; C. 7+8.

Body depth 21.1 (18.7-22.8), head length 27.3 (19.7-30.2), width of head 19.7 (18.3-21.0), dorsal spine length 12.6 (10.6-13.9), pre-dorsal length 41.1 (39.1-43.8), post-dorsal length 63.1 (57.1-71.4), length of anal fin base 13.0 (11.0-15.7) all in percent of standard length. Eye 20.0 (15.2-23.4), inter-orbital width 32.1 (30.2-34.6), dorsal spine length 44.2 (38.2-50.6), length of snout 32.6 (30.8-34.5), gape of mouth 48.5 (44.0-54.1), length of dorsal fin base 55.3 (46.4-63.4), length of anal fin base 47.2 (40.9-57.6), length of caudal peduncle 69.0 (59.9-76.2), height of caudal peduncle 35.1 (30.8-39.8) all in percent of head length. Adipose dorsal fin base 63.4 (48.8-76.6) in percent of anal fin base. Snout length 96.6 (91.3-98.5) in percent of inter-orbital width. Least depth of caudal peduncle 51.5 (41.9-59.8) in percent of its length.

Dorsal profile arched with a steep rise from tip of snout to the base of occipital process. Head flat, anteriorly depressed. Snout broad, upper jaw slightly longer. Eyes oval. Median longitudinal groove on upper surface of head not reaching base of occipital process, but extends to midway between eye and base of occipital process. Occipital process narrow and reaches basal bone of dorsal fin. Teeth numerous, villiform in semi-lunar bands across palate and upper jaw, in mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary reaching anal fin, one pair nasal extending beyond posterior border of eyes, one pair outer mandibular reaching almost half length of pectoral spine and one pair inner mandibular shorter.

Dorsal fin with a weak spine; outer surface of spine smooth, inner surface slightly serrated. Adipose dorsal fin short with an inter-space equal to the length of base of rayed dorsal. Pectoral fins with six branched rays and a strong spine with 14-15 retrorse teeth. Pelvic fins do not reach anal fin. Anal fin does not reach caudal fin. Caudal fin forked, upper lobe longer.

Colour : In alcohol preserved specimens dark grayish brown with pale yellowish bands along sides above and below lateral line; ventral surface of head and abdomen light brown. Fresh specimens silvery gray with light yellowish bands along sides. Some examples caught from Malampuzha dam were dark violet with greenish bands along sides ending in a dark spot at base of caudal fin. Specimens gradually turned yellow when preserved in formalin.

Distribution : INDIA : Confined to Peninsular India, especially along Western Ghats.

Remarks : This species is usually found in narrow, rocky streams. We collected eight examples from Chitoorpuzha at Tathamangalam Road Bridge which is a tributary of Bharathapuzha River having a rocky and sandy bottom. At the time of collection the river was about 15 meters wide with a depth of one to three meters and marginal vegetation of paddy fields; water was slow-flowing and contained a lot of weeds and algae. The catch was by cast net. The seven examples from Malampuzha dam were actually caught within a long dark culvert with a cast net. A peculiar feature observed was their colour, which was very dark violet with greenish bands along sides of body ending in a dark spot at base of caudal fin. This type of colour may be due to the habitat of the fishes that remained dark and stagnant for a long period of time. *M. montanus* is close to *M. malabaricus* in many aspects but differs from it in colouration, pectoral spine with 14 or 15 retrorse teeth and upper lobe of caudal fin longer.

Mystus multiradiatus Roberts

1992. *Mystus multiradiatus* Roberts, *Ichthyol. Explor. Freshwaters* 3(1) : 82, fig. 3b (type locality Prachinburi market, Bangkok, Thailand).

Specimen studied : No specimen seen by us.

Description : This species differs from all other species of the genus except *M. mysticetus* it having over 40 gill rakers on first gill arch. It differs from *M. mysticetus* in having the eye dorso-lateral (rather than lateral) and from all striped *Mystus* of Thailand in having head from snout tip to behind eye very flat and relatively broad. Dorsal margin of eye nearly flush with dorsal profile of head. Inter-orbital width twice eye diameter. Anal fin margin rounded.

Distribution : THAILAND : Mekong, Chao Phraya and perhaps Mekong basins.

Mystus mysticetus Roberts

1992. *Mystus mysticetus* Roberts, *Ichthyol. Explor. Freshwaters* 3(1) : 84, fig. 3c (type locality Nakron Phanom Market, Bangkok, Thailand).

Specimen studied : No specimen seen by us.

Description : Differs from all other species of *Mystus* in having eyes lateral than dorso-lateral. Mouth nearly terminal, less down turned than in other striped species of *Mystus*. Adipose fin short but very high, originating far behind dorsal fin. Gill rakers increases in number throughout life, faster than in any other *Mystus* (36-97 rakers). Anal fin with 13-15 rays, slightly more than other striped *Mystus* species of Thailand (usually 12 or less).

Distribution : THAILAND : Mekong, Rayong, Bangpakong, Chao Phraya and possibly Meklong basins.

Mystus nemurus (Valenciennes)
(Figure 17)

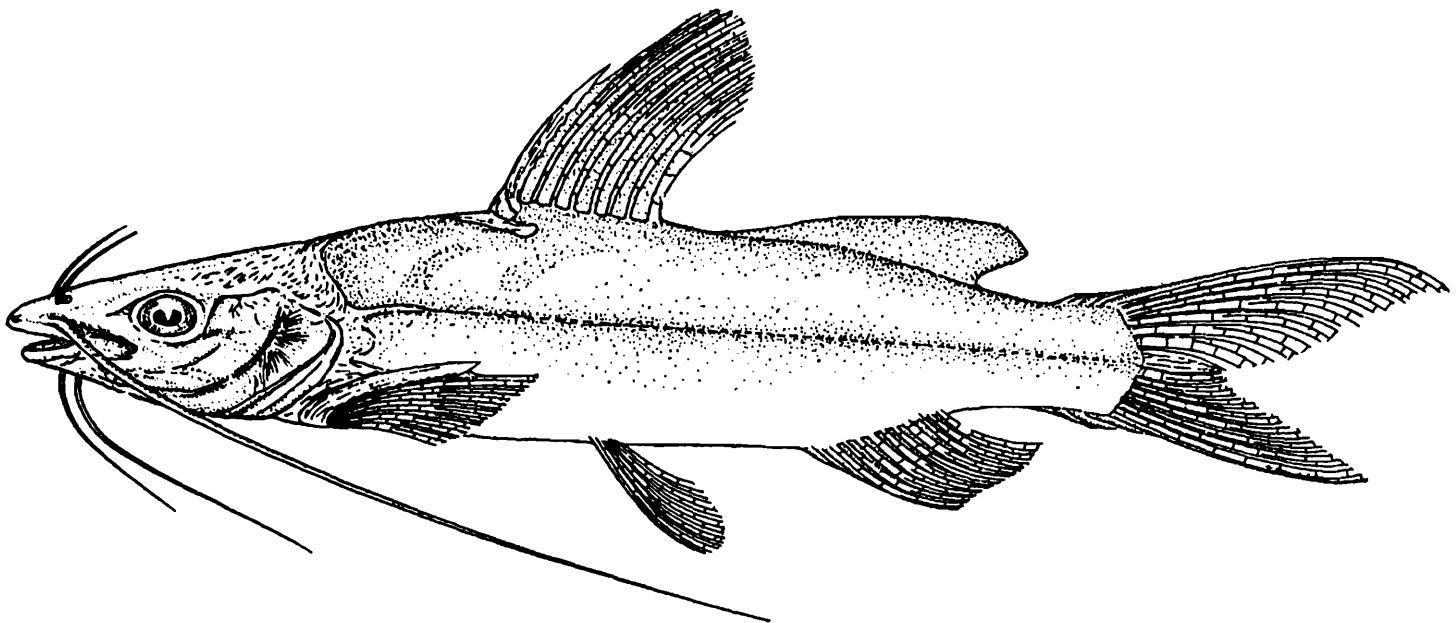


Fig 17. Lateral view drawing of *Mystus nemurus* (Valenciennes).

1839. *Bagrus nemurus* Valenciennes IN : Cuvier & Valenciennes, *Hist. Nat. Poiss.* 14 : 423 (type locality Java).
1846. *Bagrus hoevenii siebaldi* Bleeker, *Nat. & Geneesk. Arch. Ned. Ind.* 3(2) : 154, 155 (diagnosis).
1847. *Bagrus nemurus*, Bleeker, *Verh. Bat. Gen.* 21(1) : 140 (diagnosis, description).
1850. *Bagrus nemurus*, Bleeker, *Verh. Bat. Gen.* 23(12) : 10 (Surabaya, Sarawak, Central Java).
1858. *Bagrus nemurus*, Bleeker, *Ichth. Arch. Indici. Prodr.* 1 : *Siluri* : 148,149 (brief description; Java, Sumatra, Banka and Borneo).
1862. *Hemibagrus nemurus hoevenii*, Bleeker, *Atlas Ichth.* 2 : 55, pl. 59, 56, pl. 70 (synonymy, description, local names).
1864. *Macrones nemurus*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 80 (synonymy, description, systematic position of *Bagrus hoevenii* Bleeker discussed).
1865. *Hemibagrus nemurus*, Bleeker, *Ned. Tijdschr. Dierk.* 2 : 33 (Catalogue of species from Thailand).

1880. *Macrones nemurus*, Vinciguerra, *Ann. Mus. Stor. Nat. Genova* **16** : 169 (synonymy, local names, spine considered venomous) : 170 (synonymy, justification for separate entity as a species different from *M. nemurus*).
1901. *Macrones (Hemibagrus) nemurus*, Steindachner, *Abh. Senckenb. naturf. Ges.* **25** : 446 (description, Baram river, Borneo).
1903. *Macrones bleekeri*, Volz, *Zool. Anz.* **26(703)** : 556.
1904. *Macrones nemurus*, Volz, *Rev. Suisse Zool.* **12** : 468 (Indragiri, Kwantan River in Kota Baru, Wampu River in Sakaranda at Oberlangkat, Sumatra).
1904. *Macrones nemurus* var. *hoeveni*, Volz, *Rev. Suisse. Zool.* : 468 (Sungei Mahe, Sumatra).
1904. *Macrones howong, bongon, bo, kajan, fortis* Popta, *Notes Leyden Mus.* **24** : 181, 182, 183, 184, 185 (Howong, Bongon, Bo, Kajan, Central Borneo).
1904. *Macrones fortis* var. *capitulum* Popta, *Notes Leyden Mus.* **24** : 186 (Bo, Central Borneo).
1913. *Macrones nemurus*, Weber and Beaufort, *Fish Indo-Austral. Archipel.* **2** : 341 (synonymy, description, local names. Java, Sumatra, Banka, Singapore, Borneo, Malacca and Thailand, fresh and brackish waters).
1923. *Macrones nemurus*, Hora, *J. nat. Hist. Soc. Siam* **6(2)** : 171 (local names; Nontaburi, Thailand).
1925. *Hemibagrus nemurus*, Nichols, *Amer. Mus. Novit.* **185** : 1.
1934. *Mystus nemurus* Smith, *J. Siam Soc. Nat. Hist. Suppl.* **9(3)** : 294 (Thailand).
1937. *Mystus (Brachymystus) nemurus*, Fowler, *Proc. Acad. Nat. Sci. Philad.* **89** : 148, figs. 44 to 47 (synonymy, Bangkok, Pitsanulok, Tachin, Me Poon, Kemrat, Thailand).
1937. *Mystus nemurus*, Herre and Myers, *Bull. Raffles Mus. No.* **13** : 69 (Singapore, Ayer Hitam, Johore. Chin Chin Lake, Jasin and Malacca. Chinki Lake, Pahang, Bukit Merah, Telok Anson. Chandra dam, Perak, Malaya).
1940. *Mystus johorensis* Herre, *Bull. Raffles Mus.* **16** : 13, pls. 6 & 7 (type locality Kayu, north of Kola tinggi, Johore).
1940. *Mystus pahangensis*, Herre, *Bull. Raffles Mus.* **16** : 14 (type locality, Sungai Garam near Karak, Johore).
1941. *Mystus nemurus*, Hora and Gupta, *Bull. Raffles Mus. No.* **17** : 26 (synonymy, Singapore, Kelantan, Pahang, Perak, Malaya).
1945. *Mystus nemurus*, Smith, *Bull. U. S. Nat. Mus. No.* **188** : 386 (synonymy, brief description, local names; Menam Nan, Meping, Mekong, Menam Mun, Tap Rivers, Tale Sap. Tale Noi. Patani and Chantabun rivers, brackish waters of Gulf of Thailand).
1954. *Mystus (Mystus) nemurus*, Jayaram, *Rec. Indian Mus.* **51(4)** : 553 (synonymy, description).
1966. *Mystus nemurus*, Jayaram, *Int. Rev. øs. Hydrobiol.* **51(3)** : 556 (distribution).
1970. *Mystus nemurus*, Sidthimunka, *Inld. Fish. Div. Dept. fish. Bangkok* : **14**, pl. 90 (Thai name, local names, English common names; Mekong river, Thailand).
1975. *Mystus nemurus*, Desoutter, *Bull. Mus. Nat. Hist. Naturelle No.* **296** : 448 (synonymy, description; Tuk-Chkou-Kampot, Tonle Sap; Prek Tamen, Snocrou Tasom; Grand Lac du Cambodge, Kampuchea).

1989. *Mystus nemurus*, Roberts, *Mem. Calif. Acad. Sci.* 14 : 121 (Western Borneo, *M. johorensis*, *M. pahangensis* synonymised).

Specimens studied : Five exs. 129.5-176.1 mm SL in total as below :

ZSI F 128/2 one ex. 129.5 mm SL Kuala Tahan, Pahang, F. M. S. Raffles Museum collection. ZSI F 10555/1 one ex. 145.1 mm SL Nontaburi. ZSI F 120/2 one ex. 150.1 mm SL Singapore, Raffles Museum collection. ZSI unreg. one ex. 152.2 mm SL Pahang. ZSI F 126/2 one ex. Chanderoh, Perak, F. M. S. Raffles Museum.

Description : D. 7-8; P. I, 7-8; V. i. 5; A. ii, 9-10; C. 7+8.

Body depth 19.4 (16.5-21.6), head length 31.2 (27.4-32.7), width of head 19.7 (18.5-21.2), dorsal spine length 14.5 (11.5-15.9), Pre-dorsal length 46.5 (42.6-50.0), post-dorsal length 55.9 (52.7-57.7), length of anal fin base 13.1 (11.4-14.8) all in percent of standard length. Eye 17.9 (14.1-21.8), inter-orbital width 28.6 (27.0-30.5), dorsal spine length 46.4 (42.0-49.5), pectoral spine length 59.2 (53.4-62.4), length of snout 38.1 (35.4-40.3), gape of mouth 49.3 (47.4-50.0), length of dorsal fin base 53.4 (46.8-57.9), length of anal fin base 42.3 (35.0-46.8), length of caudal peduncle 54.2 (50.8-60.5), height of caudal peduncle 30.4 (26.6-33.7) all in percent of head length. Adipose dorsal fin base 71.4 (68.4-78.8) in anal fin base. Snout length 75.2 (72.6-77.8) in percent of inter-orbital width. Least depth of caudal peduncle 56.1 (52.3-62.3) in percent of its length.

Dorsal profile elevated, rising slowly from tip of snout to the base of occipital process. Head depressed, upper surface of head rugose. Eyes oval. Snout spatulate, prominent. Mouth opening crescentic. Width of head greater than height of head, its greatest width almost equal to length of head without snout. Median longitudinal groove on dorsal surface of head reaching base of occipital process. Occipital process slender, long and reaching basal bone of dorsal fin. Teeth numerous, villiform and in curved bands across palate and upper jaw; a mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary extending beyond pelvic fin and reaching almost origin of anal fin, one pair nasal reaching eye, one pair outer mandibular reaching base of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a long spine, its outer surface smooth, inner surface with four to six small teeth towards tip. Adipose dorsal fin short situated above anal fin and slightly longer than anal fin with a considerable inter-space from the rayed dorsal fin. Pectoral fins with seven or eight branched rays and a strong flattened spine with 13-14 retrorse teeth. Pelvic fins not reaching anal fin. Anal fin not reaching caudal fin. Caudal fin deeply forked, upper lobe slightly longer than lower, often with a short filamentous extension.

Colour : Pale yellowish brown on top, becoming lighter beneath. No spots or marks present on body.

Distribution : JAVA : Batavia, Bekassi, Krawang, Buitenzorg, Dukok, Tjibilong, Garut, Surabaya, Gempol, Grati, Malang, Pasuruan. SUMATRA : Palembang, Benkulen, Moara

Kompeh, Padang, Solok, Singkarak and Maninjau Lakes, Taluk, Gunung, Sahilan, Kajutanam, Banjuasin, Singi Mahe, Kota Baru, Indragiri Upper Lant Kat, Djambi, Deli. BANKA : Singkep. SINGAPORE. BORNEO : Kajan, Mahakan, Kusan, Barito, Kahajan and Kapuas rivers. Sambas Mempawah, Sarawak and Baram. MALAYA : Malacca. THAILAND.

Remarks : *Mystus nemurus* comes close to *M. baramensis* in many aspects but can be differentiated from it in having longer median longitudinal groove, long occipital process reaching basal bone of dorsal fin and prominent snout. The shape of adipose dorsal fin and gill raker counts also differentiate the species.

Mystus nigriceps (Valenciennes)

1839. *Mystus nigriceps* Valenciennes IN : Cuvier & Valenciennes, *Hist. Nat. Poiss.* 14 : 412 (type locality Java).
1847. *Bagrus nigriceps*, Bleeker, *Verh. Bat. Gen.* 21(1) : 135 (Java).
1864. *Macrones nigriceps*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 77 (synonymy, description from Bleeker's collection).
1893. *Macrones nigriceps*, Vaillant, *Arch. Mus. Hist. Nat.* 5(3) : 72.
1904. *Macrones nigriceps*, Volz, *Rev. Suisse. Zool.* 12 : 467 (description, Sungei Mahe, Sumatra, Danau Sialong Jaloka, Kwantun fluss, Djapuri, Sumatra).
1905. *Hypselobarbus nigriceps*, Fowler, *Proc. Acad. Nat. Sci. Philad.* 57 : 470.
1913. *Macrones nigriceps*, Weber and Beaufort, *Fish. Indo-Austral. Archipel.* 2 : 337 (synonymy, description, local names, Java, Sumatra, Borneo, Malacca, Thailand in rivers and lakes).
1923. *Macrones nigriceps*, Hora, *J. nat. Hist. Siam Soc.* 6(2) : 171 (local names, Nontaburi, Thailand).
1934. *Mystus nigriceps*, Smith, *J. Siam Soc. Nat. Hist. Suppl.* 9(3) : 294 (Thailand).
1937. *Mystus nigriceps* (in part), Fowler, *Proc. Acad. Nat. Sci. Philad.* 89 : 146 (Pitsanulok, Kemrat).
1941. *Mystus nigriceps*, Hora & Gupta, *Bull. Raffles Mus.* No. 17 : 27 (synonymy, Johore, Kedah, Pahang, Perak).
1954. *Mystus (Mystus) nigriceps*, Jayaram, *Rec. Indian Mus.* 51(4) : 553 (synonymy and distribution).
1966. *Mystus nigriceps*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (description).
1982. *Mystus nigriceps*, Dutt, Sharma & Desoutter, *Cybiium* 6(4) : 27 (synonymy, comparative analysis, body proportions).
1989. *Mystus nigriceps*, Roberts, *Mem. Calif. Acad. Sci.* 14 : 122 (diagnosis, discussion regarding specific status).

Specimens studied : Four exs. 63.4-200.7 in total as below :

ZSI F 123/2 two exs. 63.4 & 189.1 mm SL Pahang, F. M. S. Raffles Museum coll. ZSIF. 122/2 one ex. 200.7 mm SL Perak, F. M. S. Raffles Museum coll. ZSI F 10322/1 one ex. 130.3 mm SL Pahang, F. M. S. Raffles Museum coll.

Description : Only diagnostic features are given.

Adipose dorsal fin contiguous with dorsal fin. Barbels very long, maxillary pair sometimes extending to or beyond caudal fin. Branchiostegal rays seven or eight. Gill rakers 21 to 25. Vertebrae 41 to 44 (After Roberts, 1989).

Distribution : Widely distributed in the Malay Peninsula, Sumatra, Borneo and Java. Also in Thailand.

Remarks : Dutt *et al* (1982) synonymised *Mystus nigriceps* under the widely distributed *M. cavasius* Desoutter. One of the authors of this paper (KCJ), re-examined the holotype of *Bagrus nigriceps* preserved in the Rijksmuseum van Natuurlijke Historie, Leiden RMNII 2953. He opined that no significant differences exist between *M. nigriceps* and *M. cavasius* as seen from the holotype. The holotype of *M. nigriceps* was found to agree with *M. cavasius* in all salient features such as the long median fontanel reaching the base of the occipital process; the occipital process reaching the basal bone of the dorsal fin; the maxillary barbels reaching caudal fin and the adipose dorsal fin long and contiguous with the rayed dorsal fin. Sharma and Dutt (1984) also examined two specimens of *M. nigriceps* preserved in the ZSI (F. 122/2 and F. 10322/1) and concluded that *M. nigriceps* is a junior synonym of *M. cavasius*.

Radiographs of specimens of *M. cavasius* and *M. nigriceps* were taken to ascertain whether any significant differences exist in their vertebral counts. *M. cavasius* has $20 + 19 = 39$ vertebrae and *M. nigriceps* $20 + 21 = 41$ (vide fig. e, pl. II). The neural spines of the pre-caudal vertebrae were branched towards the tip in both the species. We have not come across similar modification in any other *Mystus* species.

Roberts (1989) on the other hand found the colouration as a distinguishing feature in *M. cavasius*. He found that the longitudinal stripes and the humeral spot outlined by pale or white areas as characteristic of several Indian *Mystus* species, but not so in any Malaysian or Indonesian species. Further, he differentiated *M. nigriceps* from *M. cavasius* by gill raker counts 22-25 in *M. nigriceps* vs 15-21 in *M. cavasius*. However, samples of *M. cavasius* from Myanmar and Deolali, Maharashtra are exceptions in having 20-24 rakers.

This problem needs further study. Since at the time of preparation of the paper, we considered *nigriceps* as a synonym of *cavasius*, no detailed description can be given at this stage of updating the paper as explained in the beginning.

Mystus oculatus (Valenciennes)

(Figure 18)

1839. *Bagrus oculatus* Valenciennes, *Hist. Nat. Poiss.* **14** : 424 (type locality "Cote de Malabar").
1849. *Bagrus oculatus*, Jerdon, *Madras J. Lit. Sci.* **15**(2) : 339 (brief description; Palghat in South Malabar).

1853. *Bagrus oculatus*, Bleeker, *Verh. Bat. Gen.* 25 : 56 (Malabar).
1877. *Macrones oculatus*, Day, *Fish. India* : 448, Pl. 108, fig. 4 (synonymy, description, Malabar Coast and Coimbatore district).
1889. *Macrones oculatus*, Day, *Fauna Brit. India Fish* 1 : 156.
1929. *Macrones oculatus*, Pillay, *J. Bombay nat. Hist. Soc.* 33 : 358 (Aleppey, Kerala).
1941. *Mystus oculatus*, Hora and Law, *Rec. Indian Mus.* 43 : 238 (Travancore, Malabar, Nilgiris, Western Ghats and associated hills).
1942. *Mystus oculatus*, Hora, *Rec. Indian Mus.* 44 : 197 (Mysore and the adjoining hill areas).
1954. *Mystus (Mystus) oculatus*, Jayaram, *Rec. Indian Mus.* 51(4) : 540-541, fig. 6 (synonymy, description and distribution).
1966. *Mystus oculatus*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(4) : 446 (distribution).
1969. *Mystus oculatus*, Babu Rao and Chattopadhyay, *J. Bombay Nat. Hist. Soc.* 35(2) : 89, Pl. 2, figs. 2, 9 (key, description).
1977. *Mystus oculatus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 24, fig. 22A (key, diagnostic charactes).
1984. *Mystus oculatus*, Venkateswarlu, *Rec. zool. Surv. India, Occ Paper No. 56* : 21 (common and vernacular names).

Specimens studied : Five exs. 78.0-86.8 mm SL in total as below :

ZSI unreg. four exs. 78.0-78.6 mm SL, Chaliyar river at Edavanna, 2 km from Manjeri, Kerala, K. C. Jayaram and Anuradha coll. 18.2.1985. ZSI 487, one ex. 86.8 mm SL India, purchased from F. Day.

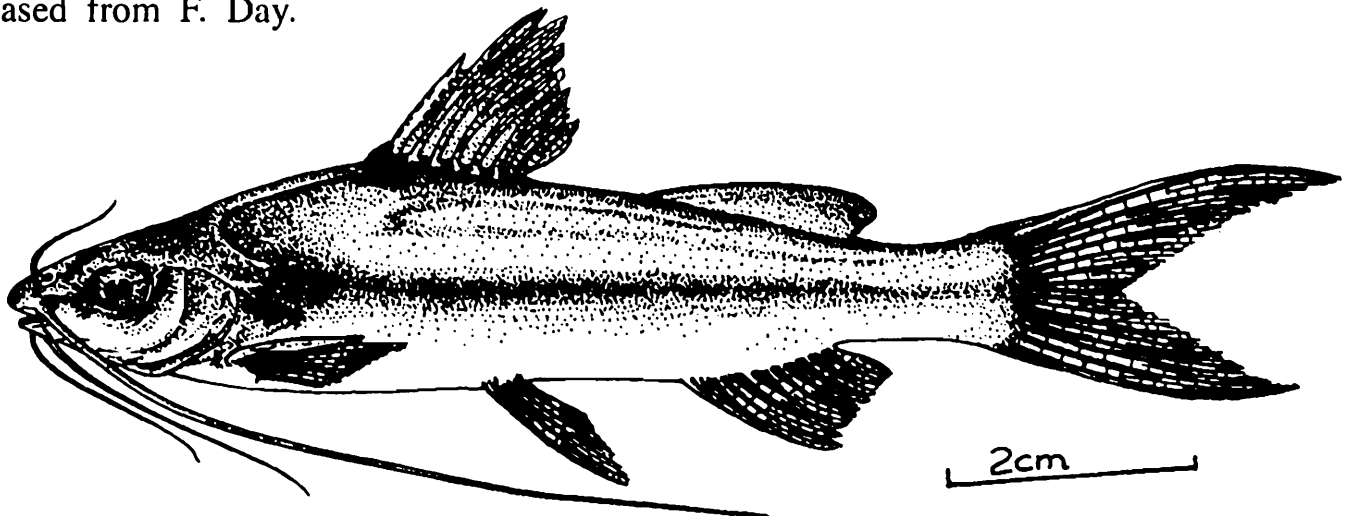


Fig 18. Lateral view drawing of *Mystus oculatus* (Valenciennes).

Description : D. I. 7; P. I. 8; V. i. 5; A. iii, 9; C. 7+8.

Body depth 22.2 (21.9-22.6), head length 23.8 (23.4-24.1), width of head 15.5 (14.8-16.4), dorsal spine length 16.1 (15.5-16.8), pre-dorsal length 38.6 (37.6-39.5), post-dorsal length 65.3 (64.8-65.8), length of anal fin base 14.8 (14.2-15.6) all in percent of standard length. Eye 30.2 (28.1-32.2), inter-orbital width 25.8 (24.3-27.3), dorsal spine length 67.7

(64.6-69.9), pectoral spine length 75.9 (72.4-79.2), length of snout 33.8 (31.9-35.5), gape of mouth 46.2 (44.3-49.2), length of dorsal fin base 61.9 (58.5-64.7), length of anal fin base 62.0 (59.4-66.7), length of caudal peduncle 81.0 (78.0-83.1), height of caudal peduncle 40.2 (38.4-43.2) all in percent of head length. Adipose dorsal fin base 72.0 (65.0-84.8) in percent of anal fin base. Snout length 76.6 (70.8-80.9) in percent of inter-orbital width. Least depth of caudal peduncle 49.7 (45.8-52.0) in percent of its length.

Dorsal profile arched with a steep rise from tip of snout to base of occipital process. Head small, compressed longer than broad and rugose. Snout rounded, upper jaw slightly longer. Cleft of mouth not extending to orbit. Median longitudinal groove on head reaching base of occipital process. Occipital process narrow and reaching basal bone of dorsal fin. Teeth villiform and in semi-lunar bands across palate and upper jaw; a deeply curved mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary reaching middle of anal fin, one pair nasal extending beyond posterior border of eye, one pair inner mandibular reaching origin of pectoral fins and one pair outer mandibular reaching end of pectoral fin.

Dorsal fin with a weak slender spine with two minute teeth at tip outer surface smooth. Adipose dorsal fin with considerable inter-space from the rayed dorsal, its base almost equaling that of rayed dorsal. Pectoral fins not reaching pelvic fins, with eight branched rays and a strong spine having 8-10 retrorse teeth. Pelvic fins not reaching anal fin. Anal fin not reaching caudal fin. No pre-anal papilla. Caudal fin forked, upper lobe longer. Caudal peduncle slightly constricted in the middle.

Colour : Dark brown above, yellowish beneath with a dark shoulder spot, a dark spot at base and a dark band along middle of dorsal fin and a dark broad band along lateral line.

Distribution : INDIA : Nilgiris, Western Ghats and associated hills in Karnataka, Kerala and Tamil Nadu.

Remarks : Valenciennes (1839) described this species from a specimen sent by M. Beiluer from Malabar and named it *oculatus* in view of the large size of the eyes. As aptly named this species is characterized by a large eye which is one diameter in length of snout and also in the inter-orbital width. Of all the different species of *Mystus* this one is easily distinguished by this feature. It is confined to streams of Western Ghats only and that too in Kerala.

M. oculatus comes close to *M. montanus* from which it can be easily distinguished by the large eye, dorsal spine with two minute teeth and the median longitudinal groove reaching base of occipital process. The body coloration is also different.

Mystus olyroides Roberts

1989. *Mystus olyroides* Roberts, *Mem. Calif. Acad. Sci.* 14 : 124, fig. 95 (type locality Sintang market, Kapuas, West Borneo).

Specimen studied : No specimen seen by us.

Description : Head short, flat. Body elongate. Eyes small. Barbels very long. Dorsal spine very short and weak. Adipose dorsal fin very long. Caudal fin with upper lobe elongated and lanceolate, lower lobe rounded and much shorter. Gill membranes broadly overlapping. Branchiostegal rays 9-11. Gill rakers 14. Pectoral fin rays eight. Anal fin rays 13. Vertebrae 24+24=48 or 49.

Colour : Body and fins without markings. Colour in life uniformly dark brown dorsally and laterally. Abdomen dusky. (After Roberts, 1989).

Distribution : BORNEO : Kapuas.

Remarks : As per Roberts (1989 : 126) this species does not appear to be close to any other species of *Mystus*.

Mystus peguensis (Boulenger)
(Figure 19)

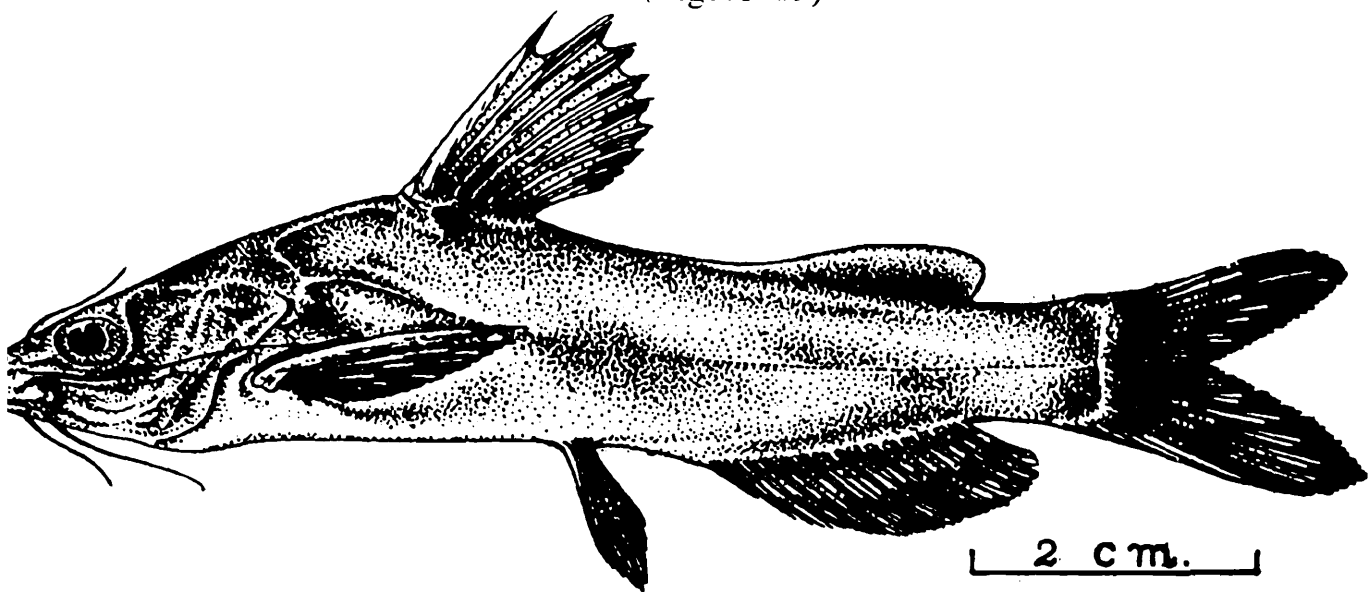


Fig 19. Lateral view drawing of *Mystus peguensis* (Boulenger).

1894. *Macrones peguensis* Boulenger, *Ann. Mag. Nat. Hist.* 14 : 196 (type locality Sittang river near Toungoo, Burma).
1954. *Mystus (Mystus) peguensis*, Jayaram, *Rec. Indian Mus.* 51(4) : 552 (synonymy and distribution).
1966. *Mystus peguensis*, Jayaram, *Int. Rev. Ges. Hydrobiol* 51(3) : 446 (distribution).
1977. *Mystus peguensis*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 27 (key, synonymy, diagnostic characters, fishery value).

Specimen studied : SU 36039, one ex. 76.4 mm SL Rangoon, Burma 1928.

Description : After Boulenger (1894) from a single specimen 20 mm in TL and also from a single specimen noted above.

D. I, 7; P. I, 6; V. i, 5; A. ii, 12; C. 7+8.

Body depth 18.1, head length 29.5, width of head 21.4, dorsal spine length 19.1, pre-dorsal length 44.5, post-dorsal 52.6; length of anal fin base 21.9 all in percent of standard length. Eye 15.8 (12.4-21.8), inter-orbital width 33.8 (25.5-38.3), length of snout 33.8, length of dorsal fin base 36.9, length of anal fin base 74.2, length of caudal peduncle 49.3, height of caudal peduncle 27.6 all in percent of head length. Adipose dorsal fin base 90.8 in percent of anal fin base. Snout length 98.7 in percent of inter-orbital width. Least depth of caudal peduncle 55.9 in percent of its length. Dorsal profile arched with a steep rise from tip of snout to base of occipital process. Head flat, longer than broad, upper surface of head slightly rough, Snout rounded, anteriorly depressed. Mouth opening crescentic. Eyes oval, anteriorly placed. Median longitudinal groove on upper surface of head almost reaching base of occipital process. Occipital process long and reaching basal bone of dorsal fin. Teeth on palate and upper jaw in a continuous crescentic band and on lower jaw in two mesially interrupted deeply curved bands, all teeth villiform.

Four pairs of barbels : one pair maxillary reaching middle of pectoral fins, one pair nasal reaching middle of eye, one pair outer mandibular reaching halfway between posterior border of eye and origin of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a moderately strong spine; outer surface smooth, inner surface finely serrated. Adipose dorsal fin short, with a long inter-space between the two fins. Pectoral fins with six branched rays and a strong spine; outer surface of spine serrated, inner surface having ten strong teeth. Pelvic fins reaching anal fin. Anal fin comparatively longer. Caudal fin deeply forked, Caudal peduncle slightly constricted in the middle.

Colour : Dark brownish above becoming lighter beneath. Adipose dorsal fin black and all rayed fins dark.

Distribution : MYANMAR : Sittang river enar Toungoo, Yangon,

Remarks : It is noteworthy that this is the only species of *Mystus* in which the outer surface of pectoral spine is finely serrated. This species is endemic to Myanmar and is close to *M. pelusius* differing from it in having shorter maxillary barbels and pectoral spine serration as cited.

***Mystus pelusius* (Solander)**
(Figure 20)

1794. *Silurus pelusius* Solander IN : Russell's *Nat. Hist. Aleppo* 2 : 210, pl. VII, fig. 1 (type locality Aleppo, Syria).
1840. *Bagrus halepensis* Valenciennes IN : Cuvier & Valenciennes, *Hist. Nat. Poiss.* 14 : 413 (brief description).

1843. *Bagrus halepensis*, Heckel IN : *Russeger's Reisen in Europa, Asien und Africa* 1 : 1091, Pl. XII, fig. 2.
1864. *Macrones aleppensis*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 75 (description of one of the typical specimens from Russell's collection; Coic river, Aleppo. Replacement name for *B. halepensis* Valenciennes 1840. Correct name *Macrones pelusius* indicated).
1883. *Hypselobagrus aleppensis*, Lorret, *Arch. Mus. Hist. Nat. Lyon* 3 (Antioche, Syria).
1931. *Macrones aleppensis*, Gruvel, *Richesses marines et fluviales Paris* (Aleppo, Syria).
1943. *Macrones aleppensis*, Kosswig & Battalgil, *Suswasserfishee Compte rendu et archives Soc. Turque Sci. Phys. Nat.* (Halep, Mossul, Antakya, Turkey).
1949. *Macrones halepensis*, Berg. *Trav. Inst. zool. Acad. Sci. U.R.S.S.* 8 : 4 (Aleppo, Syria).
1961. *Mystus pelusius*, Khalif, *The Marine and Freshw. Fish Iraq* : 54 (synonymy, local name, description and inter-relationship).
1962. *Mystus pelusius*, Mahdi, *Fish. Iraq* 43 (synonymy, local name and description).
1966. *Mystus pelusius pelusius*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1974. *Mystus pelusius*, Jayaram, *Rev. Suisse Zool.* 81(4) : 787 (synonymy, description, Syria in rivers and lakes).
1979. *Mystus pelusius*, Coad, *J. Bombay Nat. Hist. Soc.* 76(1) : 97 (Diyala river, Iran).
1984. *Mystus pelusius*, Jayaram and Anuradha, *Bull. Zool. Surv. India* 6(1-3) : 291 (synonymy).
1985. *Mystus pelusius*, Anuradha and Jayaram, *Bull. Zool. Surv. India* 7(1) : 107, figs 1 & 2 (designation of type species discussed, description, Euphrates and Tigris rivers in Syria, Iran and Iraq).
1986. *Mystus misrai* Anuradha, *Rev. Suisse Zool.* 93(2) : 292, figs. 1 & 2 (type locality Lake Antioche, Syria).
1986. *Mystus pelusius*, Anuradha, *Rev. Suisse Zool.* 93(2) : 291 (relationship with *M. misrai* discussed).
1994. *Mystus pelusius*, Roberts, *Ichthyol. Explor. Freshwaters* 5(3) : 243 (diagnosis; *M. misrai* synonymised).

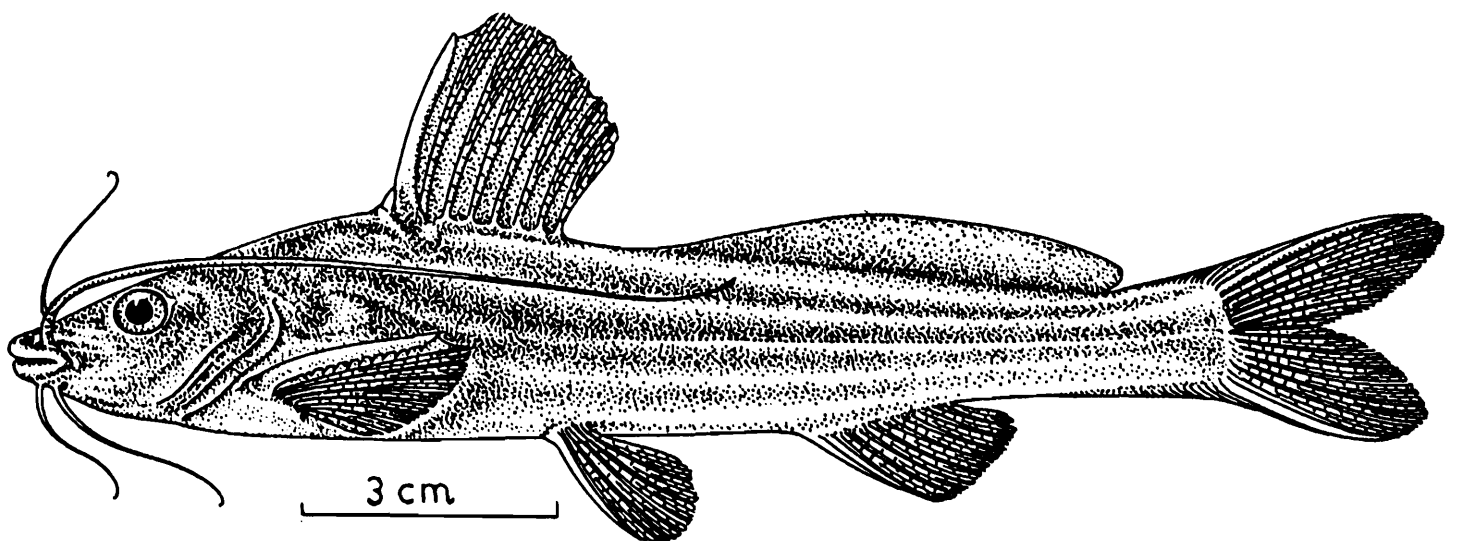


Fig 20. Lateral view drawing of *Mystus pelusius* (Solander).

Specimens studied : Three exs. 142.8-171.2 mm SL in total as below :

ZSI unreg. one ex. 142.8 mm SL Euphrates-Faluga 16.4.1973. ZSI unreg. one ex. 164.3 mm SL tigris, Baghdad 6.11.1965 (albino specimen). ZSI unreg. one ex. 171.2 mm SL Euphrates-Faluga 16.4.1973 (lean specimen).

Description : D. I, 7; P. I, 8; V. i, 5; A. ii, 8-9; C. 7+8.

Body depth 19.3 (17.9-20.7), head length 21.5 (21.4-21.6), width of head 16.2 (15.8-16.5), dorsal spine length 19.7 (17.7-22.0), pre-dorsal length 35.2 (33.4-36.3), post-dorsal length 69.9 (68.8-71.4), length of anal fin base 13.2 (12.4-14.2) all in percent of standard length. Eye 20.6 (18.9-21.8), inter-orbital width 29.1 (28.1-29.6), dorsal spine length 90.5 (82.0-97.8), length of snout 44.2 (42.7-45.3), gape of mouth 53.8 (50.8-55.7), length of dorsal fin base 62.7 (56.9-68.7), length of anal fin base 61.7 (57.6-66.1), length of caudal peduncle 84.2 (78.7-87.7), height of caudal peduncle 38.3 (37.4-38.8) all in percent of head length. Adipose dorsal fin base 34.3 (31.8-38.0) in percent of anal fin base. Snout length 65.9 (63.2-69.5) in percent of inter-orbital width. Least depth of caudal peduncle 32.3 (29.5-34.0) in percent of its length.

Dorsal profile rising gently from tip of snout to base of rayed dorsal fin. Eyes of moderate size, situated at center of head and with free orbital margins. Snout obtusely rounded. Lips thin, lower lip studded with four to six sensory pores on either side of lower jaw. Mouth sub-terminal, gape of mouth not extending to orbit. Median longitudinal groove on head as a long single fontanel, nearly reaching base of supra-occipital process. Occipital process reaching basal bone of dorsal fin and 4.5 times as long as broad. Cleithral process exposed and rugose, half as long as pectoral spine. Upper jaw slightly longer, jaws and palate with villiform teeth; teeth on palate in a semi-lunar uninterrupted band, on lower jaw in a moderately curved or angular band, mesially interrupted on upper jaw in a slightly curved continuous band. All teeth villiform.

Four pairs of barbels : one pair maxillary reaching not beyond pelvic fins, one pair nasal reaching slightly beyond posterior margin of eye, one pair outer mandibular extending up to half of pectoral fins and one pair inner mandibular extending to opercle.

Dorsal fin with a strong spine. Rayed dorsal fin inserted in anterior half of head, above tip of pectoral spine. Dorsal spine smooth on outer edge and rough on inner edge. Adipose dorsal fin commencing immediately after rayed dorsal fin with a short inter-space, smooth, high in posterior part, ending much above anal fin but not reaching caudal fin. Pectoral fins with eight branched rays and a spine stronger than dorsal spine, serrated along inner margin with 14-18 antrorse teeth. Pectoral fins not reaching pelvic fins. Pelvic and anal fins short, not reaching caudal fin. Caudal fin deeply forked with equal lobes.

Colour : Pale brown over body, fins and ventral surface lighter in colour. Occipital crest, head shield and cleithral process slightly rugose. One example 164.3 mm SL from Baghdad Museum is pale white with the head slightly brownish in colour. A black spot at base of

dorsal spine is also in this specimen. In all the three specimens examined a dark shoulder spot is visible.

Distribution : IRAQ : Euphrates and Tigris Rivers, Baghdad. IRAN : Diyala River, upper reaches of Tigris River at the Iran-Iraq border. SYRIA : Antioche, Coic River, Aleppo. TURKEY : Halep, Mossul and Antakya.

Mystus planiceps (Valenciennes)

1839. *Bagrus planiceps, anisurus* Valenciennes, *Hist. Nat. Poiss.* **14** : 421, 442 (type locality Java).
 1846. *Bagrus planiceps*, Bleeker, *Nat. Geneesk. Arch. Ned. Ind.* **3**(2) : 185 (diagnosis).
 1847. *Bagrus planiceps, B. anisurus*, Bleeker, *Verh. Bat. Gen.* **21**(1) : 135 (description, diagnosis, Java).
 1858. *Bagrus planiceps*, Bleeker, *Ichth. Arch. Indict. Prodr.* **1 Siluri** : 148 (synonymy, description, Java, Sumatra).
 1862. *Hemibagrus planiceps*, Bleeker, *Atlas Ichthyol.* **2** : 56, Pl. 71 (synonymy, local name, description, Java, Sumatra).
 1904. *Macrones planiceps*, Volz., *Rev. Suisse Zool.* **12** : 468 (Indragiri, Oberlangkar, Sungei Ruan in Sumatra).
 1913. *Macrones planiceps*, Weber and Beaufort, *Fish. Indo-Austral. Archipel.* **2** : 342 (synonymy, description, local name, Java, Borneo, Malacca in rivers).
 1934. *Mystus planiceps*, Smith, *J. Siam Soc. Nat. Soc. Nat. Hist. Suppl.* **9**(3) : 294 (Thailand).
 1937. *Mystus planiceps*, Fowler, *Proc. Acad. Nat. Sci. Philad.* **89** : 148 (Bangkok, Tachin, Rayong).
 1941. *Mystus planiceps*, Hora and Gupta, *Bull. Raffles Mus.* No. **17** : 27 (synonymy, distribution, Chenderok Lake, Perak, Kuala Tahan, Pahang, Johore).
 1945. *Mystus planiceps*, Smith, *Bull. U. S. Nat. Mus.* No. **188** : 387 (synonymy; Central Peninsular and south-eastern Thailand, Java, Sumatra).
 1954. *Mystus planiceps*, Jayaram, *Rec. Indian Mus.* **51**(4) : 553 (distribution).
 1966. *Mystus planiceps*, Jayaram, *Int. Rev. Ges. Hydrobiol.* **51**(3) : 446 (distribution).
 1971. *Mystus planiceps*, Jayaram, *Rec. zool. Surv. India*, **63** : 187 (osteological features).
 1975. *Mystus planiceps*, Desoutter, *Bull. Mus. Nat. Hist. Naturelle* No. **296** : 451 (description; enroute to Sianouk ville, Kampuchea).

Specimens studied : ZSI F 124/2 & 125/2, two exs. 95.1 & 114.0 mm SL Kwala Tahan, Pahang, F. M. S. Raffles Museum coll.

Description : D. I, 7; P. I, 9; V. i, 5; A. ii, 9-10; C. damaged.

Body depth 15.5 (14.9-16.0), head length 28.36 (28.32-28.40), width of head 18.99 (18.94-19.04), pre-dorsal length 41.1 (40.7-41.5), post-dorsal length 61.95 (61.93-61.96), length of anal fin base 14.0 (13.6-14.5) all in percent of standard length. Eye 24.95 (24.90-25.0), inter-orbital width 25.7 (25.62-25.73), length of snout 36.6 (36.1-37.0), gape of

mouth 59.6 (59.3-59.9), length of dorsal fin base 61.7 (60.2-63.3), length of anal fin base 49.6 (48.3-50.9), length of caudal peduncle 71.9 (70.9-72.8), height of caudal peduncle 29.4 (26.8-31.9) all in percent of head length. Adipose dorsal fin base 56.9 (56.1-57.7) in percent of anal fin base. Snout length 70.2 (69.2-71.3) in percent of inter-orbital width. Least depth of caudal peduncle 40.9 (36.9-45.0) in percent of its length.

Dorsal profile slightly elevated in front of dorsal fin and rising steadily from tip of snout to base of occipital process. Head flat, anteriorly depressed, longer than broad. Upper surface of head smooth. Snout spatulate. Mouth opening crescentic. Median longitudinal groove on dorsal surface of head almost reaching base of occipital process. Occipital process not reaching basal bone of dorsal fin. Teeth numerous and villiform in a broad, horse-shoe shaped curved band across palate and upper jaw; on lower jaw in two deeply mesially interrupted bands.

Four pairs of barbels : one pair maxillary reaching base of pelvic fins, one pair nasal reaching eye, one pair outer mandibular extending up to base of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a short spine, slightly serrated behind. Adipose dorsal fin short, its base almost equal to the length of base dorsal fin, the inter-space between the two almost equal to their base length. Pectoral fins with nine branched rays and a strong flattened spine, longer than dorsal spine and denticulated behind. Pelvic fins not reaching anal fin. Anal fin not reaching caudal fin. Caudal fin deeply forked, upper and lower lobes pointed.

Colour : Dark brownish on top, turning yellow beneath. Fins yellowish brown.

Distribution : BORNEO : Mahakam, Kapuas, Bongon Rivers, Sarawak, JAVA : Batavia, Perongkalong, Garut and Buitenzorg. SUMATRA : Singkarak Lake, Indragiri, Lahat, Trussan, Telokbetong, Pangabuang, Upper Lankt and Serdang.

Remarks : This species comes close to *M. nemurus* but can be differentiated by its shorter barbels, snout, broader occipital process and less rugose inter-orbital space.

Mystus pluriradiatus (Vaillant)

(Figure 21)

1890. *Macrones pluriradiatus* Vaillant, *Bull. Soc. Philom.* 4(8) : 126 (type locality Tonkin, Indo-China, Vietnam).
1904. *Macrones pluriradiatus* Vaillant, *Rech. Hist. Indo-China* 3 : 462, Pl. 23, fig. 2.
1950. *Macrones pluriradiatus*, Bertin and Esteve, *Cat. Type Poissins Mus. Nat. Hist. Paris* (5) (type specimen listed in catalogue).
1954. *Mystus pluriradiatus*, Jayaram, *Rec. Indian Mus.* 51(4) : 455 (name only).
1966. *Mystus pluriradiatus*, Jayaram, *Int. Rev. Ges. Hydrobiol* 51(3) : 446 (distribution).

1978. *Mystus pluriradiatus*, Jayaram, *Proc. Indian Acad. Sci.* 87(9) : 226 (description of holotype preserved in Paris Museum).

Specimen studied : MNHM 92-48 one ex. Holotype, Tonkin, Vietnam.

Description : D. I, 8; P. I, 8; V. i, 5; A. i, 9; C. 7+8.

Body depth 13.2, head length 26.5, width of head 19.6, dorsal spine length 11.4, pre-dorsal length 37.3, post-dorsal length 59.6, length of anal fin base 10.5 all in percent of standard length. Eye 15.9, inter-orbital width 29.6, dorsal spine length 43.2, gape of mouth 45.4, length of dorsal fin base 45.4, length of anal fin abse 39.8, length of caudal peduncle 72.7, height of caudal peduncle 31.8 all in percent of head length. Adipose dorsal fin base 39.8 in percent of anal fin base. Snout length 86.7 in percent of inter-orbital width. Least depth of caudal peduncle 43.8 in percent of its length.

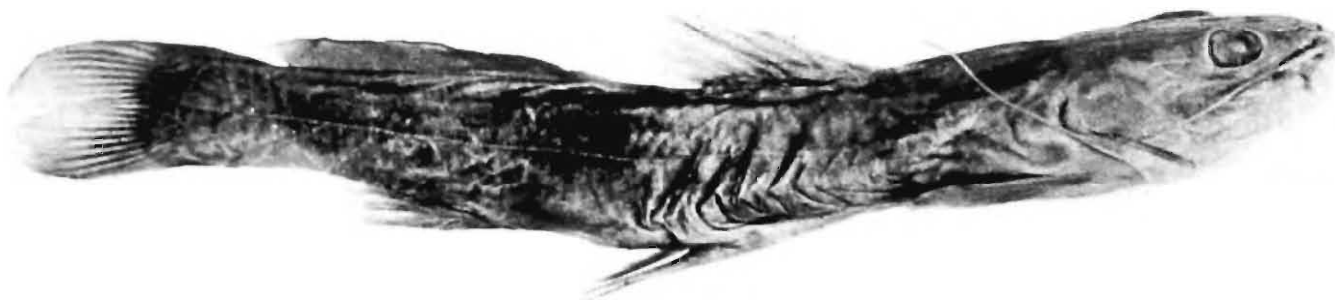


Fig 21. Photograph of Holotype MNHN 92-48 of *Mystus pluriradiatus* (Vaillant).

Dorsal profile rising gently from tip of snout to base of occipital process. Head flat, anteriorly depressed, longer than broad. Snout slightly produced. Mouth opening crescentic. Eyes small, not subcutaneous. Median longitudinal groove on dorsal surface of head shallow, not reaching base of occipital process. Occipital process subcutaneous, two times longer than broad at base, not extending to pre-dorsal plate. Pre-maxillary band of teeth six times as long as broad, teeth on palate in a continuous semi-lunar band and in two deeply curved mesially interrupted bands on lower jaw. All teeth villiform.

Four pairs of barbels : one pair maxillary reaching midway between origin of pelvic fin and pectoral fin, one pair nasal reaching anterior border of eye, one pair outer mandibular reaching base of pectoral fin and one pair inner mandibular up to bend of operculum on the ventral side.

Dorsal fin with a short smooth feeble spine. Adipose dorsal fin long, almost twice as long as the base of rayed dorsal. Pectoral fins with a strong spine with 12 antrorse teeth and eight branched rays. Pelvic fins do not reach anal fin. Anal fin does not reach caudal fin. Caudal fin forked, upper lobe slightly longer than, lower lobe. Caudal peduncle slightly constricted.

Colour : Dull brownish, head lighter. Ventral surface of body white. Adipose dorsal fin and caudal fin tinged dark brown.

Distribution : VIETNAM : Tonkin.

Remarks : The type locality is mentioned as "Tonkin : China. Jayaram (1978) stated on the basis of information from Dr. Wu Hsien-wen that Tonkin is an old name in the region of Vietnam and that "China" as mentioned in the original description is actually Indo-China, the present Vietnam. Northern Vietnam is drained by the Song Koi (= Red River) whose headwaters are in Yunnan, China. This species as such may be found in Chinese waters also, although records are lacking. *M. plurirdiatus* is close to *M. planiceps* but differs from it in having a longer adipose dorsal fin, slightly constricted caudal peduncle and a smooth feeble dorsal spine.

Mystus pulcher (Chaudhuri)
(Figure 22)

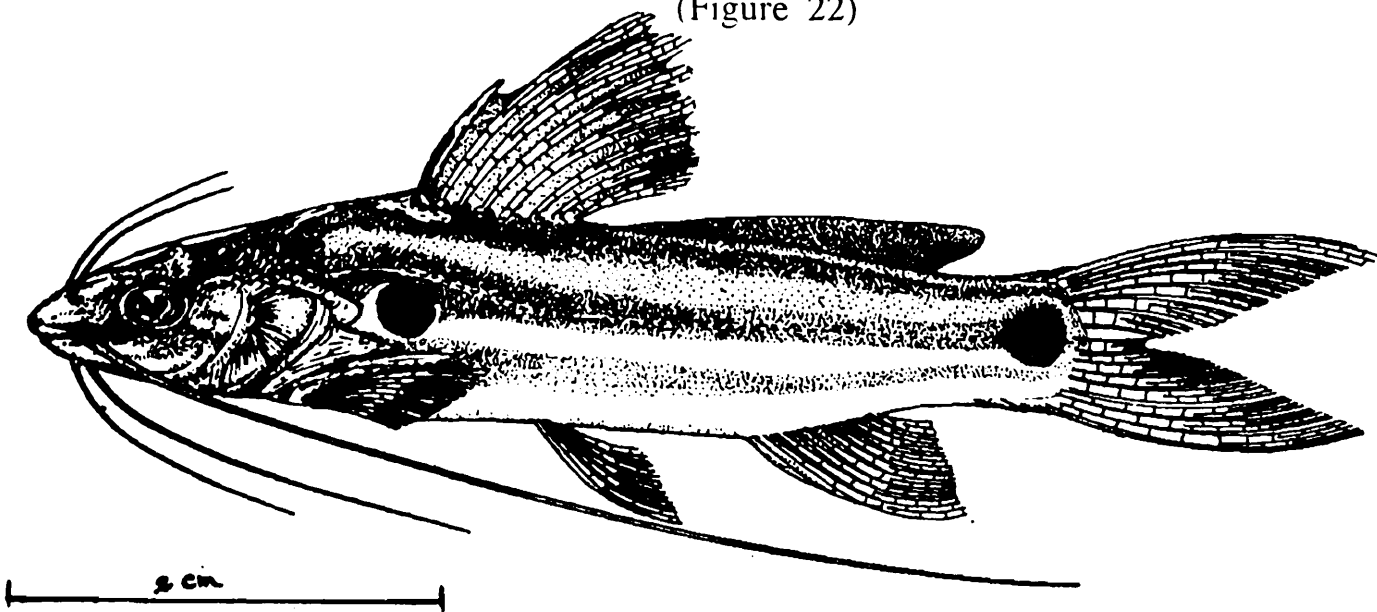


Fig 22. Lateral view drawing of *Mystus pulcher* (Chaudhuri).

1911. *Macrones pulcher* Chaudhuri, *Rec. Indian Mus.* 6 : 20, Pl. 1, fig. 4 (type locality Bhamo close to Yunnan border, Burma).
1928. *Aoria pulcher*, Nichols, *Bull. Amer. Mus. Nat. Hist.* 58 : 6 (synonymy, Yunnan).
1929. *Aoria pulcher*, Prashad and Mukerji, *Rec. Indian Mus.* 31 : 180 (small muddy streams along Kamaing Jade mines road in Myitkyina district, Burma).
1931. *Aoria pulcher*, Chu, *Biol. Bull. St. John's Univ.* 77 (synonymy, Yunnan).
1943. *Aoria pulcher*, Nichols, *Freshw. Fish. China IN : Nat. Hist. Cent. Asia* 9 : 37 (synonymy, Bhamo close to Yunnan Border, Indawgyi Lake, Myitkyina district, Burma).
1954. *Mystus (Mystus) pulcher*, Jayaram, *Rec. Indian Mus.* 51(4) : 532 (synonymy, description; Bhamo close to Yunnan border, Indawgyi Lake, Myitkyiana district, Burma).
1966. *Mystus pulcher*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(4) : 446 (distribution).
1968. *Mystus pulcher*, Menon and Yazdani, *Rec. zool. Surv. India*, 61(1&2) : 126 (synonymy, syntypes; Bhamo, Upper Burma).

1977. *Mystus pulcher*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 28, fig. 28A (key, synonymy, diagnostic characters, fishery value).

Specimens studied : Four exs. 48.2-56.5 mm SL in total as below :

ZSI F 7407/1 one ex. 48.2 mm SL Myanoung town, Henzada, Burma, Sanitary commissioner coll. Burma. ZSI F 4713/1 one ex. 49.2 mm SL Bhamo, upper Burma J. Coggin Brown coll. 26.5.1910 ZSI F 10870/1 two exs. 53.5 & 56.5 mm SL Myitkyana district, Burma B. N. Chopra coll.

Descriptions : D. I, 7; P. I, 9; v. i, 5; A. ii, 9; C. 17.

Body depth 25.0 (20.9-28.2), head length 29.6 (28.7-30.8), body depth 25.0 (20.9-28.2), width of head 21.5 (17.4-23.4), dorsal spine length 13.0 (12.2-15.00). Pre-dorsal length 50.7 (41.7-74.2), post-dorsal length 61.3 (60.3-63.7), length of anal fin base 14.5 (12.7-15.6) all in percent of standard length. Eye 19.8 (19.0-21.6), inter-orbital width 35.7 (35.5-36.0), dorsal spine length 44.1 (39.7-52.5), pectoral spine length 68.5 (62.6-73.8), length of anal fin base 49.2 (41.4-54.6), length of caudal peduncle 61.4 (54.6-68.8), height of caudal peduncle 39.6 (37.4-42.5) all in percent of head length. Adipose dorsal fin base 53.2 (45.0-72.6) in percent of anal fin base. Snout length 94.7 (90.0-93.8) in percent of inter-orbital width. Least depth of caudal peduncle 64.0 (56.7-68.4) in percent of its length.

Dorsal profile arched, rising steadily from tip of snout to base of occipital process. Head small and compressed. Upper surface of head rough. Snout conical, upper jaw slightly longer than lower. Mouth anterior, terminal. Eyes prominent, placed anteriorly. Median longitudinal groove on dorsal surface of head broad, shallow, not reaching base of occipital process. Occipital process twice as long as broad at base and reaching basal bone of dorsal fin.

Teeth numerous, villiform, in an uninterrupted semi-lunar band across upper jaw and palate; lower jaw with a mesially interrupted band.

Four pairs of barbels : one pair maxillary reaching beyond anal fin, one pair nasal reaching base of occipital process, one pair outer mandibular extending beyond pectoral spine, one pair inner mandibular reaching half length of pectoral spine.

Dorsal fin with a short weak spine serrated on both sides. Adipose dorsal fin long, its base longer than anal fin base and inserted at a small inter-space from the rayed dorsal fin. Pectoral fin with nine branched rays and a strong spine longer than dorsal having 8-11 retrorse teeth on inner surface. Outer surface of pectoral spine slightly serrated. Pelvic fins not reaching anal fin. Anal fin short, not reaching caudal fin. Caudal fin bilobed, both lobes equal in length.

Colour : Brownish on top becoming lighter beneath. Two parallel whitish brown stripes run on either side of the body, one above and the other below lateral line. Upper stripe darker than lower. Two large prominent black spots present, one on shoulder and the other at the base of caudal fin.

Distribution : MYANMAR : Bhamo close to Yunnan border. Indawgyi Lake, Myitkyina district. CHINA : Yunnan.

Remarks : This species resembles *M. bleekeri* to some extent but can be clearly distinguished from it due to the presence of prominent caudal and shoulder spots and the equal caudal lobes, whereas in *M. bleekeri* sometimes only a shoulder spot may be present and the upper lobe of the caudal fin is longer than the lower. It is interesting to observe that *M. pulcher* is more confined to Myanmar and has been recorded from Yunnan and not from Thailand or Malaya.

Mystus punctatus (Jerdon)
(Figure 23)

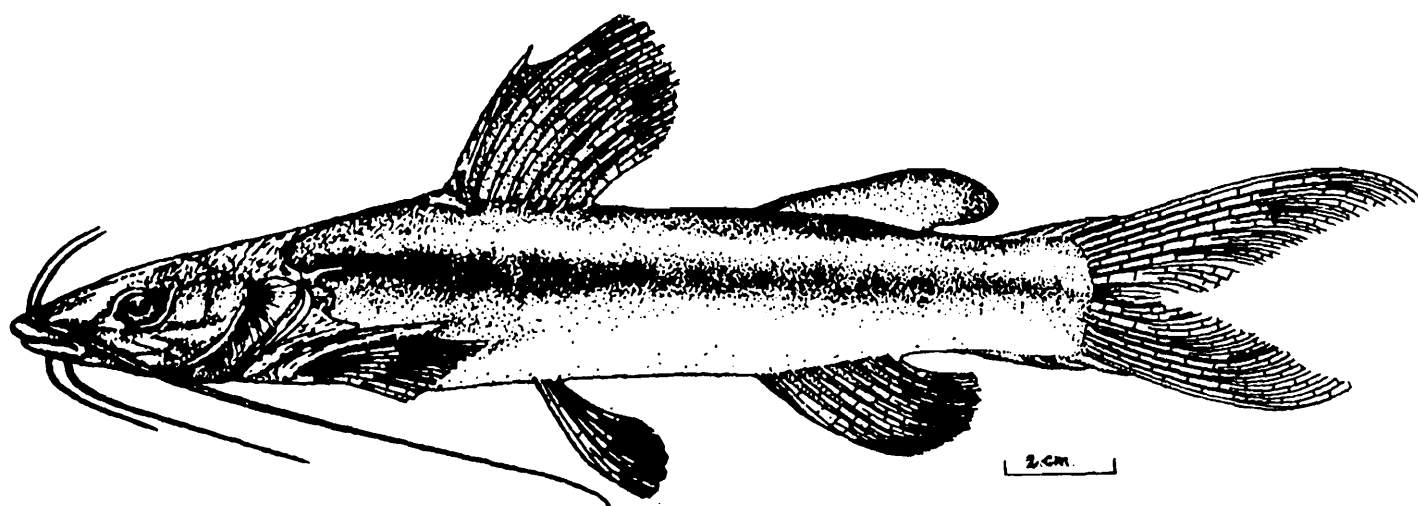


Fig 23. Lateral view drawing of *Mystus punctatus* (Jerdon).

1849. *Bagrus punctatus* Jerdon, *Madras J. Lit. Sci.* 15(2) : 330 (type locality Cauvery river, Western Ghats).
1877. *Macrones punctatus*, Day, *Fish. India* : 445, Pl. 100, fig. 3 (local names, synonymy, description, Bhavani river, Nilgiri hills).
1889. *Macrones punctatus*, Day, *Fauna Brit. India Fish* 1 : 153 (synonymy, local name, description and distribution).
1931. *Aoria punctatus*, Mukerji, *J. Bombay Nat. Hist. Soc.* 35(1) : 162 (synonymy, description, local name, Bhavani river, south India).
1937. *Mystus punctatus*, Hora, *Rec. Indian Mus.* 39 : 19 (Cauvery river, Coorg).
1942. *Mystus punctatus*, Hora, *Rec. Indian Mus.* 44 : 197 (Mysore and adjoining hill ranges).
1952. *Mystus punctatus*, Chacko, *Contrb. Freshw. Fish. Biol. St. Madras* No. 4 : 5 (Cauvery river, Mettur Dam).
1954. *Mystus punctatus*, Jayaram, *Rec. Indian Mus.* 51(4) : 547 (synonymy, description and distribution).

1954. *Mystus punctatus*, Chacko, Kuriyan and Thyagarajan, *Contrib. Freshw. Fish. Biol. Stn. Madras* No. 11 : 1-19 (Cauvery river).
1955. *Mystus punctatus*, Rajan, *J. Bombay Nat. Hist Soc.* 53(1) : 45 (synonymy, Bhavani river and Moyar river at Mangalapathi, South India).
1966. *Mystus punctatus*, Jayaram, *Int. Rev. Ges. Hydrobiol* 51(3) : 446 (name only, distribution).
1969. *Mystus punctatus*, Babu Rao and Chattopadhyay, *J. Bengal nat. Hist. Soc.* 35(2) : 89, Pl. 2, fig. 6 (description, discussion, key).
1977. *Mystus punctatus*, Jayaram, *J. Inl. Fish. Soc. India* 9: 87 (Tungabhadra reservoir).
1977. *Mystus punctatus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 36, fig. 25A (key to species, synonymy, diagnostic characters, colour, distribution, size, fishery value).
1995. *Mystus punctatus*, Shaji and Easa, *J. Zool. Soc. Kerala* 5(1&2) : 33 (Nulpuzha, Wayanad).

Specimens studied : Four exs. 120.8-196.8 mm in SL as below.

ZSI F 12403/1 one ex. 120.8 mm SL Cauvery river, Coorg, C. R. Narayan Rao coll. ZSI F 499 one ex. 128.3 mm SL Bhavani River, Tamil Nadu, purchased from F. Day. ZSI 426 one ex. 171.1 mm SL Bombay, purchased from F. Day. ZSI F. 11138/1 one ex. 196.8 mm Bhavani River, south India, R. W. Burton coll.

Description : D. I, 7; P. I, 9; V. i, 5; A. ii-iii, 7-9; C. 7+8.

Body depth 12.9 (11.3-15.6), head length 20.4 (26.8-29.5), width of head 19.9 (19.0-21.0), pre-dorsal length 42.1 (41.0-42.7), post-dorsal length 54.6 (42.7-59.4), length of anal fin base 14.4 (13.5-25.5) all in percent of standard length. Eye 16.2 (14.0-17.3), inter-orbital width 31.2 (30.8-31.7), dorsal spine length 45.3 (38.2-51.9), pectoral spine length 60.8 (53.1-68.1), length of snout 36.6 (36.0-37.3), gape of mouth 50.4 (49.8-51.1), length of dorsal fin base 51.7 (50.8-58.9), length of anal fin base 63.0 (57.3-65.7), length of caudal peduncle 63.0 (57.3-65.7), height of caudal peduncle 36.3 (32.5-39.7) all in percent of head length. Adipose dorsal fin base 91.3 (77.9-102.0) in percent of anal fin base. Snout length 85.3 (82.5-87.0) in percent of inter-orbital width. Least depth of caudal peduncle 57.8 (49.5-62.7) in percent of its length.

Dorsal profile almost straight, rising slowly from tip of snout to base of occipital process. Head flat, dorso-ventrally depressed. Snout broad and not overhanging, upper jaw longer than lower. Occipital process indistinct, long and narrow and covered by thick skin. A short inter-space present between occipital process and basal bone of dorsal fin. Median longitudinal groove on head broad, reaching halfway between eyes and base of occipital process. Teeth villiform, numerous in an uninterrupted semi-lunar band across upper jaw and palate, lower jaw with a row of mesially interrupted band of villiform teeth.

Four pairs of barbels : one pair maxillary extending up to pelvic fins, one pair nasal reaching posterior border of eye, one pair inner mandibular extending midway from snout to origin of pectoral fins, one pair outer mandibular extending up to pectoral fins.

Dorsal fin inserted vertically above end of pectoral fins with a spine with four or five serrations anteriorly towards the tip along the inner edge. Outer surface of dorsal spine smooth. Adipose dorsal fin short with a long inter-space between the two dorsal fins. Pectoral fins with nine branched rays and a strong spine with 12-16 retrorse teeth along inner border. Pelvic fins do not reach anal fin. Anal fin short, not reaching caudal fin. Caudal peduncle broad. Caudal fin deeply forked, upper lobe longer.

Colour : Light yellowish brown. About 10-13 dark rounded spots along lateral line present.

Distribution : INDIA : Cauvery River system in south India up to Bhavani River in Tamil Nadu. Also in rivers in Mysore, Western Ghats and adjoining hills ranges.

Remarks : Jerdon (1849) described this species from specimens collected from Cauvery river, Western Ghats. No pinpoint locality was given. Day in 1865 considered this fish as belonging to the genus *Hemibagrus*, perhaps in view of the depressed head. However in 1873, he transferred the species to the genus *Macrones* = *Mystus* and described it from specimens from the Bhavani River. Subsequent records of this species indicate that it is confined only to the Cauvery watershed. Jayaram (1977) stated that this species is found in the Tungabhadra reservoir which is an error. *M. punctatus* comes close to *M. menoda* from which it can be distinguished by the presence of 10-13 prominent, dark rounded spots along the lateral line.

Mystus rhegma Fowler

1935. *Mystus rhegma* Fowler, *Proc. Acad. Nat. Sci. Philad.* 87 : 102, fig. 27 (type locality Bangkok).

1992. *Mystus rhegma*, Roberts, *Ichthyol. Explor. Freshwaters* 3 : 85, fig. 4 (Bangkok, Mekong).

1994. *Mystus rhegma*, Roberts, *Ichthyol. Explor. Freshwaters* 5(3) : 251, fig. 4 (diagnosis).

Specimen studied : No specimen seen by us.

Description : Differs from all other *Mystus sensu stricto* by its strongly demarcated narrow, bold, lateral, longitudinal dark stripe straddling the lateral line and in having the base of the outer mandibular barbel inserted slightly behind rather than in front of a line vertical of posterior margin of the labial rictus. Other characters are adipose fin relatively short, originating at a distance of about one eye diameter posterior to dorsal fin and extending only a short distance on to caudal peduncle. Gill rakers 19-22, vertebrae 22-23 or 18-20 = 40-43 (after Roberts, 1992).

Distribution : THAILAND : Bangkok, Mekong River, Chao, Phraya near Chinat. CAMBODIA : Lower Mekong.

Remarks : Roberts (1992) resurrected this species from the synonymy of *M. cavasius*.

Mystus rufescens (Vinciguerra)

1890. *Mystus rufescens* Vinciguerra, *Ann. Mus. Stor. Nat. Genova* 9(2) : 98 Pl. 7, fig. 2 (type locality Meetan, Houngarau, Burma).
1910. *Mystus bleekeri* var. *burmanicus* Jenkins, *Rec. Indian Mus.* 51 : 138 (type locality Burma, *nomen nudum*).
1954. *Mystus rufescens*, Jayaram, *Rec. Indian Mus.* 51(4) : 552 (synonymy and distribution).
1966. *Mystus rufescens*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1977. *Mystus rufescens*, Jayaram, *Rec. zool. Surv. India, Occ. Papers No. 8* : 27 (key, synonymy, diagnostic characters and fishery value).
1994. *Mystus rufescens*, Roberts, *Ichthyol. Explor. Freshwaters* 5(3), fig. 4 (diagnosis).

Specimen studied : No specimen seen by us.

Description : This species differs from most other species of *Mystus sensu stricto* in having a large triangular mid-peduncular spot. Maxillary barbels extend posteriorly to anal fin origin. Gill rakers 13-20, vertebrae 40-42 (after Roberts, 1992).

Colour : Formalin preserved specimens are overall brownish with snout also of same colour. Nuchal spot at dorsal fin base extremely faint, virtually absent.

Distribution : MYANMAR : Irrawaddy, Sittang and lower Salween River basins.

Remarks : This species has a close resemblance to *M. bleekeri* but differs in colouration and meristic characters. The shoulder spot and longitudinal stripes are not so bold in this species as in *M. bleekeri*. Further in *M. bleekeri* the triangular dark mark at base of caudal fin (peduncular mark) is absent whereas it is seen in *M. rufescens*. The gill raker count is also 11-15 in *M. bleekeri* versus 13-20 in *M. rufescens*.

Mystus sabanus Inger and Chin
(Figure 24)

1959. *Mystus sabanus* Inger & Chin, *Fieldiana Zool.* 39 : 294 (type locality Deramakot Kinabatangan district, North Borneo).
1962. *Mystus sabanus*, Inger & Kong, *Fieldiana Zool.* 45 : 137 (description, Kinabatangan River at Deramakot, Kinabatangan district, below mouth of Sungei Malubok. Segama River at Segama estate, Lahad Datu district, Borneo).
1966. *Mystus sabanus*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).

Specimen studied : C 22, one ex. 77.8 mm SL ACC 4405 coll. Borneo.

Description : D. I, 7; P. I, 9; V. i, 5; A. iv, 8; C. damaged.

Body depth 22.9, head length 26.5, width of head 18.5, dorsal spine length 14.8, pre-

dorsal length 41.6, post-dorsal length 50.5, length of anal fin base 15.3 all in percent of standard length. Eye 24.8, inter-orbital width 34.9, dorsal spine length 55.8, length of snout 36.0, gape of mouth 36.9, length of dorsal fin base 56.3, length of anal fin base 57.8, length of caudal peduncle 70.9, height of caudal peduncle 38.3 all in percent of head length. Adipose dorsal fin base 41.6 in percent of anal fin base. Snout length 94.7 in percent of inter-orbital width, least depth of caudal peduncle 54.1 in percent of its length.

Dorsal profile rising steadily from tip of snout to base of occipital process. Head flat, broader than long and rugose. Snout slightly prominent. Mouth opening crescentic. Median longitudinal groove on head short, not extending up to base of occipital process. Occipital process slender and reaches basal bone of dorsal fin. Teeth, villiform, numerous and in a slightly curved continuous band across upper jaw; lower jaw with a deeply curved mesially interrupted band and a semi-lunar continuous band on the vomer.

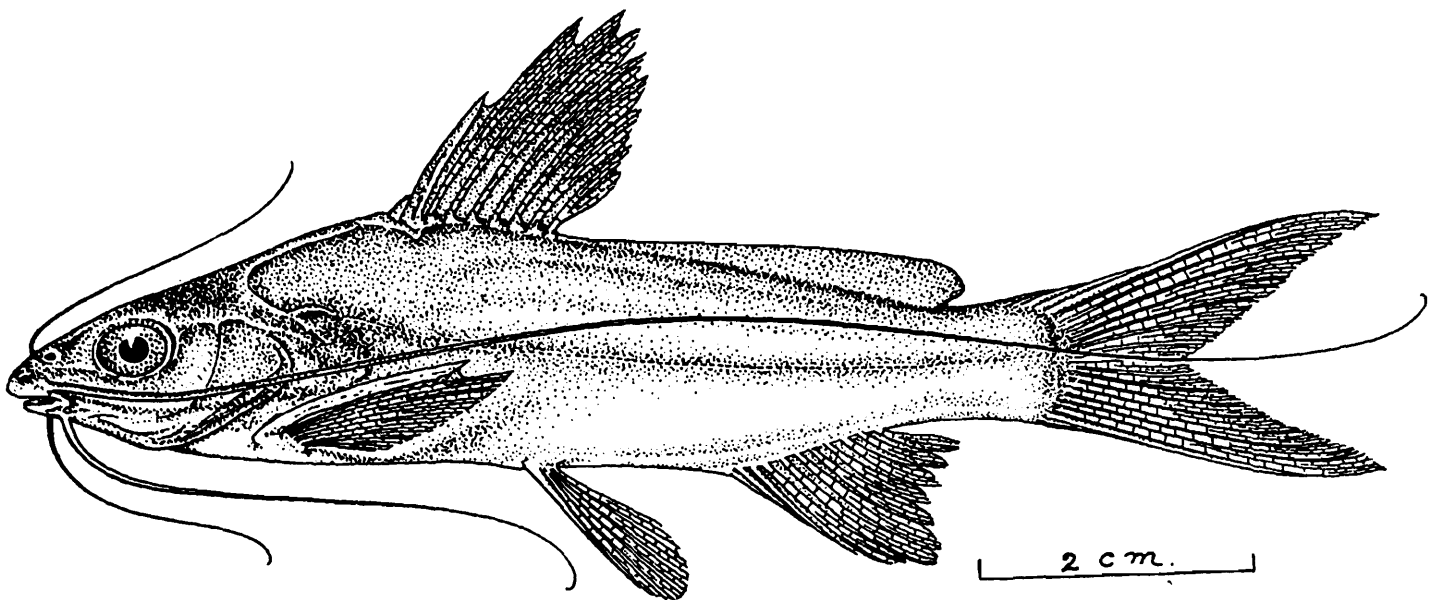


Fig 24. Lateral view drawing of specimen C.22 from ROM *Mystus sabanus* Inger & Chin.

Four pairs of barbels : One pair maxillary reaching the base of caudal fin; one pair nasal extending beyond eye, almost reaching end of preopercle; one pair inner mandibular reaching origin of pectoral fins; one pair outer mandibular extending to end of pectoral fins.

Dorsal fin inserted vertically above end of pectoral fin with seven branched rays and a slender spine, almost half as long as head and finely serrated behind, smooth on outer surface. Adipose dorsal fin extremely long, beginning almost immediately behind dorsal fin and is about one-third the standard length. Pectoral fin not reaching pelvic fins with nine branched rays and a strong spine longer than dorsal with 11 strong retrorse teeth. Pelvic fins not reaching anal fin. Anal fin not reaching caudal fin. Caudal peduncle broad. Caudal fin deeply forked; both lobes equal.

Colour : Pale yellowish brown, light below and a dark shoulder spot. dorsal, anal and caudal fins dusky, pectoral and pelvic fins colourless.

Distribution : BORNEO : Kinabatangan River, Deramakot, Kinabatangan district, Segama River at Sagama estate, Lahad Datu district.

Remarks : Inger and Chin (1959) described this species from North Borneo but subsequent records of this species do not appear to be extensive. It seems to co-exist with *M. cavasius* in the island of Borneo.

The species is close to *M. cavasius* in possessing very long adipose dorsal fin and maxillary barbels, but it can be separated by the absence of a dark spot on the basal bone of the dorsal fin and a short median longitudinal groove which does not extend up to the base of occipital process as in *M. cavasius*.

Mystus singaringan (Bleeker)

1846. *Bagrus macronemus, singaringan, heterurus* Bleeker, *Nat. Geneesk. Arch. Ned. Ind.* 3 : 150, 151 (type locality Batavia in fluvis).

1994. *Mystus singaringan*, Roberts, *Ichthyol. Explor. Freshwaters* 5(3) : 252, fig. 6 (diagnosis, see for synonymy).

Specimens studied : No specimen seen by us.

Description : This species is distinguished from other *Mystus sensu stricto* by having the colour uniform (gray to brown in life without stripe or marks) together with moderately high count of gill rakers (18-25 on first gill arch) and vertebrae 42-45.

Distribution : LAOS, CAMBODIA, VIETNAM and THAILAND : Mekong, Bangpakong, Chao Phrya, Meklong, Tapi and Patani basins. PENINSULAR MALAYSIA : Pahang, Perak and Johore. SUMATRA, BORNEO and JAVA : most largely basins.

Remarks : Bleeker (1846) described *Bagrus macronemus*, *B. singaringan* and *B. heterurus* all from Batavia. In 1862 he considered all the three as conspecific and referred them as *Hypselobagrus macronema*. As stated by Roberts (1994 : 253) *Bagrus macronemus* Bleeker 1846 is a junior primary homonym of *Bagrus macronemus* Ranzani 1842 = *Bagrus bagre* (Linnaeus, 1766), a ariid catfish of Neotropical waters. As per Art. 52(C), 60 of ICZN a junior primary homonym is permanently invalid and is to be replaced by the available oldest synonym. In the case of *Bagrus macronemus* Bleeker as stated already two other synonyms *B. singaringan* (p. 150) and *B. heterurus* (p. 151) are available. On the basis of page priority *B. singaringan* replaces *B. macronemus*. Roberts (1994) also as first reviser proposed this change.

Mystus tengara (Hamilton-Buchanan)
(Figure 25)

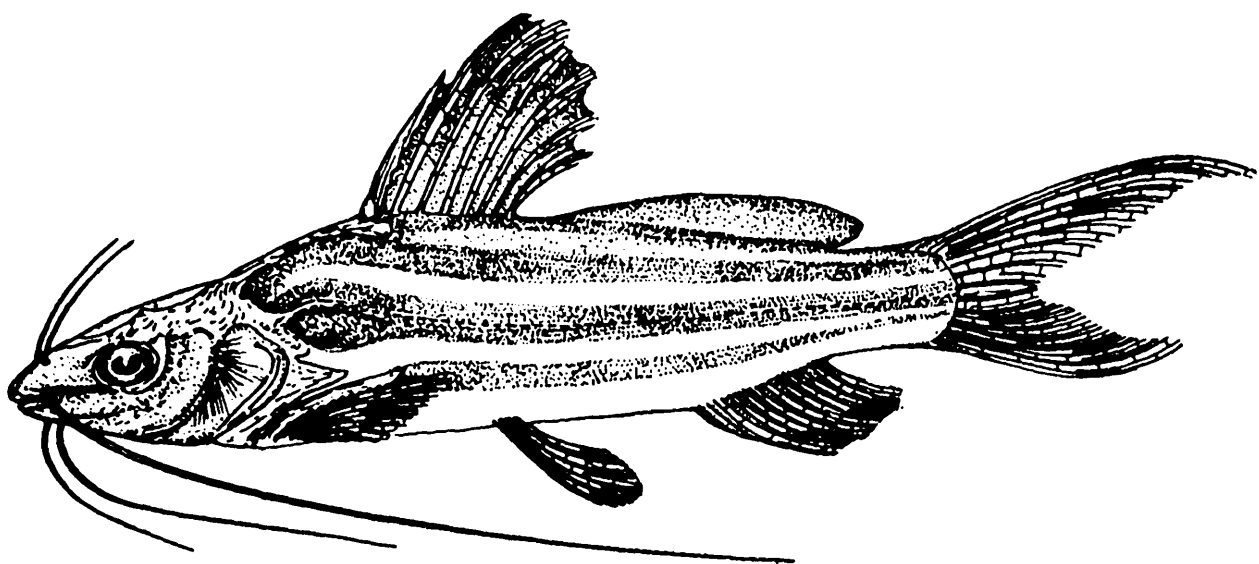


Fig 25. Lateral view drawing of *Mystus tengara* (Hamilton-Buchanan).

1822. *Pimelodus carcio* Hamilton-Buchanan, *Fish. Ganges* : 181 (type locality parts of Bengal).
1822. *Pimelodus tengara* Hamilton-Buchanan : 183, Pl. 3, fig. 61 (description, northern parts of Bengal).
1853. *Bagrus carcio*, Bleeker, *Verh. Bat. Gen.* 25 : 29 (record of Cantor from Jhelum river, cited as *Bagrus tengara*, synonymy; Hooghly river, Calcutta, Bengal, Jhelum and Narmada rivers).
1859. *Bagrus tengara*, Bleeker, *Act. Soc. Sci. Indi-Neerl.* 6 : 257 (synonymy, local names, Calcutta, Bengal, Punjab).
1860. *Bagrus tengara*, Blyth, *J. Asiat. Soc. Bengal* 29 : 149 (description; Tenasserim, Burma).
1864. *Macrones tengara*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 81 (synonymy, description; Sikkim, Khasi hills, Calcutta, Madras, Sri Lanka and Java).
1865. *Hypselobagrus tengara*, Bleeker, *Ned. Tijdschr. Dierk.* 2 : 33 (Thailand).
1865. *Hypselobagrus tengara*, Day, *Fish Malabar* : 189 (description; seas and estuaries of India and Sri Lanka).
1865. *Macrones tengara*, Day, *Proc. Zool. Soc. London* : 289 (brief description; Cochin, Malabar coast of India).
1877. *Macrones tengara*, Day, *Fish India* : 447, Pl. 101, fig. 5 (synonymy, local name, description; Northern India, Punjab and Assam).
1889. *Macrones tengara*, Day, *Fauna Brit. India Fish* 1 : 156 (synonymy, local name, description, distribution).
1929. *Pimelodus carcio*, Hora, *Mem. Indian Mus.* 9 : 187 (manuscript drawing in ASB collection indicated as IV 22, No. 191 in British Museum, Natural History, London).
1934. *Mystus tengara*, Smith, *J. Nat. Hist. Soc. Siam* 9(3) : 294-295 (synonymy, local name, description).

1940. *Mystus tengara*, Hora, *Rec. Indian Mus.* **42**(2) : 366 (biweekly market at Sihawa, Dhamtari bazaar, Mahanadi river, Orissa).
1948. *Pimelodus cacio tengara*, Hora, *Rec. Indian Mus.* **46** : 70, Nos. 32 and 33 (considered as synonym of *Mystus vittatus*, India, Sri Lanka, Burma and Thailand).
1951. *Mystus tengara*, Menon, *Proc. Nat. Inst. Sci. India* **17**(6) : 480 (Eastern Ghats).
1954. *Mystus (Mystus) tengara*, Jayaram, *Rec. Indian Mus.* **51**(4) : 538 (synonymy, description and distribution).
1964. *Mystus tengara*, Bhuiyan, *J. Asiat. Soc. Pakistan* No. **13** : 60 (synonymy, description, habitat, fishing gears, economic importance; East Pakistan, Punjab, North India, Assam).
1966. *Mystus tengara*, Jayaram, *Int. Rev. Ges. Hydrobiol* **51**(3) : 446 (distribution).
1970. *Mystus tengara*, Sen, Dasgupta and Rama Rao, *Seafood Export J.* **2**(1) : 3 (local and English names; Calcutta).
1972. *Mystus tengara*, Menon, Rama Rao and Sen, *Sci. & Cult.* **38** : 5 (Hooghly river at Pulta stretch).
1973. *Mystus tengara*, Mirza and Kashmiri, *Biologia* **19**(1&2) : 180 (Soan river at Kahnn, Rawalpindi district, Pakistan).
1974. *Mystus tengara*, Aatur Rahman, *Freshw. Fish. Res. Stn. Chandpur Bull No.* **1** (local name; Bangladesh).
1974. *Mystus tengara*, Aatur Rahman, *Bangladesh J. Zool.* **2**(1) : 4 fig. 1B (key, checklist, synonymy, local name, distinguishing features, description, Bangladesh).
1974. *Mystus tengara*, Mirza and Ahmad, *Biologia* **20**(1) : 100 (Dera Ismail Khan district, N. W. F. P. Pakistan).
1975. *Mystus tengara*, Asghar Basir and Mirza, *Bull. Hydrobiol. Res. Gordon College Ser. 1* No. **9** : 101 (Kanganpur, Pakistan).
1975. *Mystus tengara*, Tahi Omer and Mirza, *Biologia* **21**(2) : 208 (Tarbela, Pakistan).
1975. *Mystus tengara*, Mirza, *Bijdr. Dierk.* **45**(2) : 172 (status, distribution table).
1976. *Mystus tengara*, Sriwastawa and Venkateswarlu, *Indian J. Zootomy* **17**(3) : 182 (local name; plains of U. P.).
1976. *Mystus tengara*, Mirza, *Biologia* **22**(1) : 117 (common names, northern Montane and submontane regions of Pakistan).
1976. *Mystus tengara*, Jayaram and Majumdar, *Rec. zool. Surv. India*, **69** : 308 (below Hirakud dam and Mahanadi at Narsinghpur, Mahanadi at Chandrapur, M. P.)
1977. *Mystus tengara*, Jayaram and Singh, *Rec. zool. Surv. India*, **72** : 263 (synonymy, distribution; confluence of Tengen river with Mahananda river, Teesta river, Bagdogra fish market, Khoribari fish market).
1977. *Mystus tengara*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No* **8** : 23 (key, synonymy, diagnostic characters, size, fishery value and distribution).
1978. *Mystus tengara*, Sadiq and Mirza, *Pakistan J. zool.* **10**(2) : 300 (head tounsa and Sahiban canal, Pakistan).
1980. *Mystus tengara*, Mirza, *Proc. I Pakistan Congr. zool.* : 25 (synonymy, N. W. F. P., Punjab, Sind, Pakistan).

1981. *Mystus tengara*, Coad, *Nat. Mus. Canada Publ. zool.* No. 14 : 15 (synonymy, Kabul river, Afghanistan).
1982. *Mystus tengara*, Mirza, *Fish Lahore* : 29 (key, synonymy, description and distribution).
1984. *Mystus tengara*, Venkateswarlu, *Rec. zool. Surv. India, Occ. Paper No.* 56 : 21 (common and vernacular names).
1986. *Mystus tengara*, Sharma and Rajput, *J. Bombay Nat. Hist. Soc.* 83 : 566 (Bijnor district, U. P.).
1995. *Mystus tengara*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No.* 160 : 97 (Krishna River system).

Specimens studied : 32 exs. 36.8-67.9 mm SL in total as below :

ZSI F 1930/2 one ex. 36.8 mm SL Ext. F. B. No. 17, Pulta Survey. ZSI F 1435 one ex. 44.3 mm SL Punjab, purchased F. Day. ZSI F 2596/2 one ex. 45.9 mm SL Tezpur fish market, Assam, B. Prashad and S. L. Hora coll. ZSI F 4388/1 one ex. 49.9 mm SL Gandak river, Saran district, Bihar, M. Mackenzie coll. ZSI F 4568/1 one ex. 55.1 mm SL Hordi khair, Saran district, Bihar, M. Mackenzie coll. ZSI F 4587/1 one ex. 55.6 mm SL Jharai River, Saran district, Bihar, M. Mackenzie coll. ZSI F 2661 one ex. 59.7 mm SL Assam, purchased F. Day. ZSI F 4398/1 one ex. 60.5 mm SL Gandak river, Saran district, Bihar, M. Mackenzie coll. ZSI F 13150/1 one ex. 64.3 mm SL biweekly market at Sihawa, Bihar, H. S. Rao coll. 13.12.1939. ZSI F 3784/1 one ex. 67.8 mm SL Jharia river, Sirpur, Bihar. ZSI F 7668/1 one ex. 50.7 mm SL Bhagmati river, Champaran, Bihar. M. Mackenzie coll. ZSI F 7669/1 one ex. 52.5 mm SL Bhagmati river, Champaran, Bihar, M. Mackenzie coll. ZSI F 3785/1 one ex. 67.9 mm SL Jharia river, Bihar, M. Mackenzie coll. ZSI unreg. eight exs. 46.6-67.8 mm SL Dhamtari Bazaar, catch reported from Mahanadi river. ZSI unreg. six exs. 41.2-66.2 mm SL Sibsagar, Assam, S. K. Pal coll. ZSI unreg. five exs. 37.1-59.8 mm SL Ganges river, Bhagalpur.

Description : D. I, 7; P. I, 8; V. i, 5; A. ii-iii, 9-10; C. 7+8.

Body depth 24.8 (22.0-30.2), head length 28.9 (25.4-31.5), width of head 20.9 (19.8-21.8), dorsal spine length 16.6 (14.6-18.7), pre-dorsal length 45.5 (42.3-47.5), post-dorsal length 61.5 (57.5-65.6), length of anal fin base 15.4 (13.8-18.2) all in percent of standard length. Eye 24.4 (22.0-28.4), inter-orbital width 36.2 (31.9-39.7), dorsal spine length 57.0 (49.1-61.9), length of snout 34.9 (31.3-39.0), gape of mouth 42.9 (41.1-48.6), length of dorsal fin base 56.3 (45.7-62.3), length of anal fin abse 53.1 (47.7-63.1), length of caudal peduncle 61.8 (53.4-66.7), height of caudal peduncle 39.8 (32.4-43.1) all in percent of head length. Adipose dorsal fin base 48.3 (39.9-58.3) in percent of anal fin base. Snout length 93.7 (79.3-98.6) in percent of inter-orbital width. Least depth of caudal peduncle 62.7 (55.1-68.3) in percent of its length.

Dorsal profile arched, rising steeply from tip of snout to base of occipital process. Head small, compressed. Snout obtuse, upper jaw slightly longer. Eyes rounded. Upper surface of head rough. Median longitudinal groove on upper surface of head reaches base of occipital process. Occipital process long, narrow, reaching basal bone of dorsal fin. Teeth

numerous and villiform with three to five rows on palate and five or six rows on upper jaw; a mesially interrupted band across lower jaw.

Four pairs of barbels : one pair maxillary extending up to base of pelvic fins; one pair nasal reaching anterior end of opercle, one pair outer mandibular reaching base of pectoral fins and one pair inner mandibular shorter.

Dorsal fin with a strong spine, outer surface smooth, inner surface finely serrated towards tip. Adipose dorsal fin fairly long but with a prominent inter-space from rayed dorsal fin. Pectoral fin with eight branched rays and a strong spine, outer surface smooth, inner surface with 8-10 retrorse teeth. Pelvic fins not reaching anal fin. Anal fin not reaching caudal fin. Caudal fin forked, upper lobe longer.

Colour : Brownish or light brown on top turning dull yellow on sides and beneath. About five parallel longitudinal stripes on either side of body present. Sometimes a dark shoulder spot may also be seen.

Distribution : Widely distributed in INDIA, PAKISTAN, BANGLADESH, SRI LANKA, THAILAND, MYANMAR and JAVA.

Remarks : *Mystus tengara* comes close to *M. vittatus* in having longitudinal stripes on the body and shorter adipose dorsal fin. However, its longer median longitudinal groove and the longitudinal stripes on the body not so prominent as in *M. vittatus* can differentiate it. Moreover, the head and body of *M. tengara* are low and long unlike in *M. vittatus* where it is short. From the point of distribution it may be said *M. tengara* is more a species of north India whereas *M. vittatus* is mainly from the southern parts of India.

Mystus vittatus (Bloch)

(Figure 26)

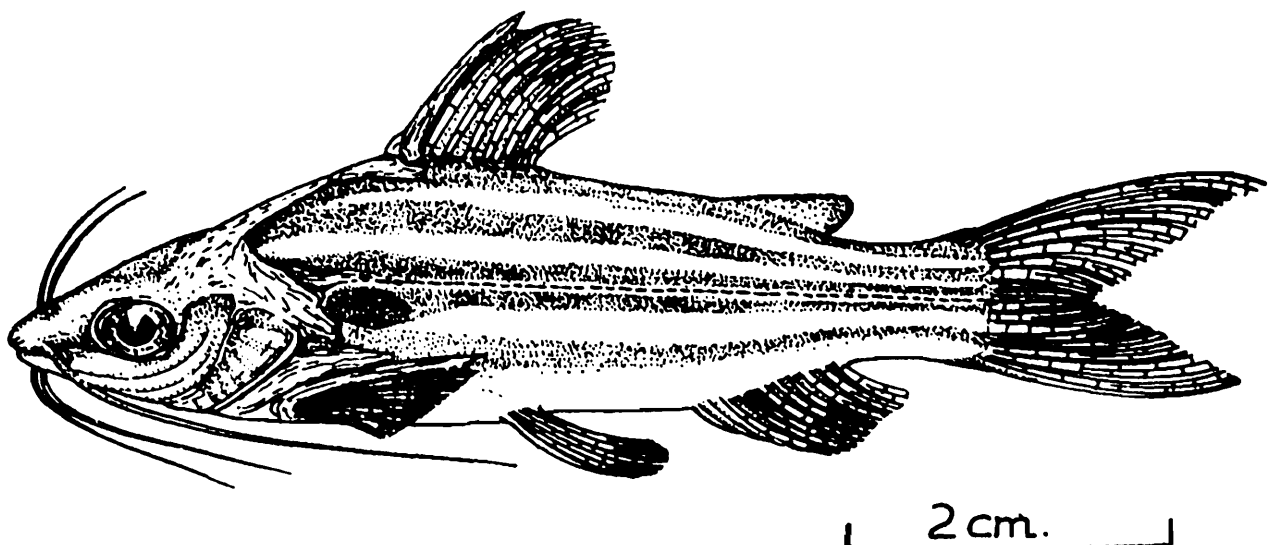


Fig 26. Lateral view drawing of *Mystus vittatus* (Bloch).

1797. *Silurus vittatus* Bloch, *Ichthyol. Hist. Nat.* 11 : 40, Pl. 371, fig. 2 (type locality Tranquebar, south India).
1839. *Bagrus vittatus*, Valenciennes, *Hist. Nat. Poiss.* 14 : 413 (brief description, Tranquebar, south India).
1849. *Bagrus vittatus*, Jerdon, *Madras J. Lit. Sci.* 15(2) : 338 (description, neighbourhood of Madras).
1853. *Bagrus vittatus*, Bleeker, *Verh. Bat. Gen.* 25 : 56 (synonymy, Tranquebar).
1877. *Macrones vittatus*, Day, *Fish India.* 448, Pls. 98 & 99, figs. 3 & 4 (synonymy, local names and description Ghont Sind, India, Assam, Burma, Siam and Ceylon).
1889. *Macrones vittatus*, Day, *Fauna Brit. India Fish* 1 : 157 (synonymy, local names, description and distribution).
1909. *Macrones vittatus*, Jenkins, *Rec. Indian Mus.* 3 : 280 (Sasthancottah Lake, Kerala).
1910. *Macrones vittatus*, Jenkins, *Rec. Indian Mus.* 5 : 135 (Satpara, Chilka Lake, Orissa).
1913. *Macrones vittatus*, Chaudhuri, *Rec. Indian Mus.* 8 : 255 (Satpara, Chilka Lake, Orissa).
1916. *Macrones vittatus*, Raj. *Rec. Indian Mus.* 12 : 250 (albinism, Cooum and Adyar rivers in Madras).
1923. *Macrones vittatus*, Hora, *Mem. Indian Mus.* 5 : 765 (main area of Chilka Lake).
1932. *Aoria vittatus*, Deraniyagala, *Spolia Zeylanica* 16(30) : 283 (local name, description, Ceylon).
1932. *Mystus vittatus*, Smith, *J. Nat. Hist. Soc. Siam* 9(3) : 294-295 (local name, Menam Chao Phya and Menam Bangpakong, Siam).
1937. *Mystus vittatus*, Fowler, *Proc. Acad. Nat. Sci. Philad.* 89 : 146 (Bangkok, Tachin Pitsanulok, Me Poon, Thailand).
1937. *Mystus vittatus*, Hora, *Rec. Indian Mus.* 39 : 10 (Cauvery river, Coorg, Karnataka).
1938. *Mystus vittatus*, Misra, *Rec. Indian Mus.* 40 : 256 (Nallamalai Hills, Tamil Nadu).
1938. *Mystus vittatus*, Shaw and Shebbeare, *J. Roy. Asiat. Soc. Bengal* 3 : 93, fig. 1 (Bengalee name 'Tengra' given, brief characterization, Terai and Duars).
1940. *Mystus vittatus*, Hora, *Rec. Indian Mus.* 42(2) : 366 (biweekly market at Sihawa, Dhamtari bazaar, M. P. catch reported from Mahanadi river).
1941. *Mystus vittatus*, Hora and Nair, *Rec. Indian Mus.* 43(3) : 366 (stream near Mehra village, Timarani nullah near Timarani Road, Midkal nullah, Sandia and Harda fish markets, Satpura range, Hoshangabad district, M. P.).
1941. *Mystus vittatus*, Hora and Gupta, *J. Asiat. Soc. Bengal Sci.* 6(2) : 78 (Kalimpong, Duars and Siliguri Terai, north Bengal).
1942. *Mystus vittatus*, Hora, *Rec. Indian Mus.* 44(2) : 197 (Mysore and adjoining hill ranges).
1943. *Mystus vittatus*, Ahmad, *Bull. Dept. Zool. Punjab Univ.* 1(5) : 324, fig. 33 (synonymy, local names, description, Ravi river, nullahs and ponds in Punjab).
1946. *Mystus vittatus*, Herre, *Spolia Zeylanica* 74(3) : 174 (Colombo and Peradeniya, Sri Lanka).
1951. *Mystus vittatus*, Menon, *Proc. Nat. Inst. Sci. India* 17(6) : 480 (Eastern Ghats).
1952. *Mystus vittatus*, Chacko, *Contrib. Freshw. Fish. Biol. Stn. Madras*, No. 4 : 8 (Sunkesula Anicut across Tungabhadra, Nellore and Sangam Anicuts, north Pennar, A. P.).

1952. *Mystus vittatus*, Silas, *Nat. Inst. Sci. India Bull.* No. 7 : 251 (Sri Lanka).
1954. *Mystus vittatus*, Jayaram, *Rec. Indian Mus.* 51(3) : 534 (synonymy, distribution).
1954. *Mystus vittatus*, Chacko, Kuriyan and Thyagarajan, *Contrib. Freshw. Fish. Biol. Stn. Madras*, No. 12 (Cauvery River).
1955. *Mystus vittatus*, Rajan, *J. Bombay Nat. Hist. Soc.* 53(1) : 45 (Bhavani River, South India).
1956. *Mystus vittatus*, David, *Proc. Nat. Inst. Sci. India* 22B(3) : 153 (Bhadra River at Bhadravathi, Mysore).
1957. *Mystus vittatus*, Motwani and David, *J. zool. Soc. India*, 9(1) (Sone River, Bihar).
1961. *Mystus vittatus*, Menon, *Rec. Indian Mus.* 59(4) : 381 (synonymy, distribution, Ponnaiyar River, Madukkarai, Usteri tank, south India).
1962. *Mystus vittatus*, Motwani, Jayaram and Sehgal, *Trop. Ecol.* 3(1&2) : 2 (Rudrasagar tank in Sibsagar, Nani river near Nowgong, Killing river near road bridge on Assam Trunk Road, Krishnai river near Krishnai-Gauhati road bridge, Brahmaputra river, Assam).
1962. *Mystus vittatus*, Karamchandani, *Trop. Ecol.* 3(1&2) : 80 (Ganga river at Dighwara, Bihar).
1964. *Mystus vittatus*, Bhuiyan, *Asiat. Soc. Pakistan Publ.* No. 13 : 61 (synonymy, local name, description).
1966. *Mystus vittatus vittatus*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1967. *Mystus vittatus*, Jayaram and Bhimachar, *Bull. Nat. Hist. Sci. India* 34 : 282 (osteological characters).
1969. *Mystus vittatus*, Babu Rao and Chattopadhyay, *J. Bengal Nat. Hist. Soc.* 35(2) : 89, Pl. 2, fig. 5, (key, description).
1970. *Mystus vittatus*, Sidhimunka, *Inld. Fish. Div. Fish Bangkok* : 14, Pl. 89 (Thai, local, English names, economic importance; Mekong River, Thailand).
1970. *Mystus vittatus*, Datta and Majumdar, *Rec. Zool. Surv. India* 62(1&2) : 70, Pl. 4, fig. 5 (Key; Rajasthan).
1971. *Mystus vittatus*, Islam and Siddiqi, *Biologia* 17(1) : 38 (synonymy, brief description and colour, Sarai Alamgir, Pakistan).
1972. *Mystus vittatus*, Menon, Rama Rao and Sen, *Sci. & Cult.* 38(5) (Hooghly River at Pulta stretch).
1974. *Mystus vittatus*, Aaur Rahman, *Bangladesh J. Zool.* 2(1) : 2 (key, checklist and synonymy, local name, distinguishing characters, description, osteological features, Bangladesh).
1974. *Mystus vittatus*, Aaur Rahman, *Freshw. Fish. Res. Sm. Chandpur Bull* No. 1 : 11 (local name; Bangladesh).
1975. *Mystus vittatus*, Dey, *J. Assam, Sci. Soc.* 8(1) : 4 (Pagladia river at Murikonaghat survey station and at Bijlighat survey station, Kamrup dist. Assam).
1975. *Mystus vittatus*, Mirza, *Bijdr. Dierk.* 45(2) : 161 (distribution).
1976. *Mystus vittatus*, Sriwastawa and Venkateswarlu, *Indian J. Zootomy* 17(3) : 182 (local name; plains of U. P.).
1976. *Mystus vittatus*, Jayaram and Majumdar, *Rec. Zool. Surv. India* 69 : 309 (below Hirakud dam, Cuttack, Raigarh in M. P.).

1976. *Mystus vittatus*, Venkateswarlu, *Acta Ichthyologica Piscatoria* **6** : 96 (synonymy, Poonpur river at Fatwah, Gowinchak, Pithbhans, Rajghat, Naneadeh, Godak river at Hazipur, Bihar).
1977. *Mystus vittatus*, Jayaram and Singh, *Rec. zool. Surv. India*, **72** : 263 (Siliguri).
1977. *Mystus vittatus*, Pillai and Yazdani, *Rec. Zool. Surv. India* **72** : 5 (synonymy, Garo hills, beel near Khamari village, Damra, Meghalaya).
1977. *Mystus vittatus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 8* : 26 (key, synonymy, diagnostic characters).
1978. *Mystus vittatus*, Sen, *Seafood Export J.* **10**(1) : 3 (local and English name, Assam).
1978. *Mystus vittatus*, Sadiq and Mirza, *Pakistan J. Zool.* **10**(2) : 299 (head Tounsa and Mankā canal, Pakistan).
1979. *Mystus vittatus*, Dutt and Sharma, *Mem. Soc. Zool. Guntur* **1** : 11 (diagnostic characters; central coastal Andhra Pradesh).
1980. *Mystus vittatus*, Mirza, *Proc. I Pakistan Congr. Zool.* : 25 (synonymy, Punjab, Sind).
1982. *Mystus vittatus*, Mirza, *Fishes of Lahore* : 29 (keys) : 31 (synonymy, colour and distribution).
1983. *Mystus vittatus*, Sharma and Dutt, *Rec. zool. Surv. India*, **81**(1&2) : 336 (synonymy, description, holotype re-examined. *M. tengara* and *M. carcio* considered synonyms of *M. vittatus*).
1984. *Mystus vittatus*, Venkateswarlu, *Rec. zool. Surv. India, Occ. Paper No. 56* : 21 (common and vernacular names).
1984. *Mystus vittatus*, Hussain and Tilak, *Rec. zool. Surv. India*, **81** : 275 (Faizabad, U. P.).
1986. *Mystus vittatus*, Sharma and Rajput, *J. Bombay Nat. Hist. Soc.* **83** : 566 (Bijnor dist., U. P.).
1987. *Macrones vittatus*, Johnsingh and Vickram, *J. Bombay Nat. Hist. Soc.* **84**(3) : 530 (Papanasam, Manimuthar Dams);
1988. *Mystus vittatus*, Barman, *Rec. zool. Surv. India, Occ. Paper No. 119* : 50 (Sonamura, West Tripura).
1991. *Mystus vittatus*, Pethiyagoda, *Freshwater Fishes of Sri Lanka* : 151 & 152 (photo of live specimen, Sri Lanka).
1992. *Mystus vittatus*, Rema Devi, *Rec. zool. Surv. India*, **92** : 207 (Keeripittamodai on Sengaltheri road Kalakad Wildlife Sanctuary).
1992. *Mystus vittatus*, Roberts, *Ichthyol. Explor. Freshwaters* **3**(1) : 81 (distribution confined to Indian subcontinent only).
1995. *Mystus vittatus*, Jayaram, *Rec. zool. Surv. India, Occ. Paper No. 160* : 97 (Krishna River system).
1997. *Mystus vittatus*, Mirza, *Biodiversity in Pakistan* : 330 (Indus, Kabul and Soan Rivers).

Specimens studied : 38 exs. 35.5-88.5 mm SL in total as below :

ZSI FF 117 one ex. 38.1 mm SL Jamuna river, Hilli, West Dinajpur. ZSI FF 118 one ex. 40.2 mm SL Jamuna river, Hilli, West Dinajpur. ZSI F 1616/2 one ex. 51.56 mm SL Hooghly river. ZSI F 2602/2 one ex. 55.5 mm SL West Dinajpur. ZSI F 1719/2 one ex 64.2 mm SL Chapanala, Balaghat, Madhya Pradesh. ZSI F 4479/2 one ex.. 66.5 mm SL Bhagirathi river, Purbasthali Ghat. ZSI F 1468/2 one ex. 70.8 mm no details. ZSI F 755/2 one ex. 72.9

mm SL Hooghly river near Nawadip Dak Bunglow. ZSI F 1369/2 four exs. 37.2-78.1 mm SL Poonniyar river south-east of Madukkarai, Pondicherry. ZSI F 2569/1 four exs. 79.2-87.9 mm SL Shasthancotta Lake, Travancore, N. Annandale coll. 8.11.1905. ZSI F 2570/1 four exs. 73.7-81.3 mm SL Travancore. ZSI F 2799/2 one ex. 84.0 mm SL Raxaul, Bihar. ZSI unreg. five exs. 35.5-38.7 mm SL narrow stream at Bogran village, one km from Karnajhora, West Dinajpur, A. K. Dutta and party coll. ZSI unreg. 10 exs. 39.8-76.5 mm SL river Vennar at its bifurcation from River Vettar at V. V. R. near Thenperambur village 15 km from Thanjavur town, K. C. Jayaram coll. 26.3.1973.

Description : D. I, 7; P. I, 8-9; V. i,-5; A. ii-iii, 7-10; C. 7+8.

Body depth 26.2 (20.8-31.8), head length 28.0 (24.7-30.4), width of head 19.9 (18.9-21.3), dorsal spine length 16.1 (12.0-22.0), pre-dorsal length 43.8 (38.1-49.3), post-dorsal length 62.7 (55.5-67.6), length of anal fin base 16.3 (12.2-24.1) all in percent of standard length. Eye 22.6 (19.1-26.8), inter-orbital width 37.5 (32.1-45.1), dorsal spine length 57.2 (45.4-72.9), length of snout 34.8 (30.8-36.0), gape of mouth 45.4 (38.9-53.9), length of dorsal fin base 58.0 (47.0-70.5), length of anal fin base 57.0 (49.2-71.8), length of caudal peduncle 63.1 (50.4-78.2), height of caudal peduncle 39.1 (33.9-46.1) all in percent of head length. Adipose dorsal fin base 55.0 (36.6-73.0) in percent of anal fin base. Snout length 90.0 (76.5-98.4) in percent of inter-orbital width. Least depth of caudal peduncle 65.8 (54.0-79.3) in percent of its length.

Dorsal profile arched with a steep rise from tip of snout to base of occipital process. Head small, compressed. Upper surface of head rough. Width of head almost equal to height of head at occiput. Snout rounded, upper jaw slightly longer than lower. Eyes oval. Median longitudinal groove on dorsal surface of head shallow and does not reach base of occipital process. Occipital process almost three times longer than its width at base and reaches the basal bone of dorsal fin. Teeth numerous, villiform, in an uninterrupted band across palate and upper jaw, in two deeply curved mesially interrupted bands on lower jaw.

Four pairs of barbels : one pair maxillary reaching base of pelvic fins, one pair nasal reaching end of opercle, one pair outer mandibular reaching a little distance beyond origin of pectoral fin and one pair inner mandibular shorter.

Dorsal fin with seven branched rays and a long spine with three to five serrations posteriorly in adult examples. Adipose dorsal fin short with a long inter-space from the rayed dorsal fin. Pectoral fin with eight or nine branched rays and a strong spine, outer surface smooth, inner surface with 15-16 retrorse teeth. Pelvic fin not reaching anal fin. Anal fin not reaching caudal fin. Caudal fin forked, upper lobe longer than lower.

Colour : Deep brownish on top becoming dull white beneath. Two parallel stripes on either side of lateral line present in adult as well as juvenile specimens. A dark shoulder spot may be present in a few.

Distribution : INDIA : Widely distributed throughout from Meghalaya, North Bengal,

Assam, Orissa, Bihar, Madhya Pradesh, Uttar Pradesh, Punjab, Haryana, Rajasthan, Andhra Pradesh, Kerala, Tamil Nadu and Karnataka. PAKISTAN : Sind, Sarai Alamgir, Tounsa and Manka canal. SRI LANKA : Colombo, Peradeniya. BANGLADESH : Chandipur. MYANMAR. THAILAND : Menam Chao Phya and Menam Bangpakong, Bangkok, Tachin, Pitsanulok, MePoon.

Remarks : *M. vittatus* and *M. tengara* are closely related and their exact identity has been in confusion. For a number of years these two species have been considered separate. It may be mentioned here that *M. tengara* is more a north Indian species unlike *M. vittatus*, which is mainly from the southern parts of India. Jayaram and Bhimachar (1967) examined these two species osteologically and treated them as separate. However Sharma and Dutt (1983) synonymised them. We have examined 38 specimens of *M. vittatus* and 32 of *M. tengara*. The median longitudinal groove in *M. vittatus* is short unlike in *M. tengara* where it is long. Moreover, the characteristic longitudinal stripes present in *M. vittatus* are not so prominent in *M. tengara*. Dorsal profile in *M. vittatus* is steeper, the head and body short unlike in *M. tengara* where it is low and long. Until and unless fresh examples of *M. tengara* are collected from the type locality in northern parts of Bengal and compared with *M. vittatus* it is preferable to keep the two separate.

Mystus wolffii (Bleeker)
(Figure 27)

1851. *Bagrus wolffii* Bleeker, *Nat. Tijdschr. Ned. Ind.* 1 : 205 (type locality Bandjermassing in fluvis).

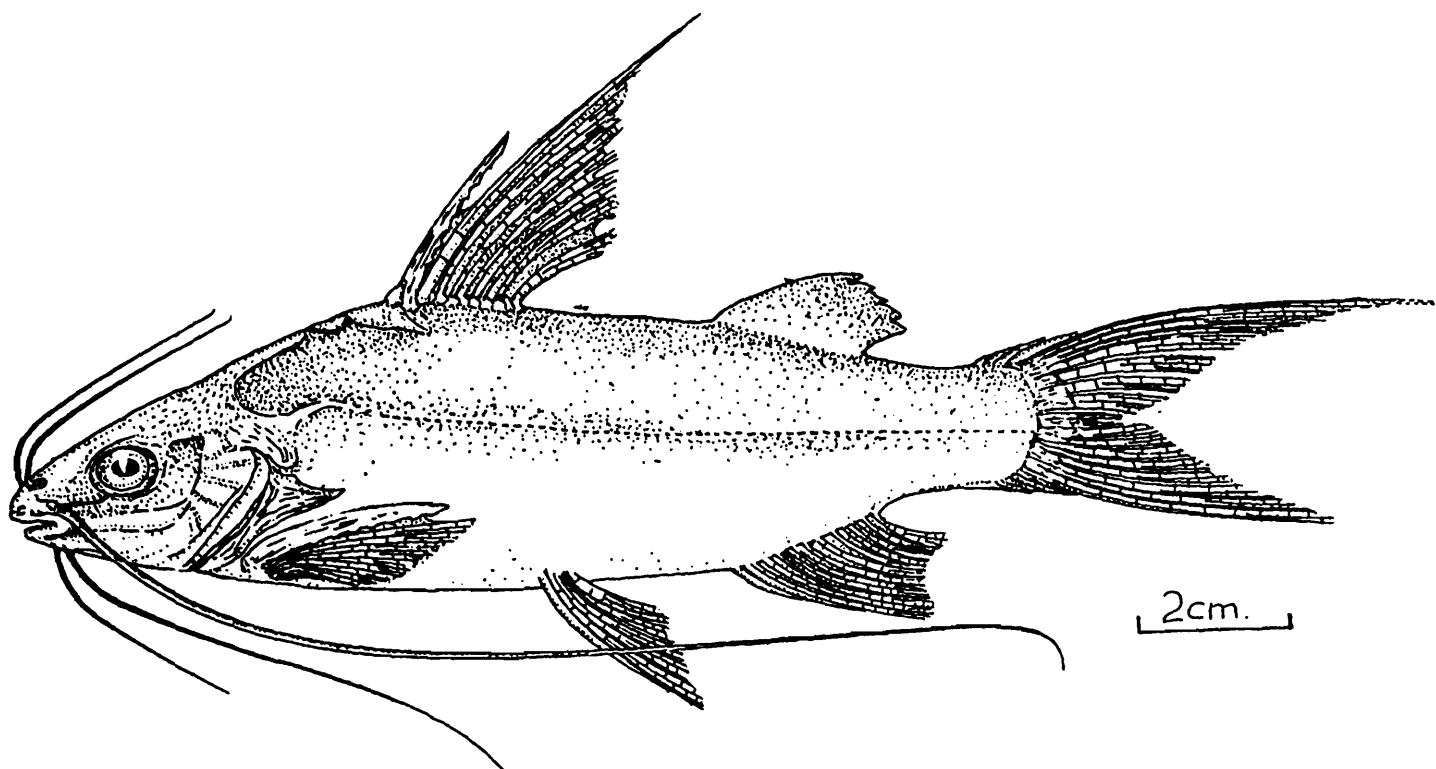


Fig 27. Lateral view drawing of *Mystus wolffii* (Bleeker).

1862. *Hypselobagrus wolffii*, Bleeker, *Atlas Ichthyol.* 1 : 58, Pl. 74, fig. 1 (description, synonymy, local names; Borneo and Sumatra).
1864. *Macrones wolffii*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 82 (synonymy, description, Borneo, Sumatra and Thailand).
1865. *Hypselobagrus wolffii*, Vinciguerra, *Ann. Mus. Stor. Nat. Genova* 16 : 171 (synonymy, Sumatra, Borneo and Thailand).
1913. *Macrones wolffii*, Weber and Beaufort, *Fish. Indo-Austral. Archipel.* 2 : 340 (synonymy, description, local name; Borneo, Thailand, Malacca in rivers).
1923. *Macrones wolffii*, Hora, *J. Nat. Hist. Soc. Siam* 6(2) : 171 (local name, Nontaburi, Siam).
1934. *Mystus wolffii*, Smith, *J. Siam Soc. Nat. Hist. Suppl.* 9(3) : 294 (Thailand).
1937. *Mystus wolffii*, Fowler, *Proc. Acad. Nat. Sci. Philad.* 89 : 148 (Bangkok, Pitsnulok, Tachin. Discussion on maxillary barbels).
1941. *Mystus wolffii*, Hora and Gupta, *Bull. Raffles Mus.* No. 17 : 28 (synonymy, record from Perak).
1945. *Mystus wolffii*, Smith, *Bull. U. S. Nat. Mus.* (188) : 383 (synonymy, Borneo, Sumatra and Thailand. Rivers Tachin. Tapi, lower Chao Phya, Lake Tale Sap, Gulf of Siam of Banghia river and Nakon Sritamarat off Pakpoon).
1954. *Mystus (Mystus) wolffii*, Jayaram, *Rec. Indian Mus.* 51(4) : 553 (synonymy and description).
1966. *Mystus wolffii*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1975. *Mystus wolffii*, Desoutter, *Bull. Mus. Nat. Hist. Naturelle* No. 296 : 447 (synonymy, description, Tonle Sap, Prektason, Cheng Chamias, Kampuchea).
1989. *Mystus wolffii*, Roberts, *Mem. Calif. Acad. Sci.* 14 : 126 (Western Borneo).

Specimens studied : Four exs. 72.5-131.2 mm SL in total as below :

ZSI F 10554/1 two exs. 72.5 & 123.0 mm SL Nontaburi, Dr. Malcom Smith coll. USNM 103173 one ex. 97.1 mm SL Menam Chao Phya, Paknam Central Thailand H. M. Smith coll. 10.9.1923. USNM 109584 one ex. 131.2 mm SL Gulf of Bandon Bight Pacific Thailand, H. M. Smith coll. 19.9.1923.

Description : D. I, 7; P. I, 9; V. i, 5; A. ii, 10-12; C. 7+8.

Body depth 26.1 (23.6-28.4), head length 24.7 (23.2-25.5), width of head 19.1 (18.5-19.7), dorsal spine length 18.8 (18.1-19.1), pre-dorsal length 42.0 (40.9-43.3), post-dorsal length 63.8 (63.1-64.3), length of anal fin base 17.5 (16.6-19.0) all in percent of standard length. Eye 24.5 (23.4-26.0), inter-orbital width 37.0 (34.3-37.9), dorsal spine length 76.8 (74.9-78.0), length of snout 35.8 (34.7-36.8), gape of mouth 50.0 (47.6-51.7), length of dorsal fin base 57.8 (53.7-62.2), length of anal fin base 70.7 (67.9-74.6), length of caudal peduncle 80.5 (75.3-85.1), height of caudal peduncle 46.8 (43.0-50.0) all in percent of head length. Adipose dorsal fin abse 78.9 (65.4-94.5) in percent of anal fin base. Snout length 94.3 (91.6-98.6) in percent of inter-orbital width. Least depth of caudal peduncle 58.3 (56.2-60.1) in percent of its length.

Dorsal profile rising steadily from tip of snout to base occipital process. Head conical, longer than broad. Upper surface of head rugose. Snout prominent. Mouth opening crescentic. Eyes situated anteriorly. Median longitudinal groove on upper surface of head almost reaching base of occipital process. Occipital process narrow, ending just in front of the elongated basal bone of dorsal fin. Teeth numerous and villiform, in a continuous curved band on palate and upper jaw, two deeply curved mesially interrupted bands on lower jaw.

Four pairs of barbels : one pair maxillary extending up to caudal fin, one pair nasal reaching base of occipital process, one pair outer mandibular reaching almost anal fin and one pair inner mandibular reaching almost pectoral fin origin.

Dorsal fin with seven branched rays and a moderately strong, flattened spine, outer rough, inner surface finely serrated. Adipose dorsal fin base almost equal to anal fin base and the inter-space between the two dorsal fins. Pectoral fins with nine branched rays and a strong spine longer than dorsal spine, with 10-17 strong teeth. Pelvic fins do not reach anal fin. Anal fin does not reach caudal fin. Caudal fin forked, bilobed.

Colour : In alcohol preserved specimens dark brownish on top, becoming lighter beneath. Nasal and maxillary barbels black, mandibular barbels white.

Distribution : THAILAND : Paknam, Gulf of Bandon Bight, Nontaburi. MALAYSIA : Malacca. BORNEO : Mahakam, Narito and Kapuas Rivers, Sarawak. SUMATRA : Palembang, Djambi, Rokari river.

Mystus wyckii (Bleeker)

(Figure 28)

1858. *Bagrus wyckii* Bleeker, *Ichth. Arch. Ind. Prodr.* 1, Siluri : 156 (type locality Java).

1862. *Hemibagrus wyckii*, Bleeker, *Atlas Ichth.* 2 : 57, Pl. 72 (synonymy, description, Java).

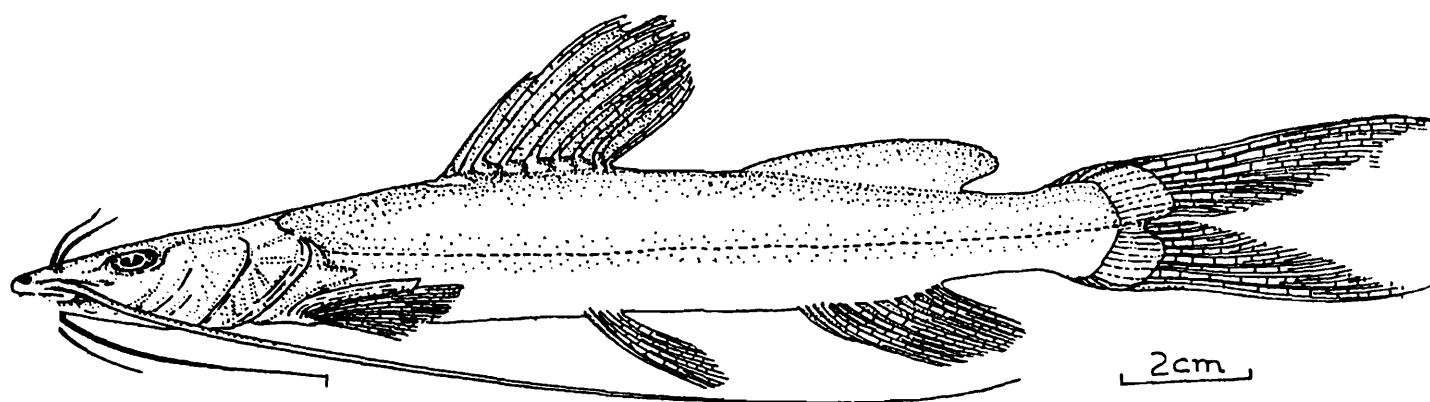


Fig 28. Lateral view drawing of *Mystus wyckii* (Bleeker).

1864. *Macrones wyckii*, Gunther, *Cat. Fish. Brit. Mus.* 5 : 83 (synonymy, description of the type from Bleeker's collection; Tjitarum river, Java).
1913. *Macrones wyckii*, Weber and Beaufort, *Fish Indo-Austral. Archipel.* 2 : 343 (synonymy, description, local names; Java and Sumatra in rivers).
1934. *Mystus wyckii*, Smith, *J. Siam Soc. Nat. Hist. Suppl.* 9(3) : 249 (Thailand).
1941. *Mystus wyckii*, Hora and Gupta, *Bull. Raffles Mus.* No. 17 : 28 (synonymy, distribution; record from Chenderoh Lake, Perak Malay Peninsula).
1945. *Mystus wyckii*, Smith, *Bull. U.S. Nat. Mus.* No. 188 : 388 (synonymy, brief description, local names; Meyom, upper Menam Chao Phya, Lophuri, Kanburi, Meping and Mechan rivers, Thailand).
1954. *Mystus (Mystus) wyckii*, Jayaram, *Rec. Indian Mus.* 51(4) : 553 (synonymy and distribution).
1966. *Mystus wyckii*, Jayaram, *Int. Rev. Ges. Hydrobiol.* 51(3) : 446 (distribution).
1970. *Mystus wyckii*, Sidthimunka, *Inld. Fish. Div. Dept. Fish Bangkok* : 14, Pl. 91 (Thai and English names, Mekong River, Thailand).
1975. *Mystus wyckii*, Desoutter, *Bull. Mus. Nat. Hist. Naturelle* No. 296, fig. 4 (description; Beng Cha Prek-Tuk-Kampot, Kampuchea. Comparison of types presented).
1989. *Mystus wyckii*, Roberts, *Mem. Calif. Acad. Sci.* 14 : 126 (Western Borneo).

Specimens studied : Three exs. 100.5, 117.9 & 398.5 mm SL in total as below :

USNM 109578 one ex. 100.5 mm SL Thailand, N. Mechem, 50 miles above mouth of tributary of Meping river, A. R. Buchanan coll. 23.1.1935. USNM 109579 one ex. 117.9 mm SL Thailand, N. Meping river at Chianmai, H. G. Deignan coll. 22.4.1935. USNM 103196 one ex. 398.5 mm SL Menam Chao Phya, Kohyal (Bangkok market), Thailand, H. M. Smith coll. 19.11.1929.

Description : D. I, 7; P. I, 9-11; V. i, 5; A. iii, 10; C. 7+8.

Body depth 12.8 (10.1-17.7), head length 30.2 (29.6-30.5), width of head 21.6 (20.5-23.3), dorsal spine length 43.6 (36.2-48.9), pre-dorsal length 43.7 (42.4-47.6), post-dorsal length 57.1 (52.5-59.8), length of anal fin base 13.1 (10.9-14.5) all in percent of standard length. Eye 12.2 (7.0-15.4), inter-orbital width 30.9 (29.9-32.3), dorsal spine length 43.6 (36.2-48.9), pectoral spine length 44.9 (44.1-45.6), length of snout 34.6 (33.8-35.2), gape of mouth 51.9 (46.5-54.8), length of dorsal fin base 43.6 (37.2-50.8), length of anal fin base 43.5 (35.0-49.0). length of caudal peduncle 35.4 (46.3-63.8), height of caudal peduncle 33.3 (26.5-46.3) all in percent of head length. Adipose dorsal fin base 65.5 (58.1-76.0) in percent of anal fin base. Snout length 89.3 (86.7-92.9) in percent of inter-orbital width. Least depth of caudal peduncle 49.9 (42.6-60.0) in percent of its length.

Dorsal profile almost straight with very little rise from tip of snout to base of occipital process. Head broad, flat and depressed. Snout bluntly rounded. Cleft of mouth not extending halfway to orbit. Median longitudinal groove on head prominent, reaching base of occipital process. Occipital process short, not extending up to basal bone of dorsal fin with a

considerable inter-space between the two. Teeth villiform and in broad bands on jaws and palate; a slightly curved continuous band on upper jaw and a deeply curved mesially interrupted band on lower jaw.

Four pairs of barbels : one pair maxillary reaching beyond dorsal fin, almost up to adipose dorsal fin, one pair nasal reaching outer margin of eye, one pair outer mandibular almost reaching origin of pectoral fin and one pair inner mandibular shorter.

Dorsal fin with seven branched rays and a long, flattened spine with is finely serrated behind. In the largest specimen 17 minute teeth are present on the inner side of dorsal spine. Adipose dorsal fin base longer than anal fin base or dorsal inter-dorsal distance and almost equal to length of dorsal fin base. Pectoral fins with 9-11 branched rays and a strong spine denticulated internally with 9 or 10 teeth and shorter than dorsal spine. Pelvic fins do not reach anal fin. Anal fin not reaching caudal fin. Caudal fin bifurcated with pointed lobes, upper lobe longer.

Colour : Head, body and all fins largely black but with well defined white markings on tips of pectoral and dorsal fins.

Distribution : THAILAND : Mekong, Menam Chap Phya, Lopburi, Kanburi, Meping and Mechan rivers. MALAYSIA : Chenderoh Lake, Perak. CAMBODIA : Beng Cha Prek-tuk-Kampot. JAVA : Tijitarum River. SUMATRA.

Remarks : This species grows to a large size and it appears to be commercially important in Thailand from where it has been recorded extensively.

IX. ZOOGEOGRAPHY

Fishes of the genus *Mystus* comprises of 44 species distributed from Syria in West Asia through India, Borneo, South China, Kampuchea, Java, Malay Peninsula, Myanmar, Nepal, Pakistan, Sri Lanka, Sumatra, Thailand and Yunnan. The genus is absent in Japan, Manchuria and also from the African continent. The north-eastern limit in China seems to be the Yangtse-Kiang and records above this are doubtful. (see Jayaram, 1978). Amongst the 44 species 14 are found in the Indian sub-continent only, which is the largest number. Of these nine are endemic in India, four in Myanmar and one (*Mystus horai*) in Pakistan.

The type species of *M. pelusius* is the only one found in Syria. There are no species endemic to Sri Lanka. Two species, *M. olyroides* and *M. sabanus* are confined to Borneo. Considering the northern limit of distribution of the genus it is seen that only five are known to occur in China (see Jayaram 1978 for their systematic position). These are *M. amemiyae*, *M. argentivittatus*, *M. chinensis*, *M. elongatus*, *M. macropterus* and *M. pluriradiatus*. The areawise break up of all the 44 species is given below :

I. DISTRIBUTION WITHIN THE INDIAN REGION

(India, Pakistan, Nepal, Bangladesh and Sri Lanka)

- i. Species widely distributed all over India: *M. cavasius*, *M. gulio*, *M. tengara* and *M. vittatus*
- ii. Species confined only to Western Ghats: *M. keletius*, *M. krishnensis*, *M. malabaricus*, *M. maydeli*, *M. montanus*, *M. oculatus*, *M. punctatus*
- iii. Western Ghats and Eastern Himalaya : *M. armatus*
- iv. Peninsular India up to Mahanadi River : *M. bleekeri*, *M. tengara*
- v. Peninsular India up to Krishna River : *M. menoda*
- vi. Western ghats (including Tamil Nadu) and Sri Lanka : *M. keletius*
- II. MYANMAR ONLY : *M. peguensis*, *M. pulcher*, *M. rufescens*, *M. leucophasis*
- III. MYANMAR AND INDIA : *M. armatus*, *M. menoda*, *M. microphthalmus*
- IV. THAILAND AND CAMBODIA : *M. bocourti*, *M. rhegma*
- V. THAILAND ONLY : *M. albolineatus*, *M. atrifasciatus*, *M. multiradiatus*, *M. mysticetus*
- VI. THAILAND AND SUMATRA : Nil
- VII. THAILAND AND BORNEO : Nil
- VIII. THAILAND, JAVA, SUMATRA AND BORNEO : *M. nemurus*
- IX. THAILAND, JAVA, SUMATRA, BORNEO AND MALAYA : *M. nigriceps*
- X. JAVA ONLY : Nil
- XI. JAVA AND SUMATRA : Nil
- XII. JAVA AND BORNEO : Nil
- XIII. BORNEO AND SUMATRA : Nil
- XIV. BORNEO AND MALAYA : Nil
- XV. SUMATRA ONLY : *M. bimaculatus*
- XVI. CHINA ONLY : *M. anemiyae*, *M. argentivittatus*, *M. pluriradiatus*, *M. elongatus*, *M. chinensis* and *M. macropterus*

It is seen that four species *M. cavasius*, *M. gulio*, *M. tengara* and *M. vittatus* are rather widely distributed. *M. gulio* and *M. vittatus* are known to enter the sea within tidal limits. These are not considered for our discussion in view of their wide distribution. From the zoogeographical point only those which are discontinuously distributed are of interest. Also species which are confined to a particular area and locality, distributed in microclimatic zones are of added value. The above listed geographical grouping of the species and their affinities are discussed below :

Species found in the Indian subcontinent : Amongst the 14 species which are found within this region as already stated *M. cavasius*, *M. gulio*, *M. tengara* and *M. vittatus* are widely distributed. *M. keletius*, *M. krishnensis*, *M. malabaricus*, *M. maydelli*, *M. montanus*, *M. oculatus* and *M. punctatus* are confined (exception *M. keletius* also known from Sri Lanka) only to the Western Ghats. Of these seven species *M. montanus* has been recorded from Hoshangabad (Madhya Pradesh) in the Satpura range of hills, but has not been subsequently recorded; it is more prevalent in the Western Ghats extending south up to Coimbatore. *M. keletius* though known from Sri Lanka also is a species more common in the Western Ghats than in Sri Lanka. *M. oculatus* and *M. punctatus* are two species which are occasionally found in the plains of Tamil Nadu also. It is quite likely that these species are washed down during the monsoon floods originating from the Western Ghats and joining the major streams in Tamil Nadu. *M. malabaricus* is apparently a well-established species in the hill ranges in north Kerala. *M. krishnensis* is closely related to *M. maydelli* and may be the adult form of the latter as stated earlier. *M. krishnensis* is confined to Tungabhadra River of the Krishna River system whereas *M. maydelli* is found in the Bhima River, which is again a part of the Krishna drainage. *M. maydelli* is known so far by only one example (81.4 mm) whereas *M. krishnensis* is known by several adult examples ranging from 322.1-419.9 mm SL. As such considering the seven species it appears that *M. malabaricus* is the oldest of the lot that may have given rise to the other species.

A single species of *M. armatus* normally known from Western Ghats has been recorded from the Eastern Himalayas also. Five examples were brought to us (1985) from Manipur University for identification which proved to be *M. armatus*. A solitary adult specimen of this species from Myanmar (F. 11150/1) is also present in ZSI Calcutta. Though Jayaram (1954) doubted its occurrence in Myanmar the specimens from Manipur confirms its possible occurrence in the East.

M. microphthamus is confined to Eastern Himalaya only. This has been recorded from Manipur valley also (Singh, 1986). It is a derivative of the peninsular *M. montanus* like ancestor. This is an instance of discontinuous distribution of taxa in the Western Ghats and the Eastern Himalaya which has been discussed by Blanford (1872) and Hora (1937, 1944, 1949, 1949a). This aspect of distribution will be discussed later.

Three other species of *M. bleekeri*, *M. tengara* and *M. menoda* show a different pattern. These are found in most places in north India but they do not extend beyond the Krishna River system in the south. These also can be grouped as widely distributed although not so widely occurring as *M. cavasius*, *M. gulio*, and *M. vittatus*.

Species found in India and Sri Lanka : Three species *M. gulio*, *M. keletius* and *M. vittatus* are found in India and Sri Lanka. Of these *M. gulio* and *M. vittatus* are widely distributed and are known to enter the sea within tidal limits. *M. keletius* is found in Southern Western Ghats and is of localised distribution.

Extra Indian Species : It has already been stated that the Indian landmass has got the largest concentration of *Mystus* species. Considering the number of species of *Mystus* which are found outside the Indian landmass, we find that 22 species are found exclusively outside this area (XI-XIX in table). The break up of these species is given in Table 10. Amongst these it is seen that *M. peguensis*, *M. pulcher*, *M. rufescens* and *M. leucophasis* are endemic to Myanmar.

Chinese species : Jayaram (1978) discussed the systematic position of Chinese species and we have also elaborated and re-examined these species in the main text. Six species occur in China, which are *M. amemiyae*, *M. argentivittatus*, *M. chinensis*, *M. elongatus*, *M. macropterus* and *M. pluriraidatus*. We have examined three out of these and it may be stated that each one is unique in its own features. Further, excepting *M. chinensis* none of these species have been recorded subsequent to their first description. In some cases even the holotypes are not traceable nor are they represented in any World Museums. Jayaram (1978) considered these species as relicts and suggested that the genus itself may not occur in China. It appears that reproductively viable populations are diminishing in their normal range of distribution of these species due to several factors such as ecological incompatibility, changes in watersheds due to man made alterations etc. These species have become archaic and as suggested by Jayaram have yielded to better evolved species of the genus *Pelteobagrus* Bleeker (Jayaram, 1968). The above distribution pattern brings out three facts :

1. There are hardly any species, which have not traversed or migrated to adjacent areas, thereby indicating that they are all immigrants.
2. The East Indian group of islands is faunistically poor in respect of *Mystus* species.
3. There are some species, which show some affinity to the species of the Indian landmass.

We shall discuss the possible causes for such patterns.

Before we discuss the above three patterns of distribution it is worthwhile to recapitulate certain paleogeographic facts of the Indian landmass, which have played a major role in determining the biogeography of India.

During the middle of the Tertiary era the areas that are now Tibet and the Himalaya were covered by an extension of the Tethya Sea in which deposition of immense sediments had continued for a vast period of time. The peninsula of India was a compact natural unit since the Cambrian Period. The Tethya Sea separated Eurasia in the north and the Gondwana landmass in the south. The sedimentation of the Tethya Sea accumulated from the Paleozoic

Era and as a result of great orogenic movements separated by periods of relative quiescence, the submerged Himalayas were thrown to form a series of long parallel wave like folds even at that time.

Due to the tectonic plate movement the Southern Madagascar Gondwana landmass moved north-eastward and the northern Laurasia landmass advanced southwards, both of which thus squeezed the Tethyan geosyncline. The opposing fronts squeezed the soft contents of the Tethys sediments to form the east west Himalaya. Since however the southern Madagascar-Gondwana landmass was much narrower than the broad northern Laurasian mass, its advance in a conical form threw the sediments on either side into the north-south folds of Baluchistan and Myanmar. Laurasia over rode the Peninsular block and the latter also dived under Laurasia which led to the formation of Tibet, Assam, Myanmar, South China and other eastern countries as Vietnam, Laos, Cambodia etc. In this process of buckling and down warping, the peninsular rim fissured east west and through these areas of weakness the Deccan lava spewed forth. The same movements brought about the block fracturing of the western part of the peninsula and subsidence of the marine fragments into the Arabian Sea which has thus given rise to the scarps of the Western Ghats. This is one of the reasons that most Western Ghat ranges are table topped and are multi-tiered horizontally.

The formation of the Assam gateway, the rise of the Himalaya, the configuration of Peninsular mountain ranges, more or less in the form as they are now, represent the most important phases in the biogeographical evolution of India. The Assam gateway opened up extensive interchanges between the peninsular autochthonous and Asiatic Tertiary fauna. The dispersal was both from east to west and vice versa. The indigenous peninsular fauna spilled over and spread into the extra peninsular areas of India, Myanmar, Thailand, Malaya and also westwards along the Himalaya. They also spread southwards into southern India and even to Sri Lanka.

Further to the above physiographic changes the Pleistocene glaciations on the Himalaya also played a considerable role. During the pluvial periods the fauna spread southwards on the Himalaya and during the arid periods they moved northwards and also to certain heights of the mountain ranges they chose to occupy.

X. PATTERNS OF DISTRIBUTION AND INTER RELATIONSHIPS

Species found in Western Ghats and Sri Lanka : Sri Lanka and India remained connected to each other till as late as upper Pleistocene, about 25,000 years ago. Sri Lanka became an island for the first time during the Paleocene and Miocene epochs when a wide arm of the sea extended across the southern parts of the peninsula. Due to slow uplift of the seabed, connection with India was established since the close of the Miocene-Lower Pliocene times. Fluctuations in sea level have been responsible for subsequent land connections with India via the Mannar Peninsula (Adam's Bridge). Interchange of fauna took place whenever land connections were established and suitable climatic conditions prevailed. This is evidenced

by the occurrence of *M. keletius*, *M. vittatus* and *M. gulio*; the latter two are known to enter the sea within tidal limits. There is no species of *Mystus* endemic to Sri Lanka.

Species confined to Western Ghats : The high percentage of endemism of species in Western Ghats is explained by the above paleogeographical facts. It would seem that many species as *M. montanus* were indigenous to the area and have either spread out northwards along the Ghats or have died out in the intervening areas. Species as *M. montanus*, *M. punctatus* are derivatives of the *M. malabaricus* stock. It is already stated earlier that *M. maydelli* may be the juvenile of *M. krishnensis*. That these species are more dominant in the southern peninsula corroborate the archaic nature of the southern landmass where they must have lived even before the uplift of the Himalaya. These are definitely older in age than their counter parts in the north and elsewhere.

Species found in the Western Ghats and the Eastern Himalaya : Blanford (1829) first noticed the discontinuous distribution of species between the eastern Himalaya and Western Ghats. Blanford observed this in Mammals but subsequent workers as Francis Day observed this in fishes also but did not pay much attention to this. Several theories have been put forward for explaining this discontinuous distribution and also for the presence of this so-called Malayan element by which name these were called. Notable amongst these are the Theory of Hologenesis proposed by Rosa in 1931; Theory of Continental Bridges; Wagenar's Theory of continental drift; Father Sarasin's Deccan Traps Theory, Dilger's Brij Hypothesis and Hora's (1937) Satpura Hypothesis. The late Dr. Sunder Lal Hora was the first ichthyologist who studied this problem in depth and proposed his famous Hypothesis in 1937, mostly for distribution of hill-stream fishes. The whole hypothesis was analyzed in a symposium in 1949. According to Hora, certain hill-stream fishes normally found in the Eastern Himalaya and further east migrated to the Western Ghats via a supposed land bridge through the elevated Vindhya Satpura range of hills across the Garo-Rajmahal gap and colonised the Western Ghats. He postulated that during the earth movements that occurred in the Tertiary era, such as the upheaval of the Himalaya, effect of glaciation these fishes became discontinuous in their distribution.

Hora's Satpura Hypothesis is the first to create a serious awareness amongst ichthyologists of the discontinuity of the fishes in the Indian subcontinent. Hora did not take into consideration that the Indian landmass was a recipient of several migrants from different areas besides the one from Eastern Himalaya which he thought was the only source and origin, especially for the fauna of the Western Ghats. He also ignored the fact that the Indian landmass itself had its own indigenous fauna which became discontinuous by several factors as development pressures, anthropogenic changes, physiographic factors, climatic modulations etc. The present accepted theory for such discontinuity is that the original pattern of distribution of these species have been destroyed and species which are thus far flung are occupying favourable niches in the ecosystem though in a discontinuous manner.

XI. PHYLOGENY

Bagrus of Africa, *Pimelodus* of South America and *Mystus* of Indian region are similar in looks and most characters. *Pimelodus* is under Pimelodidae whereas *Bagrus* and *Mystus* are under Bagridae. Bagrid fishes are more widespread, most of the species are found in abundant numbers occupying every conceivable niche and habitat. The family is predominantly an African group with a proliferation of many genera and species in that continent. There are eight genera distributed in the Indian region. Of these *Mystus* is the dominant genus with as many as 44 species spread all over its range. *Mystus* and *Rita* are similar to the African genera *Bagrus* and *Chrysichthys* respectively in many respects. They are known from Pliocene Siwalik fossil beds of India. *Mystus* is the most generalised genus, much older in age than the other Indian genera (except *Rita*) and has given rise to other genera as *Horabagrus*, *Batasio*, *Chandramara*, etc. *Mystus* is replaced by *Pelteobagrus* and *Leiocassis* in China and by *Pseudobagrus* in Japan and other adjacent areas.

Overall it can be stated that *Mystus* is derived from an African *Bagrus* like ancestor and the genus has spread from west to east. Fossil evidences support such a view. The sparse presence of *Mystus* species in west Asia and the prolific occurrence of *M. cavasius* and *M. bleekeri* in North India, the increased number of species in Thailand and adjacent areas strongly support such a thought. The East Indian islands are also known as a part of the Gondwana landmass, which disintegrated during the tertiary era as stated earlier. The fact that no *Mystus* species is found in Celebes and also that the East Indian islands as a whole have very few species indicate that the fauna is not very old in the geological time scale. It is no doubt a much-generalized genus but its affinities with the African stock are indisputable.

Table 9. Frequency distribution in certain species of *Mystus*.

Species	Dorsal	Pectoral	Pelvic	Anal	Caudal			
1. <i>M. armatus</i>	I, 7 17	I, 7 3	I, 8 14	i, 5 17	ii, 8 13	ii, 9 4	7+8 17	
2. <i>M. bleekeri</i>	I, 7 35	I, 9 14	I, 10 21	i, 5 35	iii, 6 12	iii, 7 23	7+8 35	
3. <i>M. cavasius</i>	I, 7 41	I, 8 37	I, 10 4	i, 5 41	iii, 7 4	iii, 8 18	iii, 9 19	7+8 41
4. <i>M. gulio</i>	I, 7 50	I, 8 22	I, 9 28	i, 5 50	iii, 9 10	iii, 10 17	iii, 11 23	7+8 50
5. <i>M. keletius</i>	I, 7 12	I, 9 12		i, 5 12	ii, 8 4	iii, 7 8	7+8 12	

Table 9. contd.

Species	Dorsal	Pectoral	Pelvic	Anal	Caudal
6. <i>M. krishnensis</i>	I, 7 4	I, 8 1 I, 9 3	i, 5 4	iii, 10 3 iii, 11 1	7+8 4
7. <i>M. leucophasis</i>	I, 7 11	I, 8 3 I, 9 4	I, 10 4 i, 5 11	ii, 9 2 iii, 9 2 ii, 10 6 iii, 10 1	7+8 11
8. <i>M. malabaricus</i>	I, 7 26	I, 7 12 I, 8 14	i, 5 26	ii, 9 11 iii, 8 15	7+8 damaged
9. <i>M. menoda</i>	I, 7 11	I, 9 11	i, 5 11	iii, 8 2 iv, 8 3 v, 8 6	7+8 11
10. <i>M. micracanthus</i>	I, 7 2	I, 7 1 I, 9 1	i, 5 2	iii, 8 1 ii, 9 1	7+8 2
11. <i>M. microphthalmus</i>	I, 7 2	I, 8 1 I, 9 1	i, 5 2	ii, 9 1 iii, 9 1	7+8 2
12. <i>M. montanus</i>	I, 7 54	I, 6 54	i, 5 54	iii, 8 18 iii, 9 36	7+8 54
13. <i>M. nemurus</i>	I, 7 5	I, 7 1 I, 8 4	i, 5 5	ii, 9 4 ii, 10 1	7+8 5
14. <i>M. oculatus</i>	I, 7 5	I, 8 5	i, 5 5	iii, 9 5	7+8 5
15. <i>M. pelusius</i>	I, 7 3	I, 8 3	i, 5 3	ii, 8 2 ii, 9 1	7+8 3
16. <i>M. planiceps</i>	I, 7 2	I, 9 2	i, 5 2	ii, 9 1 ii, 10 1	7+8 damaged
17. <i>M. pulcher</i>	I, 7 4	I, 9 4	i, 5 4	ii, 9 2 ii, 10 2	7+8 4
18. <i>M. punctatus</i>	I, 7 4	I, 9 4	i, 5 4	ii, 7 1 ii, 9 1 iii, 9 2	7+8 4
19. <i>M. tengara</i>	I, 7 32	I, 8 32	i, 5 32	ii, 10 9 iii, 9 23	7+8 32
20. <i>M. vittatus</i>	I, 7 38	I, 8 12 I, 9 26	i, 5 38	ii, 7 12 iii, 10 26	7+8 38
21. <i>M. wolffii</i>	I, 7 4	I, 9 4	i, 5 4	ii, 10 1 ii, 12 3	7+8 4
22. <i>M. wyckii</i>	I, 7 3	I, 9 2 I, 11 1	i, 5 3	iii, 10 3	7+8 3

Table 10. Geographical distribution of *Mystus* species

Geographical Zones (see end of Table for explanation of numbers)

Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
1. <i>albolineatus</i>												X					X		
2. <i>amemiyae</i>																		X	
3. <i>argentivittatus</i>																		X	
4. <i>armatus</i>			X								X								
5. <i>atrifasciatus</i>												X							
6. <i>baramensis</i>															X	X			
7. <i>bimaculatus</i>														X					
8. <i>bleekeri</i>				X					X	X	X								
9. <i>bocourti</i>												X							X
10. <i>cavasius</i>	X						X	X	X	X	X	X	X	X	X	X	X		
11. <i>chinensis</i>																			X
12. <i>elongatus</i>																			X
13. <i>gulio</i>	X								X	X		X	X	X	X	X	X		
14. <i>horai</i>									X										
15. <i>keletius</i>		X					X	X											
16. <i>krishnensis</i>		X																	
17. <i>leucophasis</i>											X								
18. <i>macropterus</i>																			X
19. <i>malabaricus</i>		X																	
20. <i>maydelli</i>		X																	
21. <i>menoda</i>					X						X								
22. <i>micracanthus</i>												X	X	X	X	X	X		
23. <i>microphthalmus</i>						X					X								
24. <i>montanus</i>		X																	
25. <i>multiradiatus</i>												X							
26. <i>mysticetus</i>												X							
27. <i>nemurus</i>												X	X	X	X	X			
28. <i>nigriceps</i>												X	X	X	X	X			
29. <i>oculatus</i>		X																	
30. <i>olyroides</i>															X				

Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
31. <i>peguensis</i>											X								
32. <i>pelusius</i>																			X
33. <i>planiceps</i>													X	X	X				
34. <i>pluriradiatus</i>																		X	
35. <i>pulcher</i>											X								
36. <i>punctatus</i>		X																	
37. <i>rhegma</i>												X						X	
38. <i>rufescens</i>											X								
39. <i>sabanus</i>															X				
40. <i>singaringan</i>												X	X	X	X	X	X		
41. <i>tengara</i>	X			X					X	X	X	X	X						
42. <i>vittatus</i>	X							X	X	X	X	X							
43. <i>wolffii</i>												X		X	X	X			
44. <i>wyckii</i>												X	X	X		X	X		

I = Widely distributed, II = Western Ghats, III = Western Ghats & Eastern Himalayas, IV = North India up to Mahanadi, V = North India up to Krishna River System, VI = Eastern Himalayas, VII = Western Ghats and Sri Lanka, VIII = Tamil Nadu and Sri Lanka, IX = Pakistan, X = Bangladesh, XI = Myanmar, XII = Thailand, XIII = Java, XIV = Sumatra, XV = Borneo, XVI = Malaya, XVII = Cambodia, XVIII = China, XIX = Syria

ADDENDA

Since this MS was sent to the Press, certain changes have come to our notice which are outlined below:

- I. The following species of *Mystus* are now placed under the genus *Hemibagrus* Bleeker. References are given in brackets.
 1. *M. amemiyae* (Bleeker). Possibly same as *Hemibagrus macropterus* Bleeker (Kottelat *et al.* 1998: 570).
 2. *M. baramensis* (Regan). (Ng *et al.* 2000: 65).
 3. *M. chinensis* (Steindachner). (Kottelat *et al.* 1998:569).
 4. *M. elongatus*. Considered as a tentative synonym of *H. guttatus*. (Kottelat *et al.* 1998:569).
 5. *M. krishnensis* Ramakrishnaiah. Synonym of *H. maydelli* (Rossel) as already surmised by us in the text. (Ng & Ferraris 2000: 128).
 6. *M. menoda* (Hamilton-Buchanan) (Ng & Ferraris 2000: 130).
 7. *M. microphthalmus* (Bleeker) (Ng & Ferraris 2000: 133).

8. *M. nemurus* (Valenciennes)(Kottelat & Lim 1995: 238).
9. *M. peguensis* (Boulenger) (Ng & Ferraris 2000: 136).
10. *M. planiceps* (Valenciennes) (Ng & *et al.* 2000: 63).
11. *M. pluriradiatus* (Vaillant). (Kottelat *et al.* 1998:567).
12. *M. punctatus* (Jerdon) (Ng & Ferraris 2000: 137).
13. *M. sabanus* Inger & Chin (Ng *et al.* 2000:65)
14. *M. wyckii* (Bleeker) (Ng & Rainboth 1999: 565).

II. Other changes.

1. *M. bongon* Popta. Central Borneo. Synonym of *M. nemurus* is valid as *H. bongon*. (Tan & Ng 2000 : 276).
2. *M. filamentus* Fang, Chaux & Fang 1949. Cambodia. Valid as *H. filamentus*. (Ng & Rainboth 1999 : 557).
3. *M. guttatus* (Lacepede). Valid as *H. guttatus*. (Kottelat *et al.* 1998 : 567).
4. *M. luridus* Tirant in Petillot. Cambodia. Synonym of *H. nemurus*. (Ng & Rainboth 1999 : 560).
5. *M. rubicauda* Bardach 1959. In the synonymy of *M. wyckoides*. Nomen Nudum. (Ng & Rainboth 1999 : 567).
6. *M. wyckoides* Fang, Chaux & Fang 1949. Cambodia. Valid as *H. wyckoides* (Ng & Rainboth 1999 : 567).
7. Mo (1991) revised the family Bagridae and has recognised only 23 species as belonging to *Mystus*.
8. Ferraris and Runge (1999) propose *Sperata* Holly, 1939 in place of *Aorichthys* Wu in view of the former having priority in date of publication. They have segregated the Burmese population as *Sperata acicularis* new species and have resurrected *Bagrus aorella* Blyth from the synonymy of *Pimelodus aor* Hamilton-Buchanan and have described it as a separate species of *Sperata*.

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PLATES

PLATE I

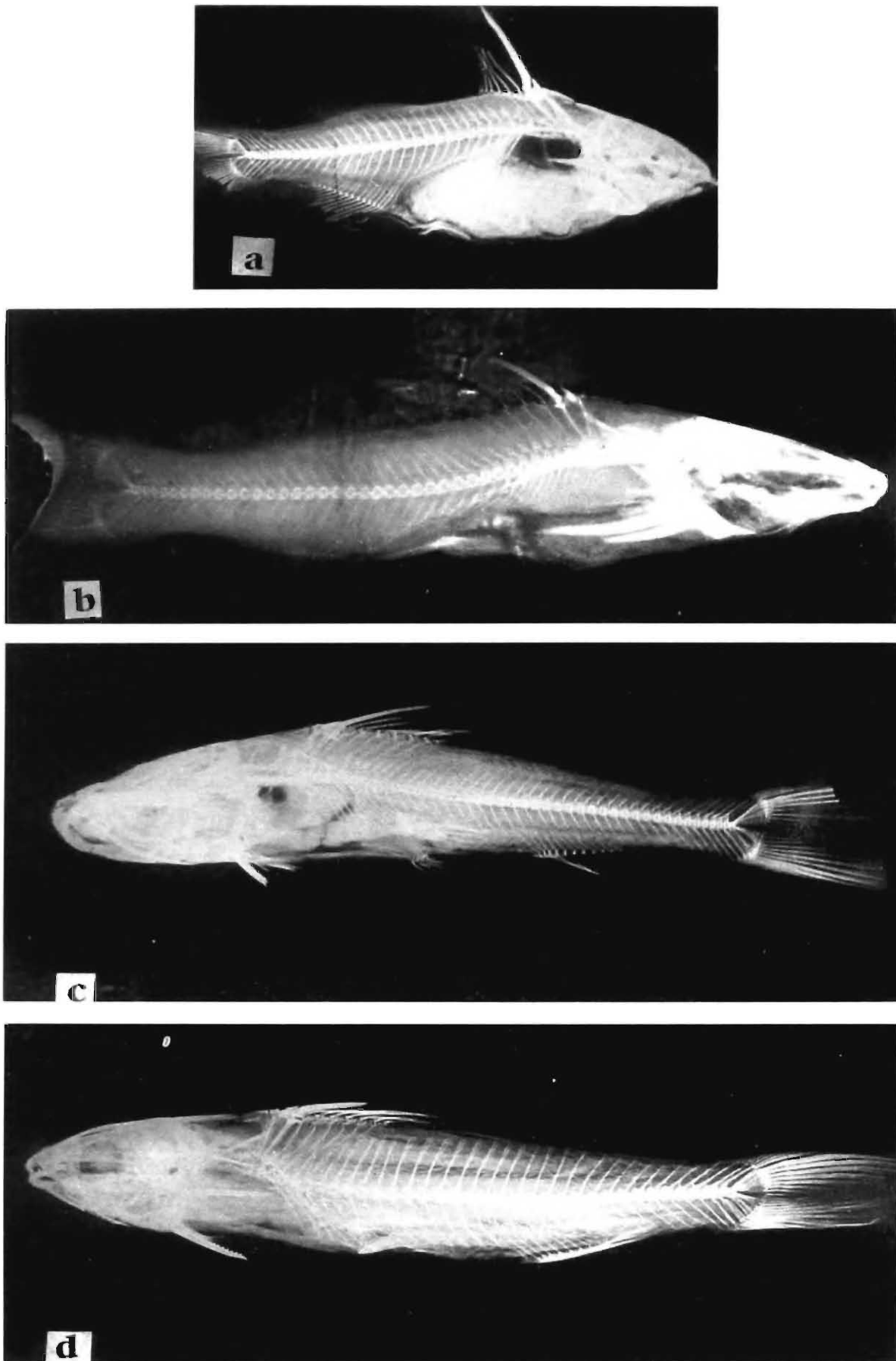


Fig. a. *Mystus argentivittatus*, b. *Mystus armatus*, c. *Mystus baramanesis*, d. *Mystus bleekeri*

PLATE II

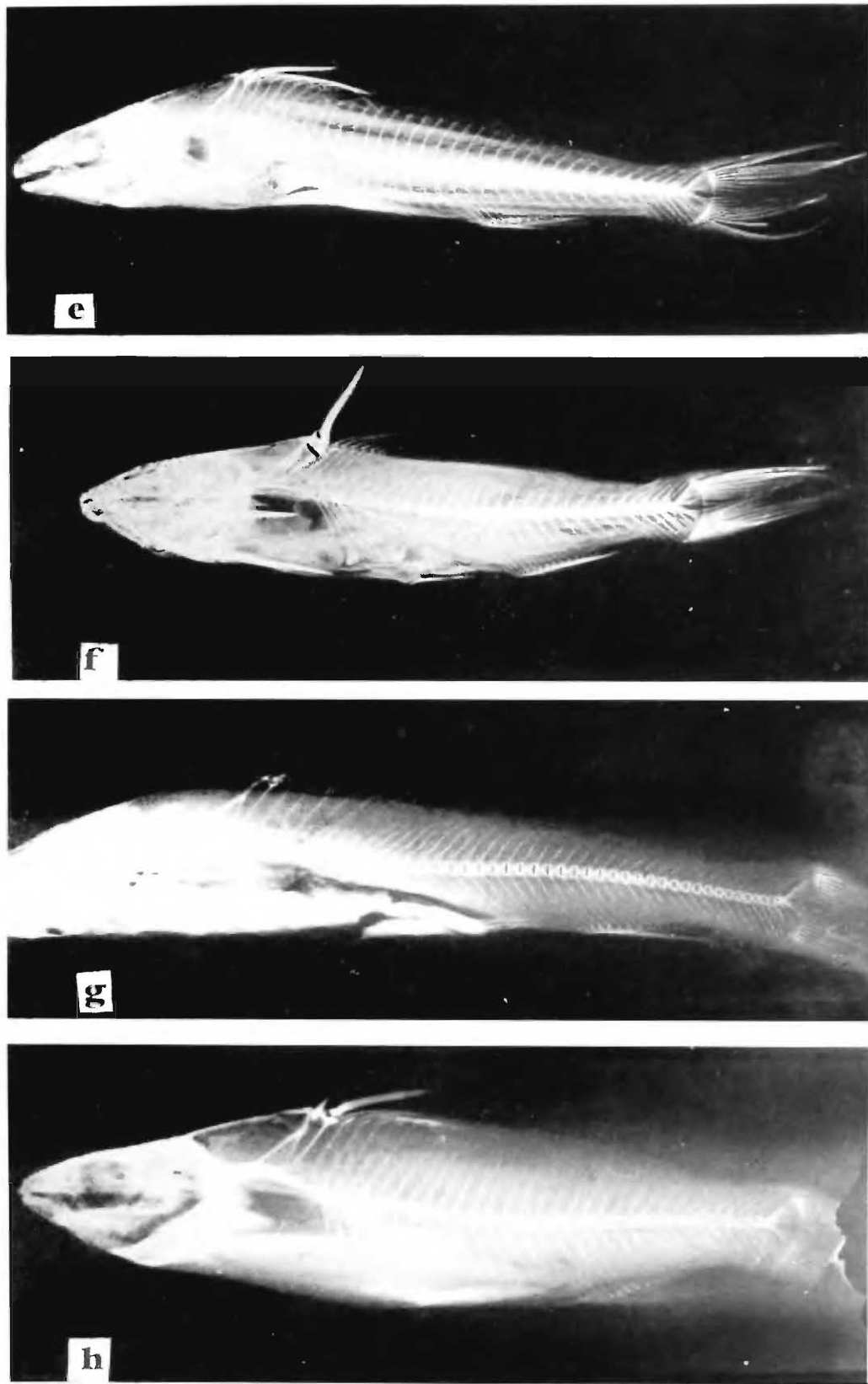


Fig. e. *Mystus cavasius*, f. *Mystus gulio*, g. *Mystus krishnensis*, h. *Mystus leucophasis*

PLATE III

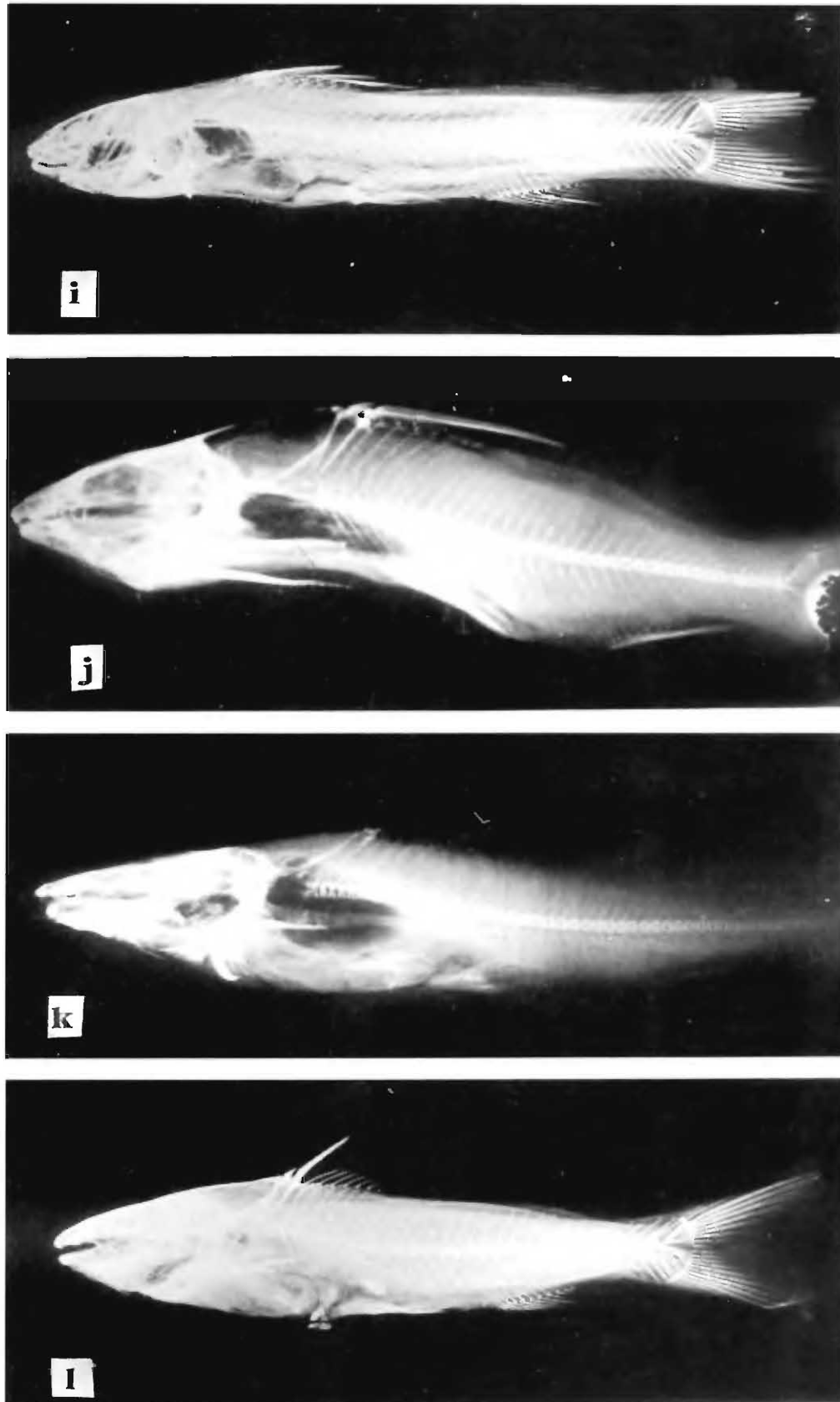


Fig. i. *Mystus malabaricus*, j. *Mystus micracanthus*, k. *Mystus microphthalmus*,
l. *Mystus montanus*

PLATE IV

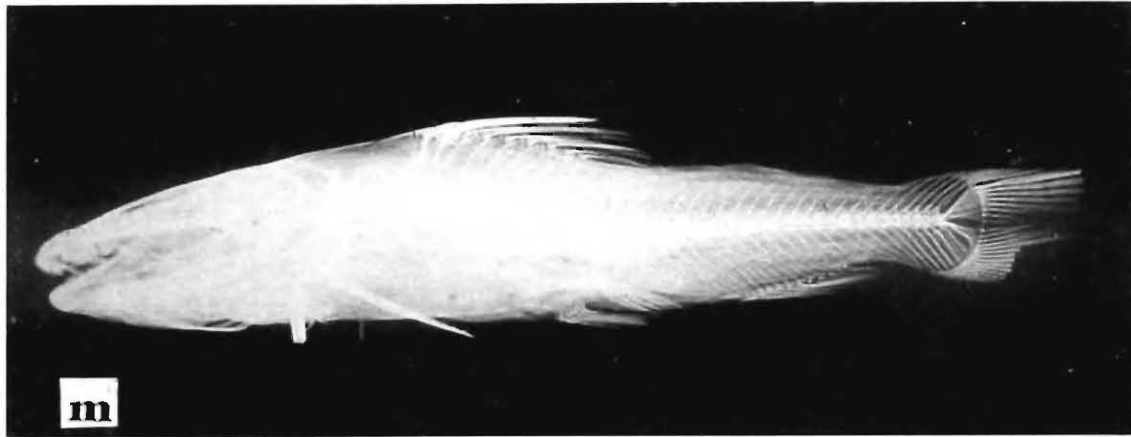


Fig. m. *Mystus nemurus*, n. *Mystus peguensis*, o. *Mystus pelusius*, p. *Mystus punctatus*

PLATE V

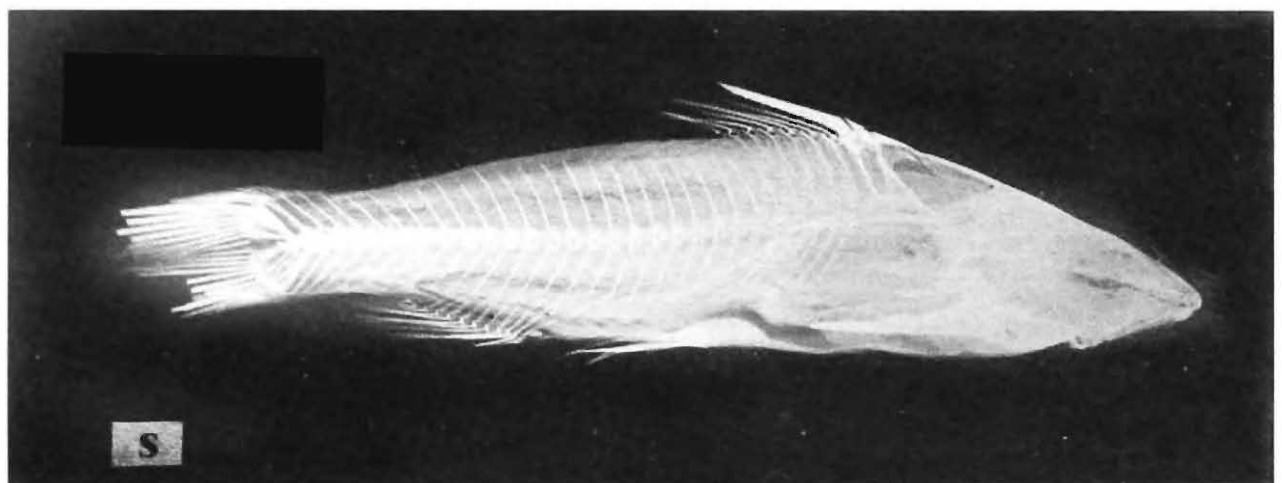
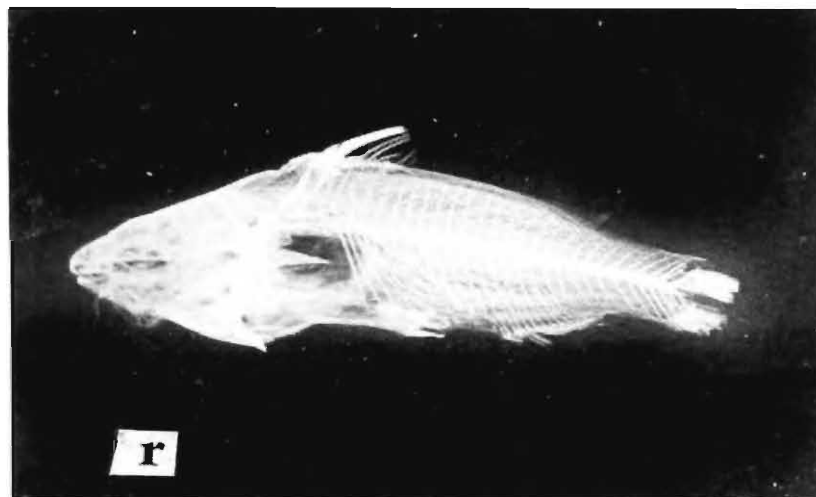
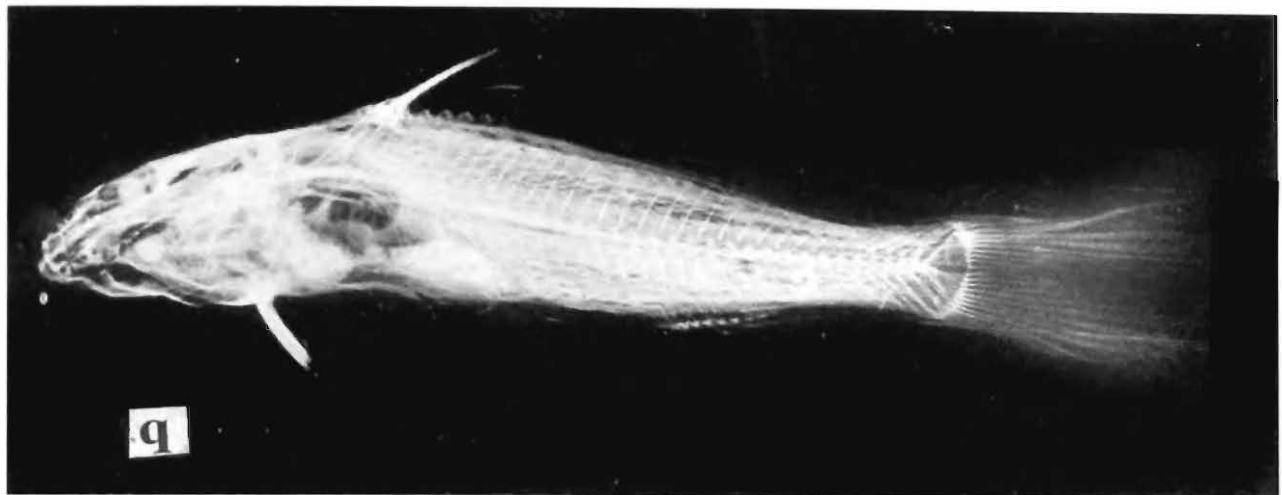


Fig. q. *Mystus sabanus*, r. *Mystus tengara*, s. *Mystus vittatus*, t. *Mystus wyckii*