

SEXUAL DIMORPHISM IN THE CARP *BARBUS (PUNTIUS)*
CURMUCA (HAMILTON)

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(Plate III)

A number of instances of sexual dimorphism among Indian carp are on record¹. A striking instance was observed by the writer in the hill carp *Barbus curmuca* (Hamilton), when making collections in the Periyar Lake on the Western Ghats in Travancore in 1936 and 1939.

Barbus curmuca occurs in Mysore and on the Western Ghats from Travancore to South Kanara. It is one of the large carps of the Periyar Lake and regularly breeds there. Several breeding males and females were available to me for examination.

Though Hamilton records a maximum size of 3 ft. for this species, Day considers that it attains "at least 4 ft. in length". Sexually mature specimens from the Periyar Lake ranged only up to 20 inches in length. The secondary sexual characters exhibited by this species are given below.

In the adult male (Plate III, fig. 1) there are usually three parallel rows of prominent pearl organs (horny tubercles) extending from about the tip of the snout along the upper jaw and face as far as the posterior margin of the eye. Mrs. J. G. Abraham of the Madras Fisheries Department, who has made a large collection at Periyar recently, found that pearl organs begin to appear as a single row when the males reach a length of 13 cm. Whilst most adult males have only 3 horizontal rows, the number may vary from 1 to 5 according to age. She also found some young females with rudiments of pearl organs as in males of the same size. In addition to pearl organs the anal fin in the male is short and rounded with the median rays somewhat elongated forming a bluntly pointed prominence in the middle of the free margin of the fin which when laid back hardly reaches the root of the caudal fin.

¹Hora, S. L. & Mukerji, D. D., *J. Asiat. Soc. Bengal* (New Series) 'XXVII, pp. 137-139, 2 figs. (1931) [in *Barbus chagunio* (Hamilton)]; Hora, S. L. & Mukerji, D. D., *Rec. Indian Mus.*, XXXVIII, p. 139 (1936) [in *Barbus spilophobus* McClelland]; Hora, S. L., *Rec. Indian Mus.*, XXXVIII, p. 141 (1936) [in *Barbus putitora* (Hamilton)]; Hora, S. L. & Misra, K. S., *Rec. Indian Mus.*, XXXVIII, pp. 341-342 (1936) [in *Labeo dero* (Hamilton)]; Misra, K. S., *Rec. Indian Mus.*, XL, p. 258, fig. 1 (1938) [in *Barbus (Puntius) melanampyx* (Day)]; Hora, S. L., *Rec. Indian Mus.*, XXXIX, pp. 22-24, figs. 8-9 (1939) [in *Barbus (Puntius) filamentosus* (C.V.)]; Hora, S. L. & Law, N. C., *Rec. Indian Mus.*, XLIII (2), p. 245, fig. 2 (1941) [in *Barbus (Puntius) filamentosus* (C.V.)].

In the adult females (Plate III, fig. 2) the pearl organs are absent. The anal fin is much longer than in the adult male, and has a characteristic shape. The anterior rays in adults are much prolonged and may reach as far as the middle of the caudal fin, when depressed. Mrs. Abraham found the anal fin shorter in young females up to a length of 20 cm., but the characteristic shape of the fin is noticeable even in the young.

Previous authors failed to recognise such marked differences as secondary sexual characters, apparently because their collections did not include mature specimens of both the sexes. Nevertheless, all the previous descriptions and illustrations confirm the existence of the secondary sexual characters described above.

Hamilton's original description¹ and his later detailed account² mention the tubercles on the head along with a "rather rounded" anal fin, and his figure illustrates both these male characters. McClelland³, according to Valenciennes⁴ only repeats Hamilton's description. Valenciennes described the species from Hamilton's account and figure, and mentioned the facial tubercles and the rounded anal fin of the male. Day's descriptions and figure are, however, interesting. His first description⁵ is unmistakably that of a mature female, as the facial tubercles are not mentioned and the anal fin is stated to be long, reaching the base of the caudal fin. In his later description⁶ the tubercles are mentioned as occurring in adults and the anal fin is not described. His figure, however, does not show the tubercles mentioned in his later descriptions but depicts the typically long pointed anal fin of the female. Evidently the figure illustrates Day's original description. Hora and Law⁷ figure a juvenile specimen. The tubercles on the head and the short anal fin indicate that the fish figured is a male.

¹ Buchanan, F. (later Hamilton), *A Journey from Madras through Mysore, Canara and Malabar* III, Chap. xviii, pp. 344-345, pl. xxx (1807).

² Hamilton, F., *Fishes of the Ganges*, pp. 294, 387 (1822).

³ McClelland, J., *Asiat. Research*, XIX, pp. 276, 353 (1839).

⁴ Valenciennes, M. A., *Hist. Nat. Poiss.* XVI, p. 317 (1842).

⁵ Day, F., *Proc., Zool. Soc. London*, p. 707 (1873).

⁶ Day, F., *Fishes of India*, p. 566, pl. cxli, fig. 1 (1878); *Fauna Brit. India. Fish*, I, p. 310 (1889).

⁷ Hora, S. L. & Law, N. C., *Rec. Indian Mus.* XLIII, p. 245, pl. ix, fig. 1 (1941).