

## AYARNANGRA ESTUARIUS, A NEW GENUS AND SPECIES OF SISORID CATFISH FROM THE AYEYARWADDY BASIN, MYANMAR

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### ABSTRACT

*Ayarnangra*, a new genus (type species *A. estuarius* new species) is described from specimens collected in strongly tidal habitats in the lower Ayeyarwaddy (Irrawaddy) basin in southwestern Myanmar. It is probably most closely related to a small group of Indo-Gangetic sisorid genera in which keratinous epidermal structures (including those formed by unicellular hook-like unculi) are greatly reduced or absent. Of these genera *Ayarnangra* is most similar to *Nangra*. External morphology of *Ayarnangra* differs from that of *Nangra* in numerous characters, viz. shorter barbels, smaller eyes, branchiostegal membranes broadly joined to isthmus, larger non-encapsulated swim bladder with a huge tympanum, serrae on dorsal fin spine, only 5–6 pectoral fin rays, 15–16 anal fin rays, and 8/8 principal caudal fin rays. Osteologically *Ayarnangra* differs from *Nangra* in having posterior median cranial fontanel very small or entirely closed in adults, posterolateral cranial fontanelles absent, mesethmoid bone not greatly expanded, maxillary bones not firmly united to mesethmoid bone, an accessory or lateral maxillary tooth patch free of the maxillary bone, no palatal teeth, and 16+22–23=38–39 vertebrae (postabdominal notably more numerous than abdominal vertebrae).

*Gogangra* new name is proposed as a replacement name for the Indo-Gangetic sisorid genus *Gangra* Roberts and Ferraris 1998 (preoccupied by *Gangra* Walker 1862 in Lepidoptera). The only known species of *Gogangra* is *G. viridescens* (Hamilton 1822).

Key words: *Gangra*, *Gogangra*, *Pimelodus viridescens*, Sisoridae, India

### INTRODUCTION

Sisoridae is a moderately large family of primary freshwater catfishes known mainly from tropical and subtropical Asia. Representatives of the family range from Iraq and Afghanistan, across much of the southern part of the former Soviet Union, across Pakistan and India, Myanmar, Thailand, Indo-China, and in continental parts of Indonesia (mainly Sumatra, Borneo and Java). The greatest concentration of lowland genera and species is in the Indian subcontinent (JAYARAM, 1999) and the greatest concentration of highland taxa is in China (HE, 1996).

ESCHMEYER (1998) reported 36 nominal genera and 145 nominal species of Sisoridae. Since then at least one new genus and several new species have been described (ROBERTS & FERRARIS, 1998). The majority of the genera and species are characterized by prominent adhesive organs based upon unicellular keratinous structures known as unculi (ROBERTS, 1982). These cells usually are grouped together in lamellae on “adhesive organs”. There

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may be a single "thoracic adhesive organ" on the breast, as in *Glyptothorax* and *Pseudecheneis*, typically found in habitats such as rapids with fast-flowing water and rocky or stony bottoms in lowland as well as highland streams. There are also a number of small or very small species with thoracic adhesive organs (as in *Erethistes* and *Laguvia*) that tend to live in slow-flowing lowland habitats. Or unculiferous laminae may be present on ventral surfaces of the head (including the lips and barbels) and fins (usually outermost rays of the pectoral and pelvic fins) as in *Glyptosternum* and *Euchiloglanis* (ROBERTS, 1982). These taxa live in habitats with swift currents and rocky or stony bottoms such as rapids and mountain streams often at very high elevations.

A small number of sisorid genera, while they may have unculiferous tubercles or papillae, appear not to have adhesive organs. These tend to occur in lowland habitats where the current is not so strong. The largest, best known, and most widely distributed member of the family is *Bagarius yarrelli*, attaining lengths of three or more meters and 100, 150 or reputedly even 250 kg. This species lives in large lowland rivers and also in large swift streams at fairly high elevations in the Himalayas and other mountain chains. Most other genera without adhesive organs tend to be restricted to lowland habitats. The strangest of all sisorid genera undoubtedly is *Sisor*, with a single species inhabiting large, slow-flowing sandy stretches of the Ganges and Brahmaputra. Other lowland genera are *Gagata* and *Nangra*. The new genus *Ayarnangra* is superficially most similar to *Nangra* which occurs in lowland rivers of the Indus, Ganges and Brahmaputra basins (ROBERTS & FERRARIS, 1998).

## METHODS

Remark on vertebral counts.—Vertebral counts, especially if abdominal and postabdominal vertebrae are distinguished, are extremely useful in systematics of most fish groups and especially of catfishes. Unfortunately there has been some difference of opinion in recent literature on the terms and their definitions.

The method of counting vertebrae here is the same as in ROBERTS & FERRARIS, 1998. That is, the actual count is made beginning with the first rib-bearing vertebra, considered to be the sixth. The hypural half-centrum is counted as one vertebra. The last abdominal vertebra is the last vertebra in which the distal end of the hemal spine lies anteriorly to the first anal-fin pterygiophores. This simple definition has the advantage over other definitions that counts based upon it usually can be determined readily in radiographs and in fossils. Vertebrae posterior to this are by definition postabdominal. The term "abdominal vertebrae" corresponds well with the region or part of the fish body properly designated "abdomen" by comparative anatomists. The region comprising the rest of the fish body posterior to this does not seem to have an appropriate anatomical term. "Tail" or "caudal" region is inappropriate, since this refers to the caudal fin itself or to the caudal peduncle and caudal fin. The term "caudal vertebrae" of authors (equivalent to, and easily confused with, the term "peduncular vertebrae") is not an appropriate term for the postabdominal vertebrae.

***Gogangra* new name**

*Gogangra* new name (gender masculine) is proposed as a replacement name and objective synonym for the Indo Gangetic sisorid genus *Gangra* Roberts and Ferraris 1998: 333 (type species *Pimelodus viridescens* Hamilton 1822). *Gangra* Roberts and Ferraris 1998 is preoccupied by *Gangra* Walker 1862: 104 in Lepidoptera (pers. comm. Darrell Siebert, 26 March and 2 April 2001). The only known species of *Gogangra* is *G. viridescens* (Hamilton 1822). It occurs in the Indus drainage of Pakistan and in the Ganges-Brahmaputra drainage of India and Bangladesh.

***Ayarnangra* new genus**

Type species.—The type species and only known species of the new genus is *Ayarnangra estuarius* new species.

**Diagnosis.**—A genus of sisorid catfishes with no specialized unculiferous adhesive organs and with the entire skin of head, body and fins relatively smooth and free of papillae, tubercles, or other specialized keratinous structures. Barbels short and eyes very small. Nostrils huge, anterior and posterior nostrils about equal in size, much larger than eye, separated from each other only by a narrow frenum bearing the nasal barbel. Mouth inferior but not so pronouncedly inferior as in *Nangra* and *Gagata*. Jaw teeth moderately numerous, those on upper jaw including teeth on tooth-plates directly attached to premaxillary bones and on a second tooth-plate lying freely in the soft mouth structures immediately laterally to each premaxillary bone. Palatal teeth absent. Anterior cranial fontanel very long and well developed, but posterior fontanelle very small (about equal to eye diameter) or absent. Lateral cranial fontanelles near end of cranium absent. Gill membranes broadly united to isthmus. Dorsal fin spine with five or six upwardly-directed serrae on its posterior margin. Pectoral fin with a very large strong spine bearing large serrae on its inner margin and 5–6 soft rays. Pectoral girdle with large coracoid process externally visible. Swim bladder with large anterior chamber. Swim bladder not encapsulated by bone. Tympanum very large. Vent large, far anterior to anal fin origin, level with middle of pelvic fins. Adipose fin well developed with triangular free margin. Caudal peduncle long and slender. Caudal fin deeply forked, upper lobe elongate but much smaller than rounded lower lobe (Fig. 3). Principal caudal fin rays 8/8 (usually 8/9 in Sisoridae). Anal fin rays 15–16, first 7–8 rays simple. Vertebrae 16+22–23=38–39. Rib-bearing vertebrae five.

Mesethmoid forked anteriorly but not greatly expanded. Premaxillary bones movably joined to each other and loosely joined to mesethmoid. Lacrimal bone greatly expanded and elongated, convex externally or laterally and concave internally medially where it partially surrounds olfactory organ. Premaxillary, lacrimal, vomer, and orbitosphenoid bones cancellous. What appears to be a large exoccipital process extending dorsal to upper margin of tympanum actually is the externally visible lateral margin of the fused ribs of the first four (Weberian) vertebrae. The exoccipital process, abutting on the anterior part of this expansion, is itself rather short.

The smallest specimens of *Ayarnangra*, from 15.8 to about 30 mm standard length, exhibit a strikingly modified caudal fin and caudal skeleton. The three uppermost caudal fin rays are greatly enlarged with the uppermost simple (unbranched) principal ray the

largest and longest. The upper half of the hypural fan projects posteriorly but the lower half is rounded and much less prominent. The condition of the caudal fin in the young of most other sisorids is unknown.

**Comparison with other genera.**—*Ayarnangra* superficially is most similar to *Nangra* but there are numerous differences. All of the known species of *Nangra* have relatively long or very long barbels, sometimes reaching posteriorly to the anal fin origin or farther posteriorly; larger eyes; branchiostegal membranes free from isthmus; swim bladder largely encapsulated, with relatively small tympanum or window; dorsal fin spine entirely lacking serrae; anal fin rays only 7–11; vertebrae 18-20+15–18=34–37 (abdominal vertebrae more numerous than postabdominal). In addition, adult *Nangra* have a large posterior median cranial fontanelle; well developed posterolateral cranial fontanelles; palatal teeth; no accessory maxillary toothplate; and caudal fin invariably with 8/9 principal fin rays.

*Nangra* also has the mesethmoid greatly expanded anteroventrally, and the premaxillary bones firmly attached to this expansion. This is a specialized condition not present in *Ayarnangra* and other sisorid genera (ROBERTS & FERRARIS, 1998).

*Ayarnangra* is such a distinctive genus that, apart from *Nangra*, it is difficult to decide with what other sisorid genera it should be compared. It is approached by the large-headed and much stouter *Gogangra* in a number of respects. *Gogangra* shares with *Ayargangra* relatively small eyes, very short barbels, and absence of posterior median and posterior lateral cranial fontanelles but there are otherwise even more differences between them than there are between *Ayarnangra* and *Nangra*.

**Etymology.**—The name *Ayarnangra* (gender masculine) is from Ayar-, a contraction of Ayeyar- (from Ayeyarwady), and *Nangra*, an Indo-Gangetic genus of Sisoridae.

### *Ayarnangra estuarius* new species

Figures 1–3

**Holotype.**—KUMF (Kasetsart University Museum of Fisheries, Bangkok) 3190, 45.9 mm, gravid female, Pathein Chaung (=Ngawan Chaung) near Pathein, lower Ayeyarwady basin, 13–17 July 2000. Tyson R. Roberts and Aung Nyi Toe.

**Paratypes.**—KUMF 3191, 23: 15.8–43.4 mm, same locality data as holotype (eleven cleared and stained with alizarin); KUMF 3192, 29.0 mm, Daga or Daka Chaung at Kyaunggon, lower Ayeyarwady basin, 12 July 2000, Tyson R. Roberts.

**Description.**—See generic diagnosis above. Barbels short. Maxillary barbel extending posteriorly a little beyond pectoral fin spine origin. Outer mental barbel 2/3 as long as maxillary barbel, and inner mental barbel 2/3 as long as outer. Bases of outer and inner mental barbels nearly parallel, or base of outer slightly more anterior. Proximal part of maxillary barbel with a laminar inner margin, its base with a thin fold or membrane attached to side of head posteriorly to origin of maxillary barbel (as in sisorids generally). First gill arch with 2+4=6 short and stubby gill rakers on leading edge. Dorsal fin with a spine and six soft rays. Pectoral fin with a spine with 9–10 strong serrae on its inner margin and only 5–6 soft rays. Pectoral fin of holotype with 43 fine serrae on its outer edge, anterior serrae small and laterally directed, last 12–13 larger and retrorsely-directed. Pelvic fins with 6 rays. Fins without filamentous extensions except for principal ray of upper lobe

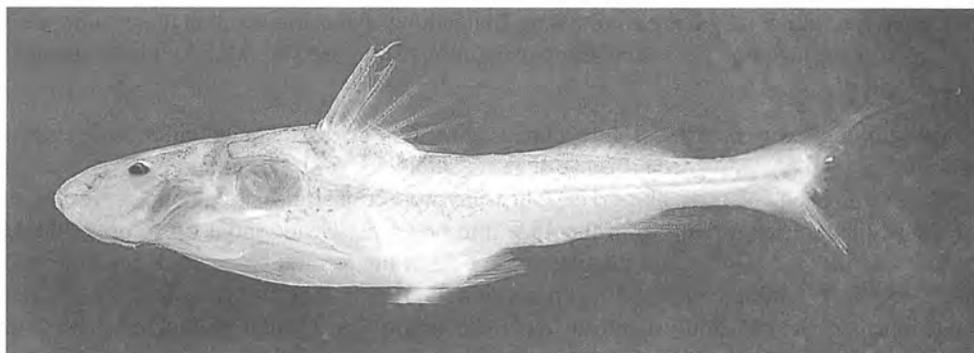


Figure 1. *Ayarnangra estuarius*. 45.9 mm holotype (lateral view). Note very large tympanum. Caudal fin badly damaged.

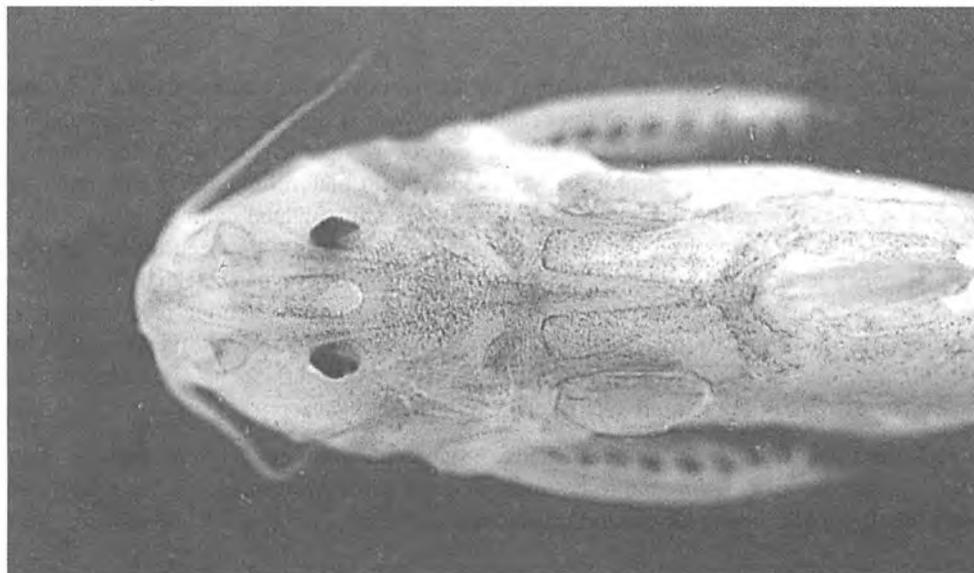


Figure 2. *Ayarnangra estuarius*. 45.9 mm holotype (dorsal view of head). Note large anterior cranial fontanelle, elongate supraoccipital process, tympanum, and serrae on pectoral fin spine.

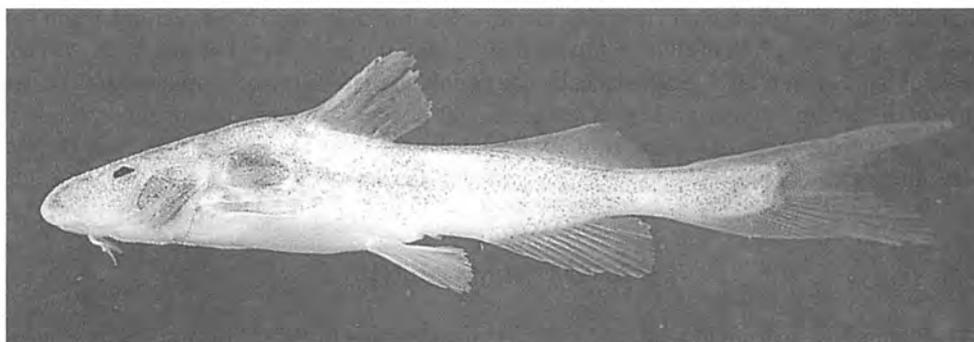


Figure 3. *Ayarnangra estuarius*. 29.0 mm paratype (lateral view). Note faint color pattern of oblique bars on body and shape of intact caudal fin.

of caudal fin, which may have a quite long filamentous extension (broken off or otherwise lost in most specimens). No secondary sexual dimorphism observed. Males without elongate genital papilla.

**Proportional measurements.**—The specimens of the type series are quite uniform in external morphology (taking into account some negative allometry of the head and eyes) including relative proportions of body parts. The following proportional measurements, expressed as times in standard length, are from the 45.9-mm holotype: Head (snout-tip to upper angle of gill opening) 4.5. Horizontal diameter of eye 25.5. Interorbital space 15.3. Snout length 8.2. Maxillary barbel length 6.0. Supraoccipital process length 11.2. Anterior cranial fontanelle length 4.6. Body depth at dorsal-fin origin 4.5. Caudal peduncle length 5.0. Caudal peduncle depth 14.3. Snout-tip to dorsal-fin origin 2.8. Snout-tip to pelvic-fin origin 2.2. Snout-tip to anal-fin origin 1.5. Dorsal fin spine length 7.1. Pectoral fin spine length 4.2. Adipose fin base 4.2. Pelvic fin length 5.1. Maximum interpelvic width 9.8. Minimum interpelvic width 17.7.

**Coloration.**—Color in life pallid, pale gray or tan overall. Color pattern absent, indistinct or subdued. Large specimens from tiger mouth nets with almost no pattern except for fine melanophores on head including dorsal surface, gill cover, supraoccipital and neurotympanal bony processes, and on lateral processes of predorsal fin plate. Single 29.0-mm paratype from Daga Chaung with relatively well-developed but still subdued color pattern on body consisting of three faint oblique bars extending postero-ventrally between dorsal fin base to above pelvic fins; from adipose fin base to above posterior part of anal fin; and on posteriormost part of caudal peduncle (Fig. 3). Such a pattern of oblique bars on body is generalized or primitive for Sisoridae. It is strongly expressed in many species of *Glyptothorax*, most species of *Gagata*, and in many other sisorid taxa. Marks on fins absent or extremely faint in all type specimens of *A. estuarius*.

**Food habits.**—*Ayarnangra* includes relatively large invertebrates such as prawns in its diet. The species of *Gagata* tend to be microphagous while *Nangra* feed at least partly on very small aquatic insect larvae and crustacea.

**Habitat.**—*Ayarnangra estuarius* is known only from large tidal rivers in the lower Ayeyarwaddy or Irrawaddy. These rivers have mud or clay bottoms and strong currents that reverse direction daily. Visibility is poor due to high sediment loads. The fish were caught in large “tiger mouth” nets that are reversed to fish in opposite directions when the tide changes. The catch is collected twice daily during the brief period of neap tide or slack water. Fish caught with *A. estuarius* belonged mainly to secondary and peripheral freshwater groups including a great variety of gobioids and almost no cyprinoids or other primary freshwater fishes. The only other primary freshwater catfishes present were juveniles of the sisorid species *Gagata melanopterus* Roberts and Ferraris 1998.

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## REFERENCES

- ESCHMEYER, W. N. 1998. *Catalog of Fishes*. California Acad. Sci. San Francisco, 3: 1821–2905.
- HE, S. P. 1996. The phylogeny of the glyptosternoid fishes (Teleostei: Siluriformes, Sisoridae). *Cybiurn* 20(2): 115–159.
- JAYARAM, K. C. 1999. *The Freshwater Fishes of the Indian Region*. Narendra Publishing House, New Delhi, xxviii+551 pp., 18 pls.
- ROBERTS, T. R. 1982. Unculi (horny projections arising from single cells), an adaptive feature of the epidermis of ostariophysan fishes. *Zool. Scripta* 11(1): 55–76.
- ROBERTS, T. R., AND C. J. FERRARIS. 1998. Review of South Asian sisorid catfish genera *Gagata* and *Nangra*, with descriptions of a new genus and five new species. *Proc. California Acad. Sci.* (San Francisco) 50(14): 315–345.
- WALKER, F. 1862. VII. Characters of undescribed Lepidoptera in the collection of W. Saunders. *Trans. Ent. Soc. London* (third series) 1: 70–128.

