# ATHERINIFORMES / ATHERINIDAE & PHALLOSTETHIDAE

## **ATHERINIFORMES** – silversides and allies

Many of fishes of the order Atheriniformes have well-separated dorsal fins and abdominal pelvic fins (see photograph of a species of *Atherinomorus*, right), and are somewhat similar superficially to the mugiliform fishes (pp. 312–317). This order comprises 6 families (Nelson, 2006; Wiley & Johnson, 2010), including a highly specialized family Phallostethidae that has a reduced or no first dorsal fin and a peculiar bilaterally-asymmetric copulatory organ under the throat in the males ("priapium", see below column).

Within the Atheriniformes, 3 and 5 species of Atherinidae and Phallostethidae were hitherto recorded from the Mekong (Vidthayanon, 2008; Shibukawa *et al.*, 2012; our unpublished data). During our field surveys in 2007–2013, we found 5 species of phallostethid fishes from the middle and lower Mekong, although we failed to collect the atherinid fishes. In the Mekong, all of these phallostethids except for *Phenacostethus smithi* (p. 320) are known only from brackish-water areas (*e.g.*, mangrove creeks) around estuaries of Vietnam; only *P. smithi* is also found



in the middle reaches of the Mekong in Cambodia and Thailand.

Three species of atherinid fishes were recorded from the Mekong Delta by Vidthayanon (2008): *Atherinomorus duodecimalis, Atherinomorus lacunosus*, and *Hypoatherina valenciennei* (as *valenciennesi* [sic.]). The photographed specimen shown above, provisionally identified as a species of *Atherinomorus* sp. (cf. *aetholepis*), was collected from Phú Quốc Island, off the south-western coast of Mekong Delta of Vietnam.



## PHALLOSTETHIDAE

# A) CTU-P 2494 (photo: LXT); B) CTU-P 2492 (photo: LXT); C) CTU-P 2495 (poto: LXT); D) CTU-P 2473 (preserved specimen, photo: LXT); E) CTU-P 2327 (photo: LXT)

*Phallostethus cuulong* Shibukawa, Tran & Tran, 2012

Family: Phallostethidae (FC: 250)Size: 2.5 cm SL (Shibukawa *et al.*, 2012: 46).Distribution: Mekong Basin in Vietnam.

**Notes:** A medium-sized species of priapiumfishes, hitherto known only from small magnrove creeks and canals around brackish estuaries of the Vietnamese Mekong. In this region, *Phallostethus cuulong* is frequently collected with the other priapiumfishes (*e.g., Phenacostethus smithi* and *Neostethus lankesteri*), but is less abundant than the others. The photograph below shows a habitat in Sóc Trăng Province of Vietnam, where *Phallostethus cuulong* was collected.

Members of the Phallostethidae are small-sized, transparent surface-swimming fishes, known from Southeast Asian countries. They have a priapium, which is a unique bilaterally-asymmetrical copulatory organ under the throat in males, and are commonly known as priapium fishes (see column on left page). The family comprises 4 genera, and, of these, 3 genera (*Neostethus, Phallostethus*, and *Phenacostethus*) are found in the Mekong (Shibukawa et al., 2012).

*Phallostethus* differs from the other phallostethid genera in having long-based anal fin with 24–27 rays (vs. 22 or less in the other genera) and serrated second ctenactinium (vs. second ctenactinium absent or, if present, not serrated) (Parenti, 1989; Shibukawa *et al.*, 2012). *Phallostethus* comprises 3 allopatric species, viz., P. dunckeri from Johor of Malay Peninsula, P. lehi from northwestern Borneo, and P. cuulong from the Vietnamese Mekong, and can be distinguished from one another by, e.g., the number of serrae on the second ctenactinium in adult males and vertebrae (see Parenti, 1996; Shibukawa *et al.*, 2012).





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# PHALLOSTETHIDAE

### Phenacostethus smithi Myers, 1928

Family: Phallostethidae (FC: 250)

Size: 1.6 cm SL (Roberts, 1971; 10).

Distribution: Mekong Basin in Thailand, Cambodia, and Vietnam; coastal basins in western Cambodia, Thailand to peninsular Malaysia.

Notes: A small-sized species of priapiumfishes, found in middle and lower reaches of rivers, canals and brackish estuaries. Phenacostethus smithi is locally abundant particularly in slow-flowing rivers and turbid canals in the Vietnamese Mekong, but is easily overlooked, due to its diminutive size.

Phenacostethus is similar to Phallostethus (rather than Neostethus) in having a toxactinium, a long rod-like external bone at the anterior part of the priapium. At least in the Mekong species, fishes of Phenacostethus and Phallostethus have an orange spot at/around the caudal-fin base (vs. absent in Neostethus). Phenacostethus is, however, distinguished from Phallostethus by having short-based anal fin with 14-15 rays (vs. 24-28 rays in Phallostethus), minute first dorsal fin (vs. absent), and a reduced, non-serrated second ctenactinium (vs. serrated) (Parenti, 1989, 1999; Shibukawa et al., 2012). Three species are known in Phenacostethus, and, of these, 2 species, P. smithi and P. posthon (below), are found in the Mekong. Phenacostethus smithi differs from the sympatric *P. posthon* in the origin of the first dorsal fin, which is above or slightly behind midlength of the anal-fin base (vs. above or slightly behind th eend of anal-fin base in P. posthon), and ruffed seminal papilla (vs. smooth). The remaining one, P. trewavasi, is hitherto known only from Sarawak, Malaysia (Parenti, 1986, 1989). The recent record of P. trewavasae from the Cambodian Mekong by Rainboth et al. (2012: 76, pl. 49, fig. 1025) needs confirmation; their photographed specimen, taken from a floodplain near Phnom Penh, has a moderately large eyelens (vs. small to minute in P. trewavasae, see Parenti, 1986, 1989), and, based on the photograph, we cannot find any discrepancies from P. smithi, that is common in southern Cambodia.

## Phenacostethus posthon Roberts, 1971

#### Family: Phallostethidae (FC: 250)

Size: 1.8 cm SL (Roberts, 1971: 13).

Distribution: Mekong Basin in Vietnam; Malay Peninsula.

Notes: A small-sized species of priapiufishes, found in lower reaches of rivers, canals, and brackish estuaries; it is usually collected together with a similar congener Phenacostethus smithi (above) in the Mekong. Tran et al. (2013: 81) misidentified a female specimen of this species as P. smithi.

Phenacostethus posthon closely resembles the sympatric congener P. smithi (see "Notes" of P. smithi, above). All of our photographed specimens of females of P. posthon have an additional orange marking around the origin of the anal fin (vs. absent in P. *smithi*); the position of the orange marking at the end of caudal peduncle is also somewhat different from that of P. smithi.

male seminal papilla smooth





E male

toxactinium distinct,

curved and rod-like

## PHALLOSTETHIDAE

#### Neostethus bicornis Regan, 1916

Family: Phallostethidae (FC: 250)

Size: 3.0 cm TL (Kottelat et al., 1993: 95).

**Distribution:** Mekong Basin in Vietnam; Western Pacific and Andaman Sea.

**Notes:** A medium-sized species of priapiufishes, found in brackish estuaries; it is commonly collected from small pools and creeks in mangrove forests of the Mekong Delta, but appears to be less abundant than *Neostethus lankesteri* (below).

*Neostethus* is readily distinguished from the other 2 phallostethid genera known from the Mekong, *viz.*, *Phallostethus* (p. 319) and *Phenacostethus* (left page), by lacking externalized toxactinium, a long rod-like bone articulating with the anterior end of the proctal axial bone (see column in p. 318). When alive, fish of *Neostethus* have a nearly transparent body, with no orange spot at the caudal-fin base (*vs.* orange spot present at least in the Mekong species of *Phallostethus* and *Phenacostethus*). Eleven species are known in *Neostethus* (Parenti, 1989; Parenti & Louie, 1998); of these, at least 2 species, *Neostethus bicornis* and *N. lankesteri*, were recorded from the Mekong (Shibukawa *et al.*, 2012). These 2 Mekong species can be distinguished by the morphology of priapium and genital papilla in male and female, respectively (see photos shown here); the examination of these characteristics needs magnification.





#### Neostethus lankesteri Regan, 1916

Family: Phallostethidae (FC: 250)

Size: 3.0 cm SL (Kottelat et al., 1993: 95).

**Distribution:** Mekong Basin in Vietnam; Western Pacific and Andaman Sea.

**Notes:** A medium-sized species of priapiufish, found in brackish estuaries. *Neostethus lankesteri* is one of the most common species of priapiumfishes in the mangrove creeks and adjacent waters of the Mekong Delta. See also the similar-looking congener, *N. bicornis*, above.





urogenital opening covered by hook-like (not hood-like) fleshy flap in female (see also *N. bicornis*, abov