

ACTINOPTERYGII – ray-finned fishes

Another class of fishes in the Mekong, Actinopterygii, comprises all living fishes, exclusive of sharks, rays, and some other non-Mekong fish groups (hagfishes and lampreys). Actinopterygii also contains lungfishes (known from Africa, South America and Australia), coelacanths (known from the deepwaters of south-eastern Africa and the northern tip of Sulawesi, Indonesia) and even tetrapods (*e.g.*, amphibians, reptiles, birds and mammals), although, of course, these are not included in this book.

The systematics and classification of this huge group still open to be debated, particularly in the major group, Teleostei (see Wiley & Johnson, 2010). Following the Nelson's (2006) system, 21 orders of the actinopterygians are found in the Indochinese Mekong: Osteoglossiformes, Elopiformes, Anguilliformes, Clupeiformes, Gonorhynchiformes, Cypriniformes, Characiformes (introduced), Siluriformes, Osmeriformes (?introduced), Aulopiformes, Batrachoidiformes, Mugiliformes, Atheriniformes, Belontiiformes, Cyprinodontiformes, Gasterosteiformes, Synbranchiformes, Scorpaeniformes, Perciformes, Pleuronectiformes, and Tetraodontiformes. Of these, in the case of the Mekong, most species-rich order is the Cypriniformes (carps and loaches, pp.72–239), followed by the Perciformes (perches, pp. 355–485) and Siluriformes (catfishes, pp. 243– 305). The fishes of the



Cypriniformes and Siluriformes, as well as the Gonorhynchiformes and Characiformes, with a few species known from the Mekong, are placed in the large supraorder taxon Ostariophysi, and are greatly diversified in the fresh-water areas in the world. For example, during our field surveys of the Mekong fishes in 2007–2013, 71–78% of total fish species collected were ostariophysi in Laos, Thailand, and Cambodia. In the Vietnamese Mekong with large tidal areas, 31% of fishes collected were ostariophysi, while 43% were perciform fishes (*vs.* 10–13% in other countries of the Indochinese Mekong).

OSTEOGLOSSIFORMES – bonytongues

Fishes of the order Osteoglossiformes typically possess well-developed teeth on tongue bones, and commonly known as bonytongues. Because of their primitive characteristics and rich fossil records, they are also well known as "living fossils." All living osteoglossiform fishes are found in the freshwater areas of South America, Africa, Australia and Southeast Asia.

Two groups of osteoglossiform fishes are known from the Mekong: Osteoglossidae (arowanas) and Notopteridae (knifefishes or featherbacks). The notopterids are consumed as popular food fish throughout the Indochina. In contrast, only a

single osteoglossid fish native to the Indochina, *Scleropages formosus*, is tentatively shown here, although there are no proper records from the Mekong Basin.

In their report of exotic species in the Mekong Basin, Welcomme & Vidthayanon (2003) listed another osteoglossiform fish, *Arapaima gigas*, as the exotic species occasionally found in central Thailand. It is the world-famous gigantic predator native to Amazon, and hitherto there are no records indicating the establishment of this species in natural waters of the Mekong.

Scleropages formosus (Müller & Schlegel, 1840)

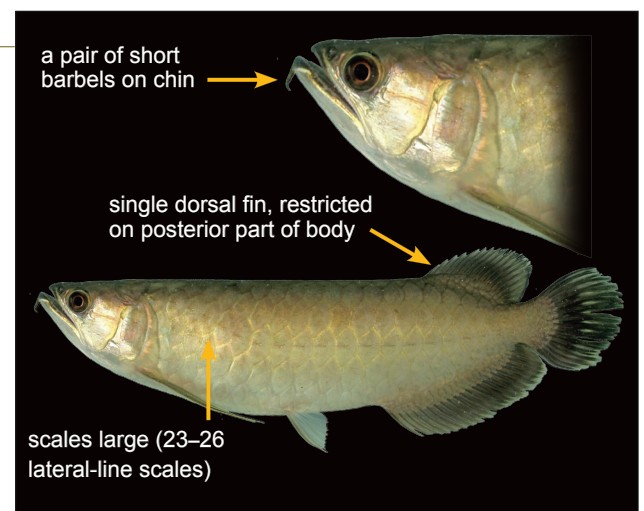
Family: Osteoglossidae (FC: 065)

Size: 90 cm TL (Smith, 1945: 55).

Distribution: ?Mekong Basin in Vietnam; western Cardamom mountain range of Cambodia and Thailand, Malay Peninsular, Sumatra, Borneo, and Bangka.

Notes: A highly esteemed aquarium fish, known from Southeast Asia; it is currently listed in the Appendix I of CITES, and was categorized as "Endangered" in the IUCN Red List of Threatened Species in 2019. Vidthayanon (2008) noted "very rare in southern Vietnamese Mekong, Dong Nai," although the Đồng Nai is actually not related to the Mekong. In Indochina, a few populations, facing serious threats of illegal fishing, also they exist in the protected areas of western face of the Cardamom mountain range of Cambodia.

Based on the morphological and molecular analysis, Pouyaud *et al.* (2003) subdivided the Asian arowana, formerly known as *Scleropages formosus*, into 4 distinct species. However, their analysis was based on a few specimens of each species, and their conclusion did not agree with the phylogenetic relationships shown by themselves (see discussion of Kottelat & Widjanarti,



2005: 145–146). Further analysis is clearly needed to clarify the taxonomic status of these nominal species, and hitherto the CITES and IUCN do not follow the classification of Pouyaud *et al.* (2003). More recently, Roberts (2012) described an additional new congener *Scleropages inscriptus* from Myanmar.

NOTOPTERIDAE

Notopterus notopterus (Pallas, 1769)

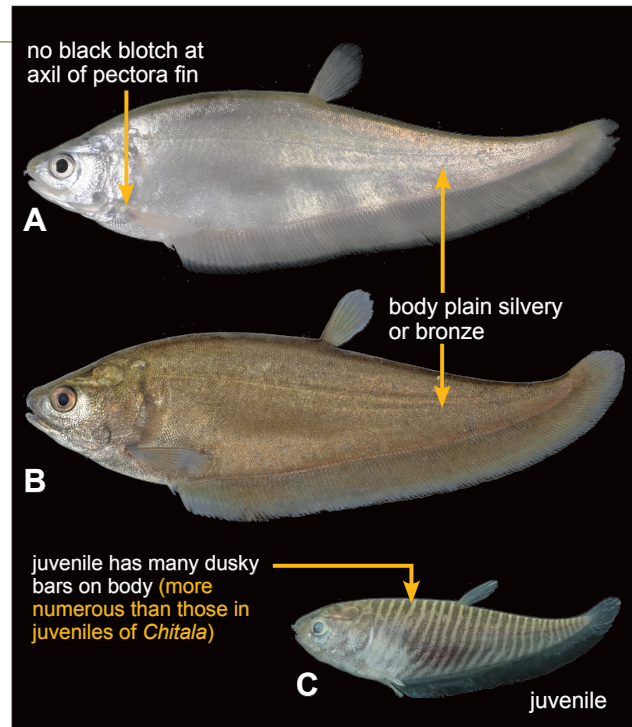
Family: Notopteridae (FC: 066)

Size: 60 cm SL (Kottelat, 2001a: 26).

Distribution: Mekong Basin in Laos, Thailand, Cambodia, and Vietnam; South and Southeast Asia (eastward to Taiwan).

Notes: A relatively small-sized knifefish, typically found in standing waters of lakes, ponds, reservoirs and floodplains; it is commonly marketed fresh throughout the Indochinese Mekong (see photographs below). It is also found in aquarium fish trade, however, due to its non-attractive coloration, it seems to be less popular than *Chitala ornata* and *C. blanci*.

Notopterus, comprising only a single species *N. notopterus*, differs from *Chitala* by its smaller mouth, larger scales on cheek, and nearly straight dorsal profile of head behind the eye. Its plain silvery or bronze coloration is similar to *Chitala lopis* (p. 44), but it differs by lacking a black spot at axil of the pectoral fin, as well as the generic characteristics as shown above. Juveniles of *Notopterus* and *Chitala* have many narrow dusky colored bands, but the bands in *Notopterus* are more numerous and close-set than in *Chitala* (at least in *C. ornata*, see photographs on the next page).

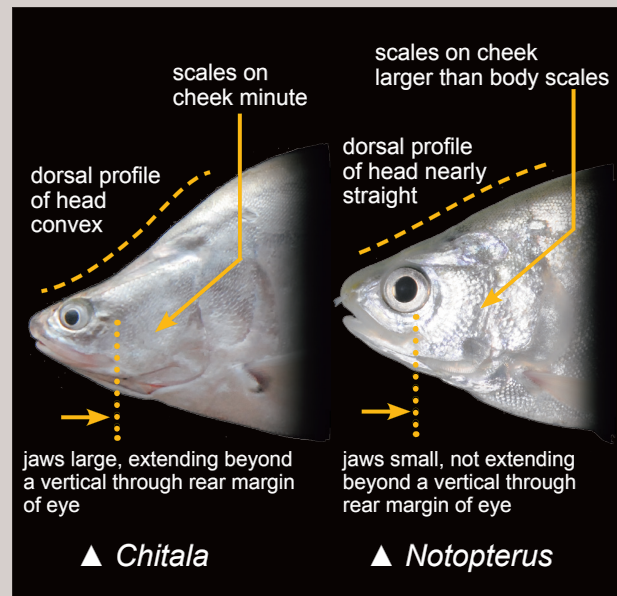


A) IFREDI-P 1475 (photo: PT); B) NUOL-P 524 (photo: VV); C) IFREDI-P 2297 (photo: PT)

Knifefishes (or featherbacks)

Fishes of the osteoglossiform family Notopteridae have a greatly compressed, knife-like shaped body, and thus they are commonly known as knifefishes. Another common name, featherbacks, refers to the small feather-like dorsal fin at the middle of the dorsum. Four species of knifefishes, assigned to *Chitala* and *Notopterus*, are known from the Indochinese Mekong. These genera are easily distinguished based on the size of the mouth and cheek scales, and the head shape (as shown in the right figures). Also, the body size of fishes of *Chitala* exceeds much larger than *Notopterus notopterus*.

Knifefishes are consumed as popular food fish, and are commonly found in the local markets throughout the Indochinese countries. Owing to their numerous small intermuscular bones, the knifefishes are usually processed as fish balls (for, e.g., noodle soup) or fish cakes. The photographs below show the typical view at the local markets for processing knifefishes using spoons.



Shaving off flesh of *Chitala ornata* (right; Phnom Penh, Cambodia, photo: KS) and *Notopterus notopterus* (left; Cần Thơ, Vietnam, photo: KS).



Chitala ornata (Gray, 1831)

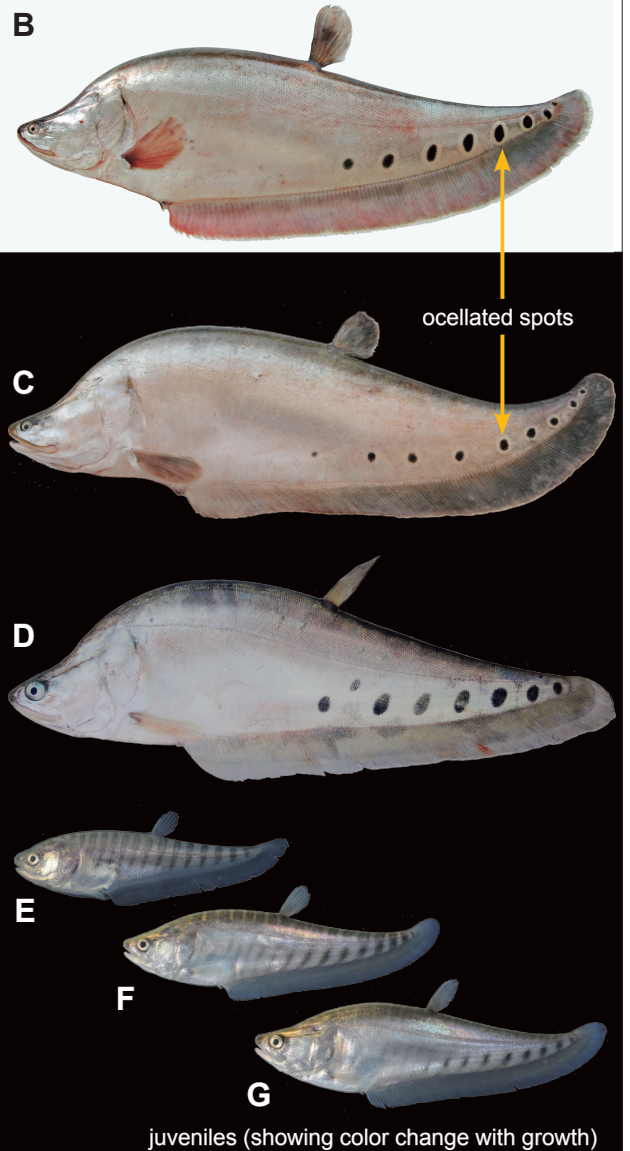
Family: Notopteridae (FC: 066)

Size: 100 cm SL (Kottelat, 2001a: 26).

Distribution: Mekong Basin in Laos, Thailand, Cambodia, and Vietnam; Chao Phraya and Meklong basins.

Notes: One of the most common species of *Chitala* throughout the Indochinese Mekong, found in the large rivers. Juveniles shown here (photos D–F) were collected from shallow coastal areas with dense aquatic vegetation in a reservoir at Savannakhet of Laos in May.

Chitala ornata is readily distinguished from the other Mekong congeners by its conspicuous ocellated spots on the posterior half of the body. Until Roberts' (1992b) revisional work, this species was confused with a similar-looking congener *C. chitala*, which is restricted to the Indian subcontinent.



A and C) IFREDI-P 512 (photo: PT); B) CTU-P 4070 (photo: LXT); D) IFREDI-P 34 (photo: PT); E–G: NUOL-P 1123, 1127 and 1128 (photo: KS); H) marketed fish, not preserved (Cần Thơ, Vietnam, photo: KS)



Chitala lopis (Bleeker, 1851)

Family: Notopteridae (FC: 066)

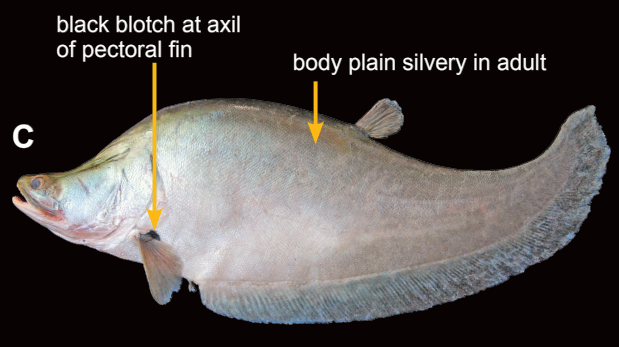
Size: 150 cm SL (Kottelat, 2001a: 26).

Distribution: Mekong Basin in Laos, Thailand, and Cambodia; Chao Phraya Basin and Sundaland.

Notes: A large-sized, plain silvery knifefish, appears to be much less common in the Mekong.

Chitala lopis differs from the other Mekong congeners in having plain silvery body in adult. Like *Chitala blanci* (below), *C. lopis* has a black blotch at the axil of the pectoral fin. The small fish has several faint, dusky colored oblique bars on the body (photo B).

Kottelat & Widjanarti (2005) suggested that the Indochinese population of *Chitala lopis* was possibly non-conspecific with true *C. lopis*, which is apparently endemic to Java. According to them, the Indochinese population may should be identified as *C. borneensis* or unnamed species.



Chitala blanci (d'Aubenton, 1965)

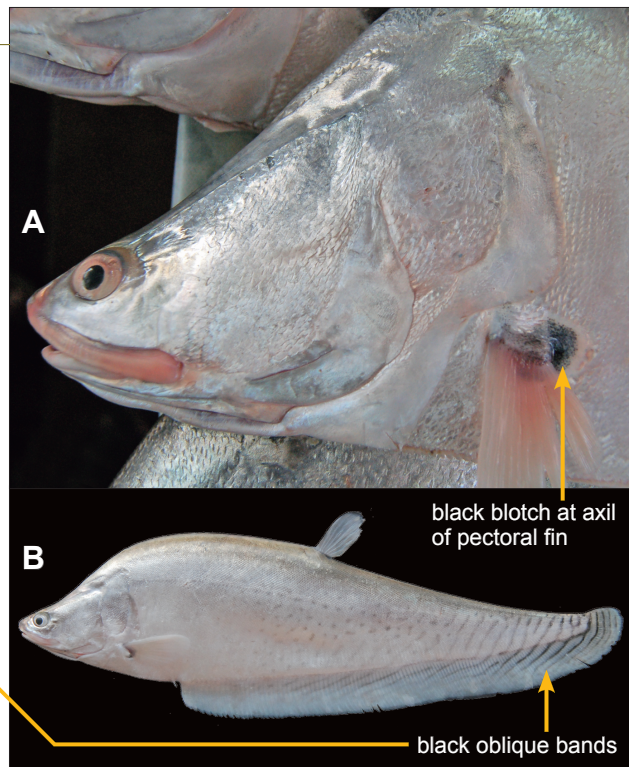
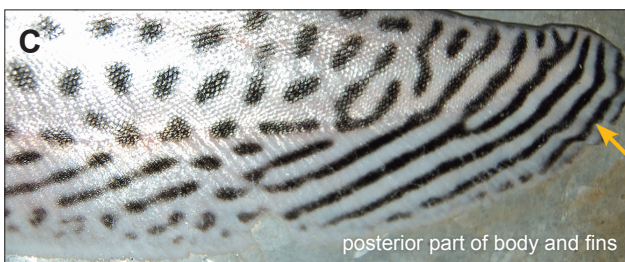
Family: Notopteridae (FC: 066)

Size: 80 cm SL (Kottelat, 2001a: 25).

Distribution: Mekong Basin in Laos, Thailand, and Cambodia.

Notes: A medium-sized knifefish, found in large rivers of the middle Mekong. It is commonly marketed fresh in the region, and it is also found in the aquarium fish trade as a popular ornamental fish. Due to the recent decline in population size, this fish was categorized as "Near Threatened" in the IUCN Red List of Threatened Species in 2011.

Chitala blanci is readily distinguished from the other 2 congeners in the Mekong by its characteristic black banded pattern. Like *Chitala lopis* (above), *C. blanci* has a black blotch at axil of the pectoral fin.



A and C) IFREDI-P 5883 (photo: PT); B) IFREDI-P 5885 (photo: PT)

A and C) Marketed fish, not preserved (Vientiane, Laos, photo: KS); B) IFREDI-P 704 (photo: PT)



Marketed fish of *Chitala blanci* (Ratanakiri, Cambodia, photo: KS)