

MAKARARAJA CHINDWINENSIS, A NEW GENUS AND SPECIES OF FRESHWATER DASYATID PASTINACHINE STINGRAY FROM UPPER MYANMAR

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ABSTRACT

Makararaja chindwinensis new genus and species is described from a single mature female specimen from the Chindwin River, Irrawaddy basin, in northern Myanmar. Despite the round disc and somewhat slender tail, its relationships are not with the whiptailed stingrays of the subfamily Dasyatinae, but with the flagtailed stingray genus *Pastinachus*. *Makararaja* and *Pastinachus* (of which *Hypolophus* is a junior synonym) together form the new dasyatid subfamily Pastinachinae.

Key words: Dasyatidae, *Makararaja chindwinensis*, Myanmar, new genus, Pastinachinae, stingray

INTRODUCTION

Despite hearsay accounts of freshwater cartilaginous fishes or elasmobranchs in the Irrawaddy basin and elsewhere within Myanmar, no reliably documented specimens have come to light until the distinctive stingray that is the subject of this article. The only preserved specimen was obtained in the Chindwin River during fieldwork by the author in collaboration with the Myanmar Department of Fisheries in April 2003. While clearly related to the marine and euryhaline dasyatid genus *Pastinachus* Rüppell 1829 (formerly *Hypolophus* Müller and Henle, 1837), it differs markedly from previously described species and represents a new genus. Local fishermen report it is frequently caught in the Chindwin River between Kampti and Tamanthi and also for some distance downstream from Tamanthi. The holotype of the new species is deposited in the Zoological Reference Collection (ZRC), Raffles Museum for Biodiversity Research, National University of Singapore.

Pastinachinae new subfamily

Pastinachinae are whiptailed stingrays or Dasyatidae differing from other members of the family in having the upper jaw very strongly arcuate and with correspondingly shaped toothplates. Lower jaw anteroposteriorly elongate. The teeth are pavement-like. Tail thicker near base than in Dasyatinae and with spine insertion relatively far posterior. Ventral cutaneous tail fold well developed. Two genera, *Pastinachus*, with *P. sephen* and several unrecognized or undescribed species perhaps including *P. sankur* or *P. fluviatilis* (Hamilton 1822) (ROBERTS, 1998; LAST ET AL., 2005), and *Makararaja* new genus, with a single species. The new genus differs markedly from *Pastinachus* in having a nearly oval disc

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with the dorsal surface with minute dermal denticles versus a “diamond-shaped” or “strongly rhomboidal” disc with the central part of its dorsal surface with relatively large dermal denticles.

The widely used stingray genus name *Hypolophus* Müller & Henle 1837 (with generic type species *Raja sephen* Forsskål 1775) is now recognized as a junior synonym of *Pastinachus* Rüppell 1829 (with the same generic type species) (PAXTON *ET AL.*, 1989: 43; LAST & COMPAGNO, 1999: 1482; and ROSENBERGER, 2001: 615). All of the species are superficially rather similar, with a thick, diamond-shaped or rhomboidal disc; heavy dermal denticulation in middle of the upper surface of the disc; a thick-based tail, with well developed ventral cutaneous membrane; and a sting located relatively far posteriorly on the tail (Figs. 1–2).

Pastinachinae may be referred to by the common name “flag-tailed stingrays” in reference to the conspicuous ventral cutaneous tail membrane (also after the Thai name for *P. sephen*: *pla gaben tong*).

Note on *Raja fluviatilis* (Fig. 2)—Sometimes placed in *Himantura*, *Raja fluviatilis* Hamilton 1822 (type locality Ganges) belongs in *Pastinachus*. If the name is available (see ROBERTS, 1998) it is either a junior synonym of *P. sephen* or a valid species of *Pastinachus*. *Raja sankur* Hamilton 1822 is the next available junior synonym of *R. fluviatilis* (*op cit.*).

***Makararaja* new genus**

Type species.—*Makararaja chindwinensis* new species

Formerly all of the species of Pastinachinae could be assigned to a single genus, *Hypolophus* or *Pastinachus* (Figs. 1–2). The new genus described here differs from all other dasyatid genera in having a nearly round disc with the dorsal surface with pearl organs and other dermal denticles so minute that it seems to lack them. It also differs in tail morphology. Floor of mouth with four papillae: two in the middle and one to each side (versus five in *Pastinachus*, with three in the middle of the mouth). In other pastinachines the tail is exceptionally stout proximally, and the sting insertion is located farther posteriorly. The tail has a well-developed ventral cutaneous membrane but its depth is much less than in *Pastinachus*. The sting insertion is relatively far posterior compared to non-pastinachines, but not so far posterior as in *Pastinachus*. The base of the tail is more slender than in *Pastinachus* but not so slender as in *Himantura* and other dasyatin genera.

Pectoral fin pterygiophores 105–107? versus 111–126 in *Pastinachus* (Peter Last, pers. comm. 11 Jan 2005). In the shape of the jaws and toothplates *Makararaja* is basically similar to *Pastinachus*.

***Makararaja chindwinensis* new species**

Figures 3–8

Holotype.—ZRC 50566, 385 mm disc width, mature female, Chindwin River about 20 km downstream from Khamti, 19 April 2003, Tyson R. Roberts (the new species is well known to fishermen in the stretch of the Chindwin River between Khamti and Tamanthi. According to the fisherman who caught it the holotype is full grown. From the remarks of several fishermen the species does not get much larger).

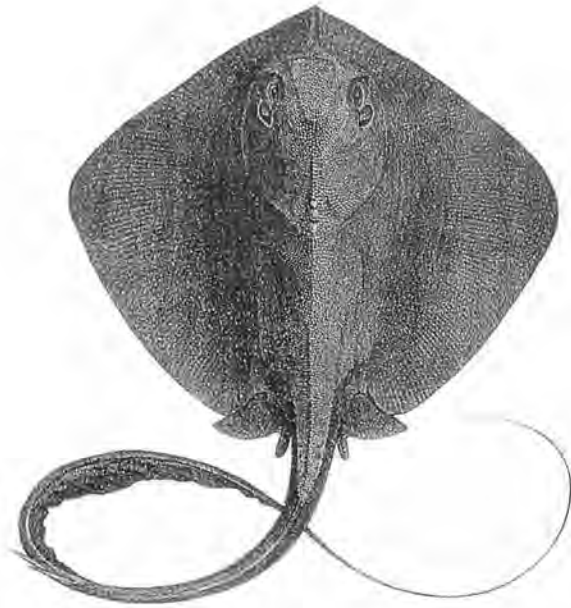


Figure 1. *Pastinachus* cf. *sephen* (from DAY, 1875).

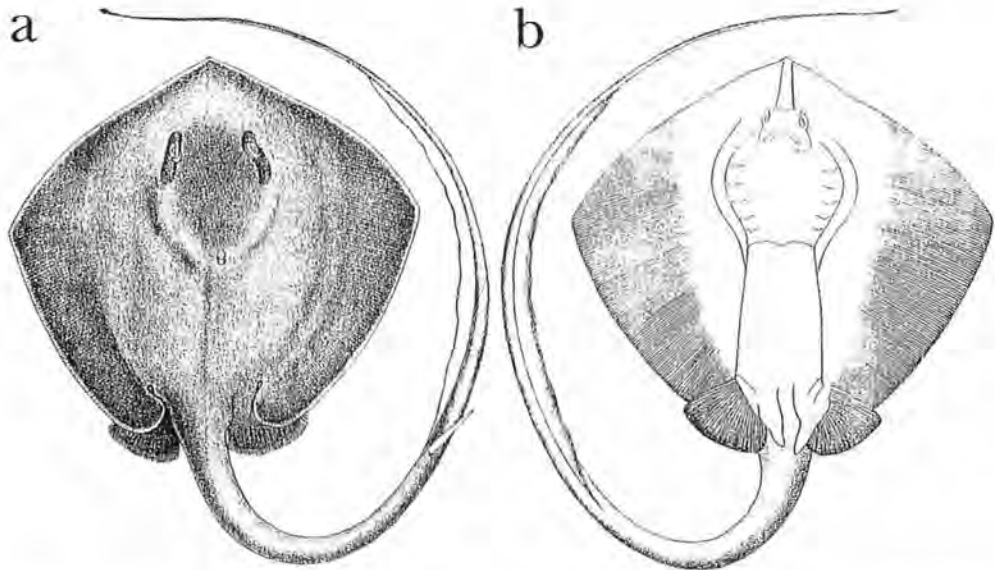


Figure 2. *Raja fluviatilis* Hamilton 1822. This nominal species is referable to *Pastinachus*. It is either a junior synonym of *P. sephen* or a valid species (from ROBERTS, 1998). Note differences in disc shape and ventral tail-fold compared to *P. cf. sephen* in Fig. 1.

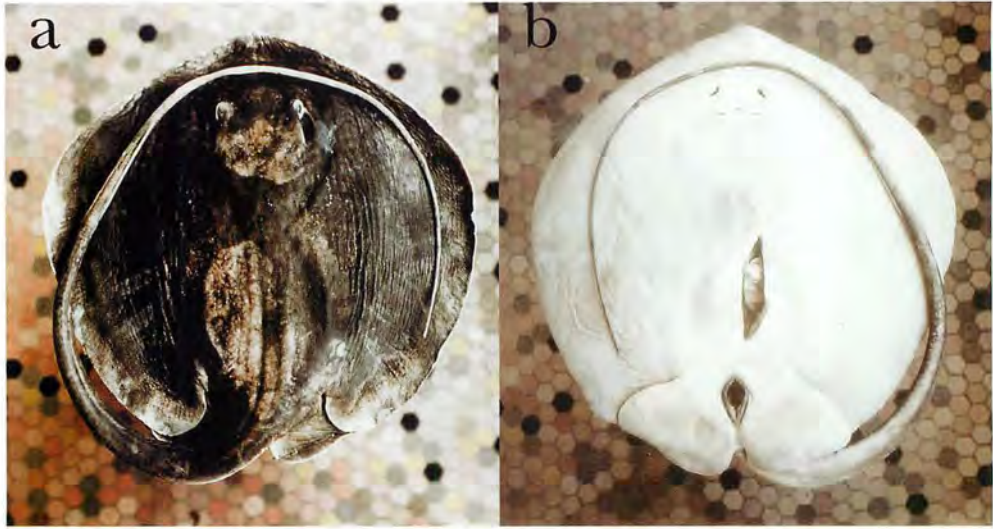


Figure 3. *Makararaja chindwinensis*. Holotype, ZRC 50566, 385 mm female.

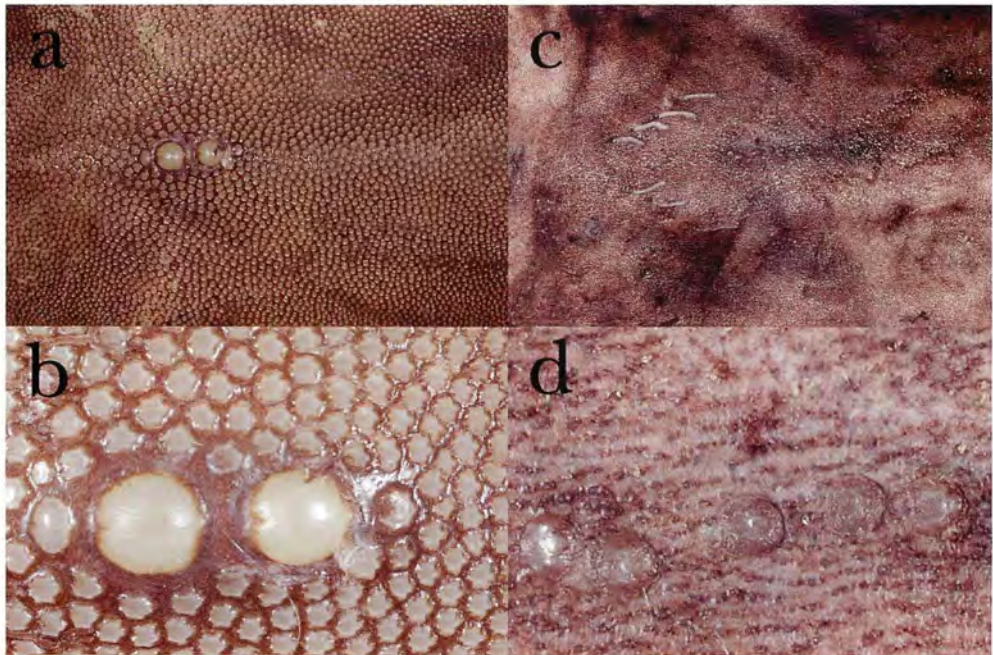


Figure 4. Pearl spines and denticles near center of dorsal surface of disc. a–b, *Pastinachus cf sephen*, ZRC 50645, 315 mm male; c–d *Makararaja chindwinensis*, ZRC 50566, 50566, 385 mm female. (a and c at same scale, b= 53% of d).

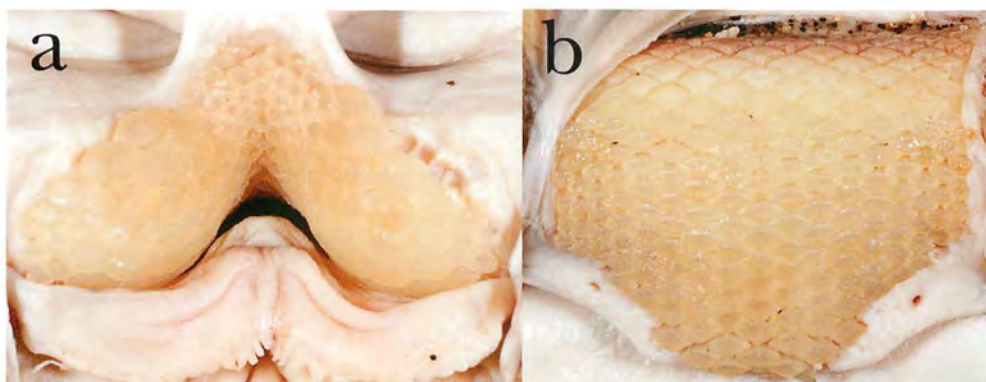


Figure 5. *Makararaja chindwinensis*. Jaw teeth. a, upper jaw; b, lower jaw.



Figure 6. *Makararaja chindwinensis*. Radiograph of jaws with mouth shut.



Figure 7. *Makararaja chindwinensis*. Portion of tail with stings. a, lateral view; b, dorsal view.



Figure 8. *Makararaja chindwinensis*. Spiral valve.

Comparative material of *Pastinachus*.—*Pastinachus cf sephen*, ZRC 50645, 3: 297–315 mm, Singapore, Jurong Fish Port, K. Lim and M. Manjaji, Feb 1997.

Diagnosis.—A small species of freshwater dasyatid. Maximum disc size reportedly about 500 mm and maximum weight 3–4 kg. Disc with slightly triangular shape, but more nearly round than in any known species of Southeast Asian freshwater dasyatid species (Fig. 3), and very distinct from the triangular or diamond-shaped disc of *Pastinachus* (Figs. 1–2). Pearl buttons and other dermal denticles of dorsal disc surface minute, far smaller than those of *Pastinachus* (Fig. 4). Pectoral fin radial pterygiophores (propterygial + mesopterygial + metapterygial=total) 51 + 8 + 46–48? = 105–107? Pelvic fin pterygiophores 26–27. Discrete vertebral centra about 130. Tail with a long but relatively low-lying ventral fin fold (Fig. 7). Sting very slender, stiletto-like, with very fine point (Fig. 7). Sting with 59 barbs on left side, 70 on right side. Spiral valve turns 16–17 (Fig. 8) (versus 20 in some *Pastinachus*).

Morphometric characters.—See Table 1.

Table 1. *Makaraja chindwinensis* measurements of holotype in mm/% of disc width

| | |
|--|-----------|
| Disc width | 385 mm |
| Disc length ² | 390/10 |
| Maximum width across pelvic fins | 199/51.6 |
| External width between pelvic fin origins | 99/25.7 |
| Least interspiracular width | 68.5/17.8 |
| External eye bulge | 25.0/6.4 |
| Snout length ³ | 78/20.3 |
| Spiracle length | 29.5/7.7 |
| Maximum internarial width | 48/12.4 |
| Width of mouth opening at lower jaw | 37/9.6 |
| Width of first gill slit | 12.5/3.2 |
| Width of fifth gill slit | 8/2.1 |
| Least distances between successive gill slits: | |
| First and second | 84/21.8 |
| Second and third | 077/20 |
| Third and fourth | 64/16.6 |
| Fourth and fifth | 54/14.0 |
| Exposed nostril length | 12.6/3.3 |
| Pre-sting tail length | 312/81.0 |
| First sting length | 113/29.4 |
| First sting maximum width | 3.8/98 |
| Second sting length | 25/6.4 |
| Total tail length | 575/149.4 |
| Ventral cutaneous tail membrane length | 265/68.8 |
| Ventral cutaneous tail membrane depth | 8.2/2.1 |

²straight line measurement from snout tip to distal margin of pelvic fins

³straight line measurement from snout tip to front of eye

Coloration.—Dorsal surface pale grey or tan; ventral disc surface white (Fig. 3). Tail with distinct banding continued onto ventral cutaneous membrane (Fig. 7).

Gut.—The alimentary tract was excised about one inch below the oropharyngeal cavity and an inch above the cloaca or vent. It was then sliced open for its entire length by a single mid-ventral cut. The postpharyngeal gut, with a total length about 340 mm, comprises six morphologically distinct sections. Except for the spiral valves, these sections are continuous, i.e., not separated by valves or marked constrictions, so that the exact limits are not well defined.

The esophagus, about 50 mm long, has 6–8 transverse ridges. These grade into an expanded stomach, about 60 mm long, with 19–20 large, thick, and rugose folds. The stomach is followed by a nearly featureless smooth-walled section of gut 85 mm in length. The thickened anterior half of this section has a single thick fold, 35 mm long and up to 10 mm wide, with lateral margins indented from main wall. A very thin-walled featureless section extends posterior to the fold for 35 mm, to the beginning of the spiral valve.

The thickened spiral valve, with 16–17 turns, is 110 mm long. The first spiral valve turn is extremely elongate, its length 40 mm from its origin to the origin of the second turn. Successive turns are progressively smaller. The posterior-most part of the gut, about 60 mm long, has almost featureless thin walls.

Etymology.—*Makararaja* (gender feminine) is from the Sanskrit, *makara*, originally meaning crocodile, but also the term for the cosmological arches or gateways of Hindu temples shaped like the open jaws of a crocodile, in allusion to the shape of the jaws of pastinachine stingrays including this new genus; and *raja*, Latin, for a skate or ray fish; *chindwinensis* for the Chindwin River, where the fish lives.

CONCLUSION

Until now it was generally considered that *Pastinachus* were essentially marine fishes, and that their occurrence in freshwater was a matter of adult fish in the tidal or lower part of rivers occasionally expatriated from marine populations. The presence of a freshwater pastinachine in the upper Irrawaddy basin some 850–950 km inland was totally unexpected. Perhaps there are also species of *Pastinachus* that live only in fresh water. For a summary of riverine and freshwater records attributed to *P. sephen* see COMPAGNO & COOK (1995: 78). A recent freshwater riverine record of *Pastinachus* (as *Hypolohpus* sp) is from the Baram River basin in Sarawak (NYANTI ET AL., 2006: 106).

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