

SEX CHANGE IN THE OVIPAROUS
INDIAN BACKWATER OYSTER,
OSTREA MADRASENSIS PRESTON

THE adult larviparous oysters are always hermaphrodite whereas the oviparous ones are of separate sexes. Following the discovery of a single hermaphrodite individual in one species of oviparous oyster by Kellog,⁵ other workers, viz., Burkenroad,⁴ Loosanoff,⁶ Amemiya,^{1,2} Awati and Rai³ and Roughley⁸ have observed occasional change of sex in the American oyster, *Ostrea virginica*, the Portuguese oyster, *Ostrea (Gryphaea) angulata*, the Japanese oyster, *Ostrea gigas*, the Bombay rock oyster, *Ostrea cucullata* and the Australian commercial oyster, *Ostrea commercialis*. The sexuality of the Indian backwater oyster, *Ostrea madrasensis*, has not hitherto been studied. Since 1948 the present writer has examined over 4,000 specimens of adult oysters from different localities in the environs of the Madras City and the number of hermaphrodite ones noted in them is very small. Though some of them showed sperms and eggs when examined in the fresh condition, they have been in serial sections found to be of one sex only owing to the reason that the hermaphrodite regions of the gonad probably were not included in the sections. Clear hermaphrodite stages, however, were obtained in serial sections of material from two individuals collected from Ennur backwaters in the month of July 1953. Such individuals being very rare they are recorded owing to their scientific interest. The gonads of both these oysters when examined fresh showed fully ripe and motile sperms and eggs in all stages of development. In the serial sections of one of them (Fig. 1) the follicles close to the periphery and opening directly into the gonadial ductules showed eggs of larger size of which some were free within the lumina whilst those lying deeper down had eggs of gradually decreasing sizes proliferating from the lining epithelium. All follicles were fully packed with ripe sperms. In the second specimen (Fig. 2), the sections indicate that the formation of eggs has progressed much further as revealed by the presence of larger ones even in the deeper portions of the gonadial layer and the sperm masses of the lumina were less dense. Owing to the absence of developing spermatocytes in both the oysters and the presence of ova in varying stages including young oocytes, it is clear that the sex change is from male to female. The rarity of hermaphrodite individuals is fairly clear evidence that bisexual condition is purely transitional.

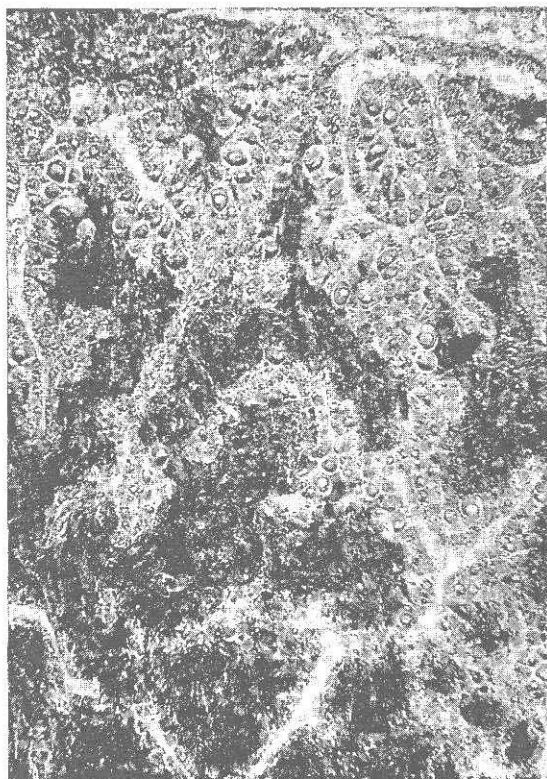


FIG. 1. Photomicrograph of section of gonad of *O. madrasensis* 130—Upper follicles with larger eggs and lower with smaller ones. Dark masses sperms.

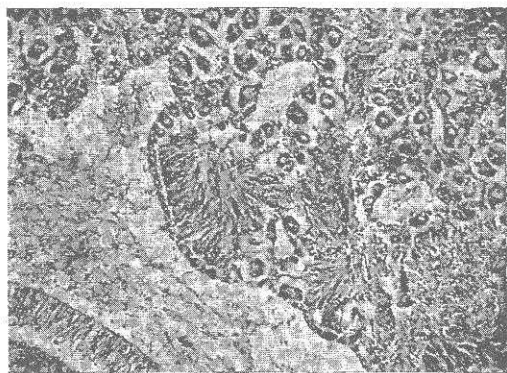


FIG. 2. Photomicrograph of section of gonad of *O. madrasensis* 160 showing large eggs and less dense masses of sperms in the lower follicles.

Table I shows the percentages of sexes in fortnightly samples of about 100 oysters examined every month from Ennur backwaters.

TABLE I

Month	Males	Females	Indeter- minate sex	Herma- phrodites
	%	%	%	%
March 1953	61.2	38.7	nil	nil
April "	59.77	40.23	nil	nil
May "	60.63	39.36	nil	nil
June "	57.44	34.04	nil	8.5?
July "	42.16	52.94	0.98	3.9
August "	43.60	44.66	10.68	0.97
Sept. "	27.88	66.34	5.76	nil

From March to June the percentage of males in the samples is very high which, however, diminishes gradually commencing from July to September 1953. In September 1953 the percentage of females is as high as 66.34. As the main spawning season which is November-December (Rao⁷), approaches, the proportion of the females in the population seems to increase considerably. The number of hermaphrodite individuals met with being so small, it is doubtful whether all oysters that change their sex pass through this transitional phase. The occurrence of fair numbers of oysters of indistinguishable sex during the months preceding September shows that this species also changes its sex after passing through a stage in which the germ cells are undifferentiated into male or female components. A detailed study of the sex ratios and seasonal gonadal changes in *Ostrea madrasensis* in relation to the fluctuating environmental conditions is in progress.

The author's grateful thanks are due to Dr. N. K. Panikkar for his helpful criticism.*

Central Marine Fisheries K. VIRABHADRA RAO.

Research Unit, Madras-5,

October 12, 1953.

* Published with the permission of the Chief Research Officer, Central Marine Fisheries Research Station, Mandapam Camp P.O.

1. Amemiya, I., *Nature*, 1925, **116**, 608.
2. —, *Jap. Jour. Zool.*, 1928, **2**, 99.
3. Awati, P. R. and Raj, H. S., *Indian Zool. Memoirs*, 1931, **3**, 1.
4. Burkenroad, M. D., *Science*, 1931, **74**, 71.
5. Kellog, J. L., *Bull. U.S. Fish. Comm.*, 1892, **10**, 389.
6. Loosanoff, V. L., *Biol. Bull.*, 1942, **82**, 195.
7. Rao, K. V., *Proc. Ind. Acad. Sci.*, 1951, **33**, 231.
8. Roughley, T. C., *Proc. Linn. Soc., N.S.W.*, 1933, **58**, 279.