

HERMAPHRODITISM IN THE THREADFIN FISH,  
*POLYNEMUS MICROSTOMA BLEEKER*

K. DORAIRAJ

*Central Marine Fisheries Research Institute; Regional Centre, Mandapam Camp*

The occurrence of hermaphroditism in the small-mouthed threadfin fish, *Polynemus microstoma* Bleeker, collected from the Palk Bay and the Gulf of Mannar is reported for the first time. Hermaphroditism is found in both the lobes of the gonad. The two sex portions in the ovotestis, which are easily distinguishable by their colour, adhere along the entire length of the gonad in antero-posterior direction. The testicular portion is on the inner lateral side of the gonad. The relative size of the male and female portions of the ovotestis varies in different specimens. It is seen from the microsections that the two sex portions are separated by a thin connective tissue.

The occurrence of hermaphroditism is reported as an abnormality in some species of fishes as the Indian mackerel (Prabhu and Antony Raja, 1959), oil sardine (Antony Raja, 1963) and skipjack (Raju, 1960), but the same phenomenon is considered as a normal condition in some other fishes as *Serranus* spp. (Clark, 1959). The fishes of the family Polynemidae, popularly known as threadfins, are particularly interesting in that out of nine species and one variety so far recorded from the Indian coasts, seven are known to exhibit hermaphroditism, they being *Eleutheronema tetradactylum* (Shaw), *Polynemus indicus* Shaw, *P. plebeius* Broussonet, *P. sextarius* Bl. and Schu., *P. sextarius* var. *mullani* Hora, *P. heptadactylus* Cuv. and Val. and *P. xanthonemus* Cuv. and Val. (Patnaik, 1967; Hida, 1967; Nayak, 1959 and Kagwade, 1969 and 1970). The occurrence of hermaphroditism in one more polynemid species, namely the small-mouthed threadfin fish, *Polynemus microstoma* Bleeker is reported here for the first time.

The author recorded, hermaphrodite specimens in the trawl catches from Palk Bay and Gulf of Mannar, landed at Mandapam and Rameswaram. About 35% of the total fish examined during January-February 1971 were hermaphrodites. Hermaphroditism is found in both the lobes of the gonad. The two sex elements in the hermaphroditic gonad are easily distinguishable by their colour in fresh specimens and by the microscopic examination of preserved specimens. In fresh specimens the male portion of the ovotestis is milky white and the female portion is either light greyish or dull yellowish in colour. In the right and the left lobes of the hermaphroditic gonad, the ovarian and the

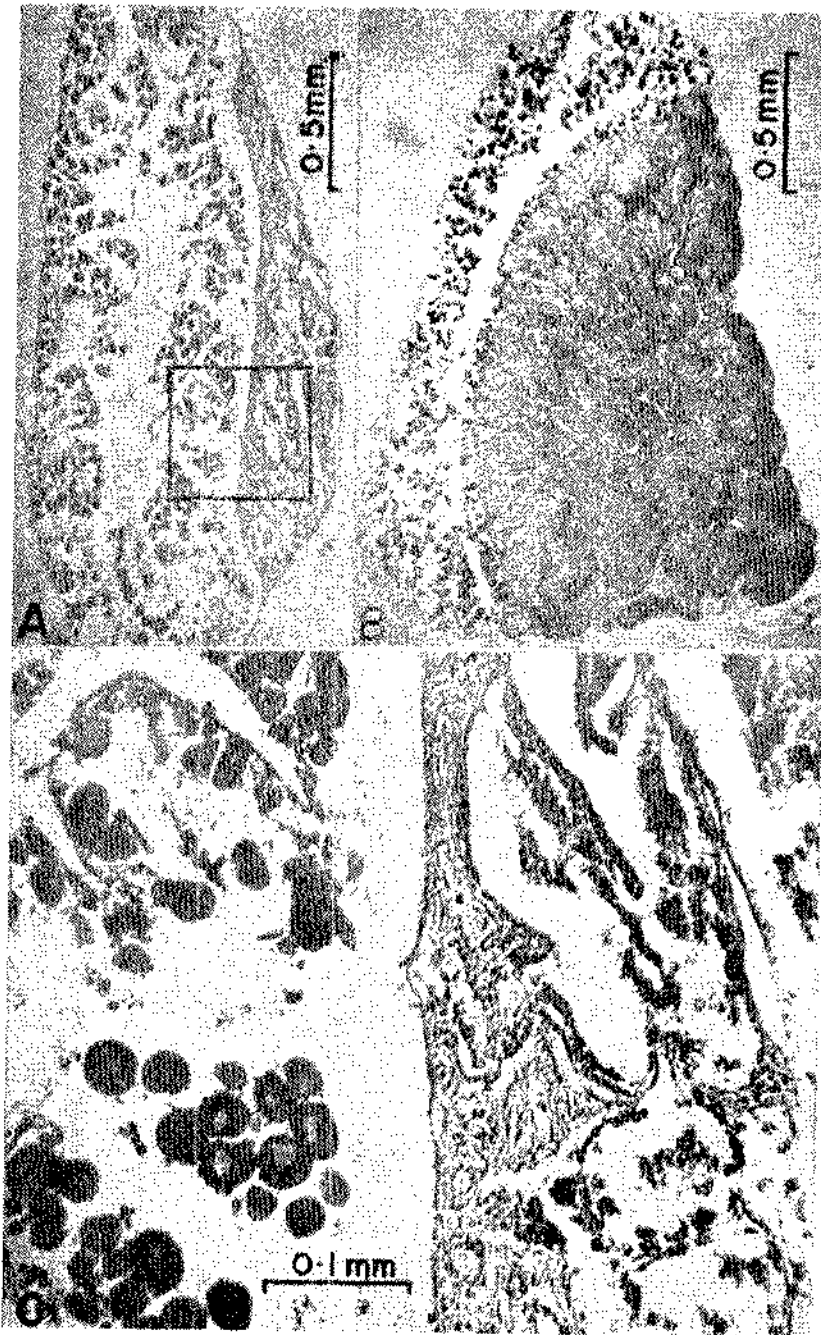


FIG. 1. Transverse microsections of ovotestis of *Polynemus microstoma*.

- A. The ovarian portion on the left side and the testicular portion on the right side (Fish 138 mm fork length).
- B. The ovarian and testicular portions (Fish 141 mm fork length).
- C. An enlargement of a portion of the section marked in A, showing oocytes, spermatogonia and the connective tissue separating the two portions of the hermaphrodite gonad.

testicular parts adhere along their entire length in the antero-posterior direction. The testicular portion is on the inner lateral side of the gonad and faces its counterpart of the other half whereas the ovarian portion is on the outer lateral side. The structure and size of the portions bearing the same sex elements in the right and the left lobes of the hermaphrodite gonad are usually identical. The relative size of the male and female portions of the ovotestis is not uniform but varies in different specimens (Fig. 1, A and B).

Microsections of an immature ovotestis of a specimen measuring 138 mm in fork length were taken. The transverse microsections were cut at  $8\mu$  thickness and stained with Delafield's Hematoxylin and counter-stained with Eosin. The photomicrograph of a section and an enlargement of a small portion of the section are shown in Fig. 1, A and C. The ovarian portion occupies more than one half of the ovotestis while the testicular portion occupies a narrow strip at the inner side of the hermaphroditic gonad and they are separated by thin connective tissue. The ovarian portion has a number of fairly big-sized ovigerous lamellae containing numerous oocytes in different stages of development. The oocytes measured between 0.025 mm and 0.063 mm in diameter. In the testicular portion spermatogonia and spermatocytes occur in clusters in the lobules which are smaller in size as compared to the lobules of the ovary. In another specimen of 141 mm in fork length the ovarian portion is relatively much smaller than the testicular portion (Fig. 1, B). Oocytes are scattered in the lamellae of the ovary while the spermatocytes and spermatids are closely packed in the lobules of the testis.

A comparison of the structure of the hermaphrodite gonad of *P. microstoma* with that of other species of hermaphroditic polynemid fishes shows, in general, a close similarity in the arrangement and position of the two sex elements in the ovo-testes. But some difference is noticed with regard to the relative sizes of the testes and ovary. In *P. microstoma* the present author has observed two types of hermaphrodites viz., (1) the female dominated hermaphrodite in which the ovary portion occupies more than one half of the ovo-testes and (2) the male dominated hermaphrodite in which the testis portion occupies more than one half of the ovo-testes. Similar conditions in the ovo-testes of *P. sextarius*, *P. sextarius* var. *mullani* and *P. xanthonemus* were observed by Hida (1967). But in *P. indicus*, the size of the testicular part in the hermaphrodite gonad was observed to be "either equal to or smaller than the ovarian part" (Kagwade, 1970).

The present finding of hermaphroditism in *P. microstoma* lends further support to the opinion expressed by Kagwade (1970) that the hermaphroditism may be a general character of polynemid fishes.

I express my sincere thanks to Dr. R. V. Nair, Deputy Director and Shri K. Virabhadra Rao, Retired Fishery Scientist for their guidance and

scrutiny of this note. I am thankful to Shri P. Raghavan for taking the photomicrographs.

- ANTONY RAJA, B. T. 1963. An instance of hermaphroditism in the oil sardine, *Sardinella longiceps* (Cuv. & Val.). *J. mar. biol. Ass. India*, 5 (1):148-150.
- CLARK, E. 1959. Functional hermaphroditism and selffertilisation in a serranid fish. *Science*, 129:215-216.
- HIDA, T. S. 1967. The distribution and biology of polynemids caught by bottom trawling in Indian Seas by the R/V *Anton Bruun*, 1963. *J. mar. biol. Ass. India*, 9 (2): 281-299.
- KAGWADE, P. V. 1969. Hermaphroditism in *Polydactylus indicus* (Shaw). *J. mar. biol. Ass. India*, 10 (2):399-401.
- KAGWADE, P. V. 1970. The polynemid fishes of India. *Bull. cent. mar. Fish. Res. Inst.*, 18:69.
- NAYAK, P. D. 1959. Occurrence of hermaphroditism in *Polynemus heptadactylus* Cuv. & Val. *J. mar. biol. Ass. India*, 1 (2):257-259.
- PATNAIK, S. 1967. Hermaphroditism in the Indian salmon, *Eleutheronema tetradactylum* (Shaw). *Curr. Sci.*, 36 (19):525.
- PRAKHU, M. S. AND B. T. ANTONY RAJA. 1959. An instance of the hermaphroditism in the Indian mackerel, *Rastrelliger canagurta* (Cuvier). *Curr. Sci.*, 28 (2):73-74.
- RAJU, G. 1960. A case of hermaphroditism and some other gonadal abnormalities in the skipjack, *Katsuwonus pelamis* (Linnaeus). *J. mar. biol. Ass. India*, 2 (1):95-102.
-