

MATURATION AND BREEDING HABIT OF *DASYATIS*
(*AMPHOTISTIUS*) *IMBRICATUS* (SCHNEIDER) AT PORTO NOVO

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ABSTRACT

In *Dasyatis imbricatus* only the ovary and the uterus on the left side are functional. It has a prolonged breeding season from December to July and produces 1 or 2 embryos. The ova are ready for ovulation even before the parturition of the embryo in the uterus. The females reach maturity when they attain the size of 170-179 mm as confirmed by the ponderal index. The males in the 160-169mm size group are mature as judged by the relationship between body length and clasper length. Sexes in the commercial catches vary — 51.25% males to 48.75% females

INTRODUCTION

The ray fishery is of importance since they are good marketable food fishes. A very good ray fishery exists in this region of east coast. They are eaten fresh as well as in salt cured form. All the information available are mostly related to sharks. Information on the Indian ray fishes is very scanty and only some information is available on the breeding of rays in Bombay waters (Setna and Sarangdhar, 1949) and on *Rhinoptera javanica* and *Gymnura poecilura* (James 1962 and 1966). The present work deals with breeding season, size at maturity, sex ratio and ponderal index in the ray fish *Dasyatis (Amphotistius) imbricatus*.

MATERIAL AND METHODS

The material for this study was collected from Porto Novo fish landing Centre and Cuddalore Port areas from small trawlers between November 1972 and October 1974. These rays, being inhabitants of shallow waters, are sometimes caught by the cast nets operated from small canoes at the mouth region of Vellar river. Measurements of disk width and sexes were noted at the landing centre. Samples on a monthly basis were preserved in 10% formaldehyde for further studies. The clasper lengths were taken as shown in Fig. 2.

BREEDING IN *D. (A.) IMBRICATUS**Reproductive organs of the female:*

In *Dasyatis (Amphotistius) imbricatus* only the ovary on the left side develops. Correspondingly the left uterus is functional while the right uterus remains undeveloped as a strip of tissue by the side of the kidney. Just below the oesophagus, the oviducal funnel can be seen continuing posteriorly along with the shell gland ending in a dilated uterus opening outside through cloaca. The uterus of this species has a thick wall. One to two embryos develop in the uterus. The wall of the uterus is produced into many finger like processes called trophonemata.

Breeding season:

D. (A.) imbricatus appears to have a specific breeding season. No egg capsule could be traced in the uterus throughout the period of observation but full grown embryos were found in the uterus of females collected from December to May. Besides, specimens which have already released the young ones were also met with during the same period. The uterus of such specimens appear loose and baggy with a relatively big pit inside and the trophonemata appear worn out and pale, compared to the normal trophonemata which are highly vascularised.

The embryos collected were nearly full grown with their ovisac and the connecting stalk still hanging below the disk on the ventral side (Fig. 1). A full grown embryo, 75 mm across the disk and recovered from the uterus on 16th July 1973, was in the process of parturition with the tail of the embryo protruding out. The yolk stalk appeared to be completely absorbed and the sac was reduced to the size of a pin head. The size of the full grown embryos inside the uterus varied according to the size of the mother. The parturition period also

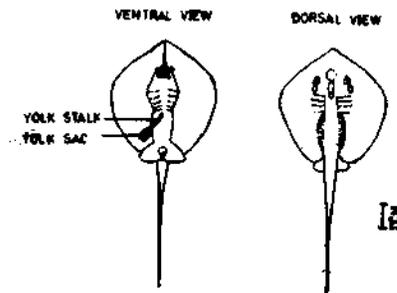


FIG. 1

appears to be a protracted one from December to May. Incidence of free swimming embryos of 56 mm across the disk were recorded during May. Some late breedings were also evidenced by the occurrence in July of embryos ready for parturition. It was suggested (Ford 1921) that the embryos from the largest capsules would remain for the longest time in the uterus.

The ova developing for the succeeding ovulation measured 10 mm in diameter in October, 11 mm in November, 12 mm in December and 13-15 mm in February. In another case, ova of the size of 12-14 mm were met with in May. Generally two to three ova develop out of the general egg stock at a time, and get heavily deposited with yolk. Only one ovum and some times two, get fertilized and subsequently develop into an embryo. No fixed placental connection is established between the mother and the foetus.

Conditions in the uterus:

This species is ovo-viviparous non-placental type. No separate compartment is developed for each embryo. The embryo lies inside the uterus with the head portion towards the anterior side of the mother, the free sides of the pectoral fin folded up in a tube like fashion.

The posterior end of the uterus is open towards the vagina during gestation period. At the time of parturition the embryo emerges tail-side first.

During early gestation, the embryo is nourished by the yolk enclosed in the egg capsule which is common to all the ovi-ovoviviparous species. When the yolk is completely absorbed, feeding appears to be supplemented by the secretions from the uterine wall. This is fully evidenced in this species by the development of finger like projections from the wall of the uterus and the numerous filamentous structures entering the gillslits.

Size at maturity:

Teshima (1971) determined maturity size in respect of male of *Mustelus manazo* by the relation between the body length and clasper length. The relation between the length of disk across and the clasper length is shown in Fig. 2. It is clear that the rate of growth of claspers increases in specimen up to 159

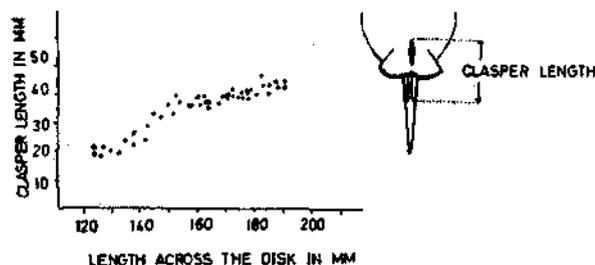


FIG. 2

mm size. The growth rate of claspers beyond this length group is slackened. The males reach maturity when they reach 160-169 mm size. This is amply proved by an examination of testes. The specimens up to 140 mm across the disk do not

show any differentiation of testes. In fishes of 140 mm and 149 mm size, the testes are white ribbon like organs, occupying 1/4-1/3 body cavity; those between 150 mm and 159 mm develop testes as 3-lobed segment-like structures occupying upto 1/2 body cavity. Those beyond 160 mm develop testes as 5-lobed segment like structures, occupying almost the full length of body cavity.

The ovary in specimens upto 140 mm across the disk could not be seen. From 140 mm-149 mm, the ovary is just visible and weighs on an average 0.018 g. In 150-159 mm size group the ovary weighs 0.035 g., and 0.186 g at 160 mm to 169 mm size group. In 170 mm to 179 mm size group the weight increases to 0.588 g. Pregnant females were recorded in the size range of 170 mm onwards, with a lonely exception of a female of 165 mm which carried an embryo. The females seem to attain maturity when they reach 170 mm to 179 mm size range.

PONDERAL INDEX

Hickling (1930) and Devadoss (1969) studied the ponderal index by correlating the lower level of condition with the attainment of sexual maturity and spawning in fishes. The length weight data collected throughout the period of investigation were pooled and the value for 'K' was calculated by using the formula $100 W/L^3$, where W is the weight in g of fish, L, length of fish in cm (here width of disk) and K the ponderal index. The results are presented in Fig. 3. The point of inflexion on a curve showing the diminution of 'K' with increasing length is thus an approximate indication of the length at which sexual maturity is reached (Hart 1946). It may be said from the curve pattern in Fig. 3 that *D. (A.) imbricatus* assumes maturity at 170 mm. This is further supported by the incidence of mature and spent specimens at this size group.

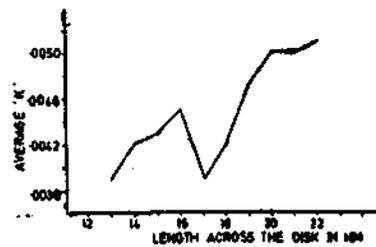


FIG. 3

SEX RATIO

Sexes in Elamobranchs are easily recognised by the presence of two claspers which are the posterior extension of pelvic fins in males. The maximum size of this ray recorded in the present study is 198 mm across the disk in males and 220 mm in females, but Misra (1959) has recorded specimens measuring about 304 mm across the disk. The total number of fish examined presently is

359 (Table 1) of which 184 were males (51.14%) and the sex ratio is 1 female : 1.05 males. However the predominance of any one sex was seasonal. Female dominance was noticed during May to July and November and December, whole males appeared in good numbers during January to April and again in September.

TABLE 1. *Showing percentage of sexes in the commercial catches.*

Months		Total No. examined	% females	% males
November	1972	37	67.5	32.5
December	1972	42	50.9	49.1
January	1973	51	45.1	54.9
February	1973	19	40.4	59.6
March	1973	50	36.0	64.0
April	1973	14	16.7	83.3
May	1973	46	52.2	47.8
June	1973	7	57.1	42.9
July	1973	18	66.7	33.3
September	1973	8	37.5	62.5
October	1973	6	50.0	50.0
November	1973	33	54.5	45.6
February	1974	28	42.8	57.2
July	1974	45	55.6	44.4
August	1974	35	42.9	57.1
Total		359	48.75	51.25

REMARKS

Chaudhuri (1916) studied four embryos of this species from the collections made from Chilka lake. According to him, only one embryo collected during September measuring 60 mm across the disk appeared full-term and the other three embryos obtained during March were in early stages of development. Based on this Jones and Sujansingani (1954) Suggested that this species probably has an extended breeding season at Chilka lake. In the present study at Porto Novo, however the parturition time of this species appears to be from December to July and the peak from February to May, since many specimens which have already extruded their embryos (as evidenced by an examination of the uterus) were collected during this period.

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