MATSYA 9-10: 129–134, 1983–84

Further observations on the biology of the sting ray, *Dasyatis Imbricatus* (Schneider) at PortoNovo

P. DEVADOSS

Centre of Advanced Study in Marine Biology, Annamalai University, PortoNovo-608 502

Abstract

The length weight relationship of *Dasyatis imbricatus* (*schneider*) was calculated separately for males and females. The results show that exponent is greater than 3 for females suggesting that growth is not strictly isometric. Analysis of gut contents reveal the bottom feeding nature of this ray with crustacean forms constituting 64.8% followed by polychaetes with 33.5 of the feed. The size at first maturity is determined by relating the percentage of liver weight in body weight to the average body weight and also to the length of the body.

INTRODUCTION

The importance of fishing for rays is increasingly felt in recent years, as man's effort extends in search of more food for the ever increasing population. The sting rays form an important fishery at PortoNovo. The large sized rays are fished by a specialised type of bottom set gill net locally called 'Thirukai Valai,' while the smallest rays like *D.imbricatus* (Schneider) and electric rays are fished by shrimp trawlers and at times by the cast net at the mouth of the Vellar estuary. Information on the biology of rays is meagre. Prashad (1920) described the embryonic stages of the electric ray, *Narcine indica.* James (1962, 1970) made observations on the fishery and biology of *Rhinoptera javanica* muller and Henle and *Gymnura poecilura* (*Shaw*) from Mandapam area. Devadoss (1977, 1978) studied the taxonomy, food and feeding habits, breeding and fishery of some rays of PortoNovo—Cuddalore coast of Tamilnadu.

The length-weight relationship has been studied in a large number of bony fishes, but this aspect has not been investigated much in the case of elasmobranchs. In the present work an attempt was made to fill this gap to certain extent in respect of *D. imbricatus.*

MATERIAL AND METHODS

Samples were collected from the trawl landings. The length across disc of rays was measured in mm and the body weight and liver weight were taken in gm. Rays measuring between 110 mm and 220 mm length across disc were examined. The stomach contents of 208 rays were studied qualitatively. Due to small size of stomachs, occurrence method (Hynes, 1950) was employed and the incidence of various species or groups as food was noted month-wise.

The length-weight relationship of males and females was calculated separately using the formula $W = a L^b$ where W is weight in gm, L length in mm and a and b are constants.

This formed part of the author's Ph.D., thesis, Annamalai University.

Present address: Madras Research Centre of CMFR Institute, CmC Road, Madras-600 105

Results and Discussion

Length-weight relationship: In figure I the observed values of length and weight and their logarithmic values have been plotted separately and the calculated length weight curve fitted to the data. The calculated length weight relationships are given below.

Males $W = 0.0000\ 4070^{2.9838}$

Females $W = 0.0000\ 00\ 9114\ L^{3.6907}$

The corresponding logarithmic equation may be represented as:

Males $\log W = 4.3903 + 2.9838 \log L$

Females $\log W = 6.0403 + 3.6907 \log L$

It is seen that exponent is greater in females suggesting that growth is not strictly isometric. The curve of females intersects that of males at sizes 170-190 mm (Fig. 1) indicating that females tend to be heavier after attaining this length. Incidentally the females reach

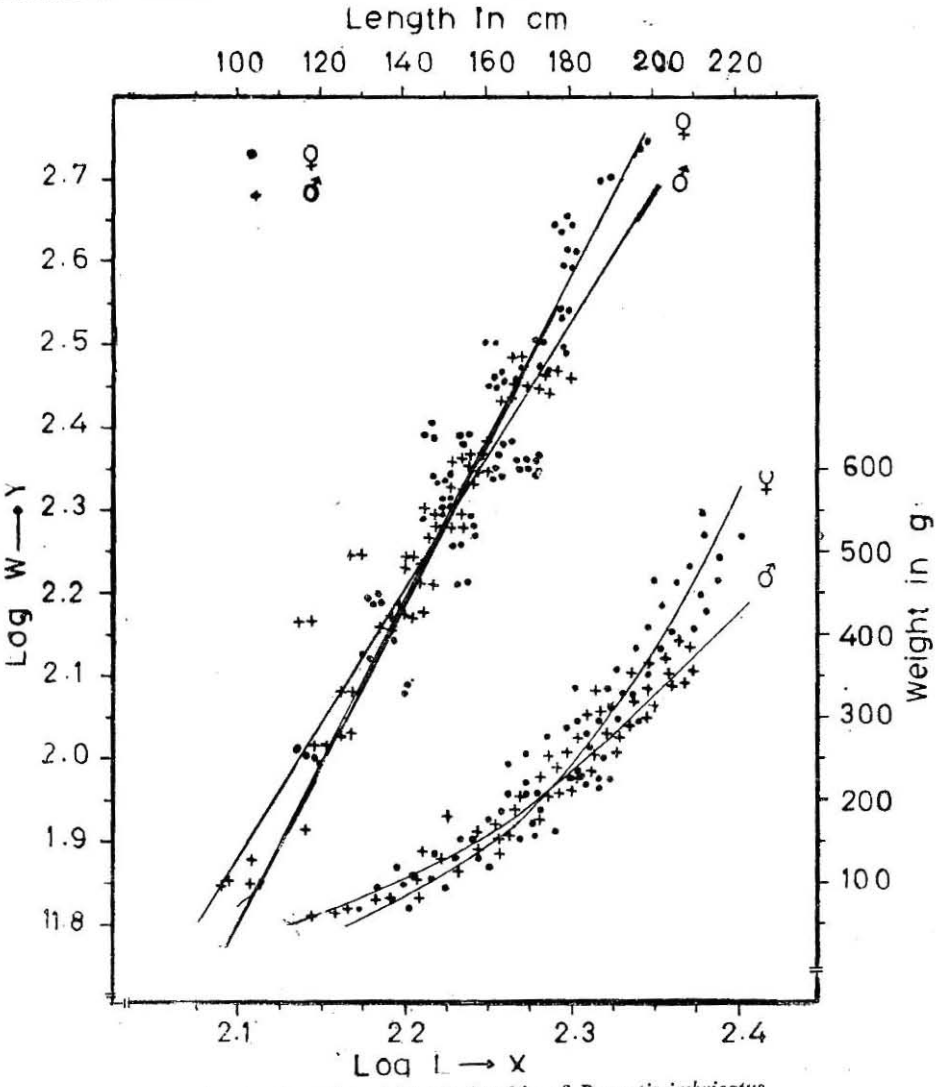

Fig. 1. Length weight relationship of *Dasyatis imbricatus*

TABLE 1. INCIDENCE OF VARIOUS SPECIES OR GROUPS OF ORGANISMS AS FOOD OF *Dasyatis imbricatus* AT PORTONOVO

Month	No. Stomachs Examined	Polychaetes		Mysids		Amphipods		Crabs		Shrimps		Stomatopod Larvae		Other crustaceans		Molluscs		Fish	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			No.	%	No.	%
December 1975	18	108	45.38	30	12.61	32	13.45	28	11.76	26	10.92	—	—	14	5.88	—	—	—	—
January 1976	20	32	23.19	50	36.23	16	11.59	8	5.80	24	17.39	—	—	8	5.80	—	—	—	—
February	24	84	22.58	92	24.73	38	10.22	16	4.30	116	31.18	4	1.08	—	—	—	—	22	5.91
March	16	34	34.68	24	24.49	—	—	28	28.57	6	6.12	—	—	4	4.08	—	—	2	2.04
April	24	22	24.44	—	—	—	—	30	33.33	8	8.89	—	—	30	33.33	—	—	—	—
May	22	28	18.67	36	24.00	36	24.00	22	14.67	26	17.33	—	—	—	—	2	13.33	—	—
July	10	—	—	12	50.00	—	—	6	25.00	6	25.00	—	—	—	—	—	—	—	—
September	15	12	23.08	10	19.23	18	34.62	—	—	8	15.38	4	7.69	—	—	—	—	—	—
October	14	—	—	36	54.55	16	24.25	6	9.09	4	6.06	—	—	4	6.06	—	—	—	—
November	22	142	49.31	16	5.56	30	10.42	22	7.64	56	19.44	14	4.86	6	2.08	2	0.69	—	—
February 1977	25	130	52.00	—	—	94	37.60	14	5.60	6	2.40	4	1.60	—	—	2	0.80	—	—
TOTAL	208	592	33.52	306	17.33	280	15.86	180	10.19	286	16.19	26	1.47	66	3.74	6	.34	24	1.36

their first maturity at 170–179 mm (Devadoss, 1977).

Food and feeding habits: As part of observations on the biology of the species qualitative information was recorded on stomach contents by listing species or group of species encountered. The incidence of various food items in the stomachs month-wise is summarised in Table 1.

Crustaceans: Under this group a wide range of species was recorded on 64.8% of the occasions when sampling was conducted. Mysids, amphipods, Alima larvae, *Apseudes, Nebalia,* isopods, copepods, Crabs like *Matuta, Emerita, Albunea* and hermit Crabs and shrimps like *Ogyrides, Alpheus, Acetes, Solenocera* and young ones of the other prawns together constituted the major portion of the food in the order of importance.

Polychaetes: In this category, mostly the nereids and eunicid worms constituted the next important diet forming on average 33.5%. These worms were more common from November to March.

Others: These included gastropods and byssus threads of bivalves which accounted for 0.3% and larvae and young ones of fishes (1.4%). Besides, all stomachs invariably contained sand grains.

The study on stomach contents established the fact that this ray is a bottom feeder subsisting on the epifauna and infauna of the habitat. This is amply proved by the presence of the borrowing crustaceans and polychaete worms and also by incidence of sand grains in the stomachs. Dorso-ventrally compressed body and the ventral position of the mouth are well suited for feeding on the bottom fauna. Clark (1922) observed that the small rays preferred crustaceans like amphipods and isopods. *D.imbricatus* is one of such small sized species and naturally it is adapted for feeding on the smaller crustaceans.

Liver as index for maturity: Maturity and breeding of this ray was studied in detail at PortoNovo (Devadoss, 1978). An attempt has been made in the present study to relate the size of liver with the first maturity. The liver exhibited certain significant developments before and after the initial maturity. Then maximum liver weight of 6.5% in relation to body weight was found when the non pregnant females attained the mean body weight of 220 gm and 3.2% in the case of males with mean body weight of 190 gm. Individual rays showed variations in percentage of liver weight to body weight.

It was found that the liver weight of both sexes increased with the total weight until the animal started breeding. The females with developing ovary showed the highest percentage of liver weight to body weight (6.5%), whereas the females of the same body weight bearing pups in advanced pregnancy showed liver weight of 2.5% to body weight. Incidentally the females with 170–79 mm across disc attained the mean weight of 220 gm when they reached their first maturity stage. So also the males between 160–169 mm size weighed on an average 190 gm when they attained maturity.

These observations showed that at the early stage of pregnancy the liver weight reached its maximum, but gradually declined as the gestation period progressed. In other words, the

liver functions as a store house of energy which is consumed at the time of gestation for nourishment of the developing embryos. The percentage of liver weight in body weight was compared with the length of the animal which also showed (fig. 2) a strong indication of lesser weight of liver at the onset of maturity.

ACKNOWLEDGEMENT

The author is highly indebted to Dr. R. Natarajan, Director, Centre of advance study in Marine Biology, PortoNovo for guidance and to the to the authorities of Annamalai University for extending all facilities.

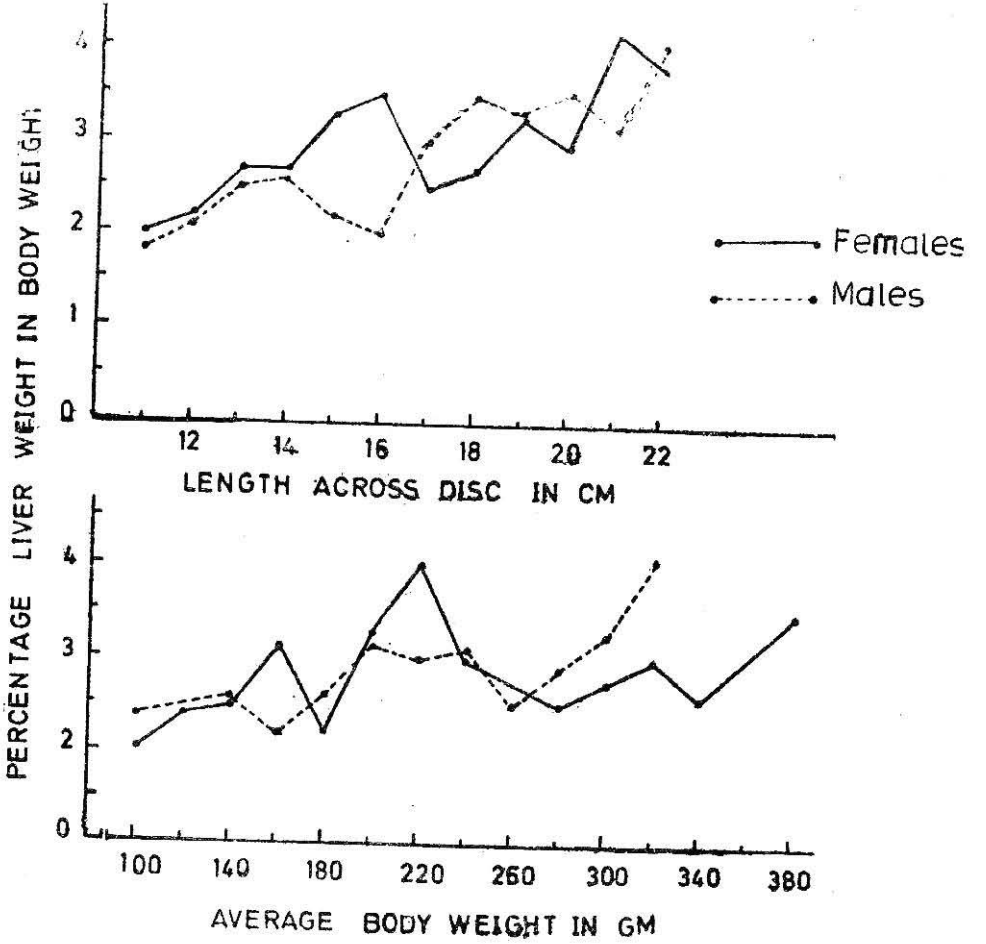

Fig. 2. A. Percentage of liver weight and body weight against length of *D.imbricatus*.

B. Percentage of liver weight and body weight against body weight of *D.imbricatus*.

LITERATURE CITED

CLARK, R. S., 1922. Rays and skates (Raiae) No. 1 egg capsules and young. *J. Mar. Biol. Ass. U.K.*, **12(4)**: 578-643.

DEVADOSS, P., 1977. Studies on the elasmobranchs of Portonovo coast (South India) Ph.D., Thesis, Annamalai Univ., 210 pp.

————1978. Maturity and breeding in *Dasyatis imbricatus*. *Indian J. Fish*, **25**:

————1978. A preliminary study on the batoid fishery resources of Cuddalore coast. *Indian J. Fish.*

HYNES, H. B. N., 1950. The food of the fresh water stickle-backs (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in studies of the food of fishes. *J. Anim. Ecol.*, **19**: 36-58.

JAMES, P. S. B. R., 1962. Observations on shoals of the Javanese cow nose ray, *Rhinoptera javanica* Muller and Henle from the Gulf of Mannar, with additional notes on the species. *J. Mar. Biol. Ass. India* 217-223.

————1966 Notes on the biology and fishery of the butterfly ray, *Gymnura poecilura* (Shaw) from the Palk Bay and Gulf of Mannar. *Indian J. Fish*, **13**: 150-157.

PRASHAD, B., 1920. Notes from the Bengal Fisheries Laboratory No. 7. On some Indian Torpedinidae from the Orissa Coast. *Rec. Indian Mus.*, **19**: 97-105.