SOME OBSERVATIONS ON THE FECUNDITY AND SPAWNING HABITS OF THE ROCK COD, *EPINEPHELUS TAUVINA* (FORSKAL)

G. S. D. SELVARAJ AND M. RAJAGOPALAN
Central Marine Fisheries Research Institute, Cochin-18

Some observations on the fecundity and spawning behaviour of *Epinephelus tauvina* (Forskal) trawled at depths between 35 and 45 metres along the south-west coast of India are dealt with here.

Rock cods are important in the perch fishery of the south west coast of India, as is evident from the results of the exploratory surveys carried out along the south west coast of India (Menon & Joseph, 1969; Silas, 1969). However, there is hardly any information on the biology of the rock cods from this area. The observations embodied in this note on the fecundity and the spawning behaviour of *Epinephelus tauvina* (Forskal) should therefore, be of interest.

Material: 1 male: 3-11-1967, M. V. VELAMEEN, trawled at 36 metres, off Cochin, T.L. 1920 mm, wt. 180 Kgs, wt. of testis 15 Kgs; 1 male (FIG. 1 a): 11-11-1971, M. V. BLUEFIN, from 45 m, off Ponnani, T. L. 2090 mm, wt. 151 kgs, wt. of testis 14 kgs; 1 female: 19-11-1971, M. V. BLUEFIN, from 36 m, off Cochin, T. L. 2115 mm, wt. 265 Kgs and wt. of ovary 17 Kgs.

Morphometric and meristic details: Since morphometric and meristic details of large size specimens of *E. tauvina* will be desirable, the following data on the material examined is also given below:—

D. XI. 15-16; A. III. 8; P. 18; V. I. 5; L. l. with 65 tubules; scales on mid-lateral row about 90; cheek scales 37-38, G. R. (8-9) + 8 short knobular blunt processes plus 8-9 rudiments on the anterior region of the lower limb, each provided with numerous closely set patches of teeth; maxilla, mandibles, vomer and palatine with closely set minute conical teeth; vomerine teeth in three patches. Head 30.3, snout 6.4, eye 2.1, maxillary 16.1, snout to nares 4.7, predorsal distance 30.0, prepectoral distance 33.3, prepelvic distance 40.4, preanal distance 62.0, greatest depth of body at dorsal origin 39.5, depth at caudal peduncle 10.9, length of pectoral 18.7, pelvic 12.6 and caudal 13.3 per cent in total length (average for two specimens). Colour uniform brown dorsally and lighter ventrally.

Gonads: The stages of maturity of gonads were determined based on the principles defined by the International Council for the Exploration of the

Sea (Wood, 1930). The fully mature testis (Stage VI) is bilobed, greatly enlarged, very soft and milky white in colour with oozing milt. The maturing ovary (Stage IV) is also bilobed, greatly enlarged and golden yellow in colour occupying most of the body cavity. Each lobe of the ovary has numerous lobules (FIG. 1 b). The ovarian wall is very thin and bursts at the slightest pressure. At this stage, the ova are loose but densely packed.

The ova of the most advanced mode (FIG. 2) vary in diameter from0.37 mm to 0.63 mm and are spherical and translucent, with granulated yolk and no oil globules. The ova of smaller sizes are opaque and those less than 0.075 mm are transparent and of irregular shape.

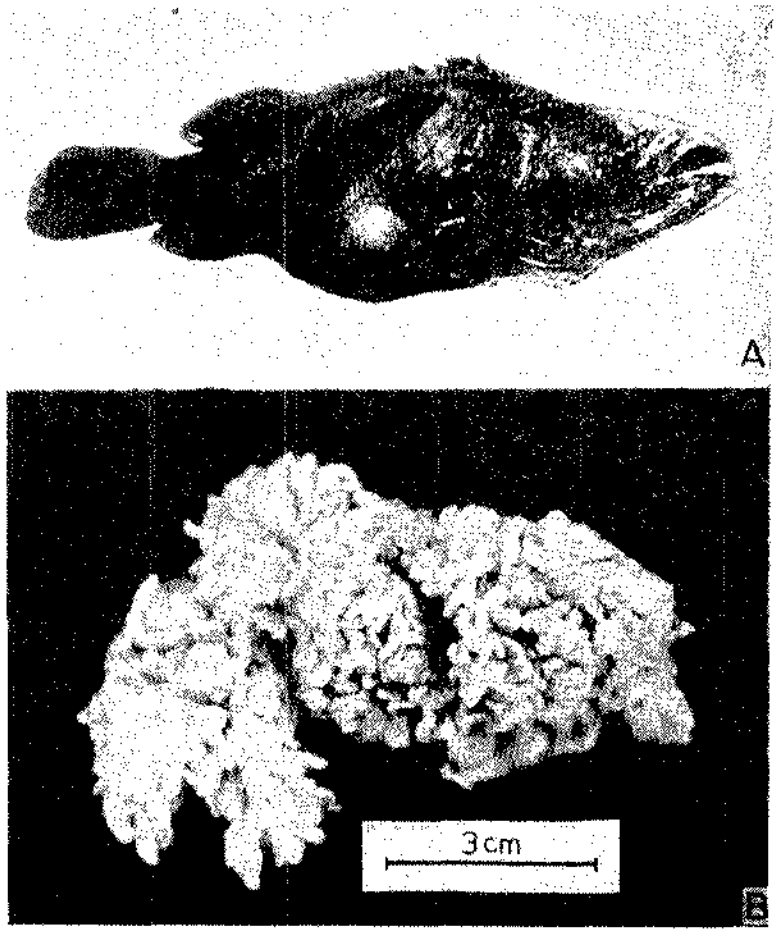

FIG. 1. A. *Epinephelus tauvina* (Forskal) male 209 cm.
B. Portion of ovary (Stage IV) of *Epinephelus tauvina* (Forskal) showing the lobules with loose ova.

The diameter of 3000 ova were measured from six different parts of the ovary (anterior, middle and posterior regions of right and left lobes). Early developing ova of less than 0.075 mm were not included in the measurements. A comparative analysis of the different regions of the ovary reveals that the ova of the most advanced mode are almost equally distributed throughout the ovary, whereas, the early developing ova occur in relatively greater numbers in the anterior region of the ovary. However, the three regions of the right and left lobes examined for ova diameter showed the same pattern of distribution of ova, as will be seen in the frequency polygon of the total number of ova examined (FIG. 2).

Fecundity: From each lobe, three samples of ova of 2 grams each (with ovarian tissues) were taken from the anterior, middle and posterior parts for

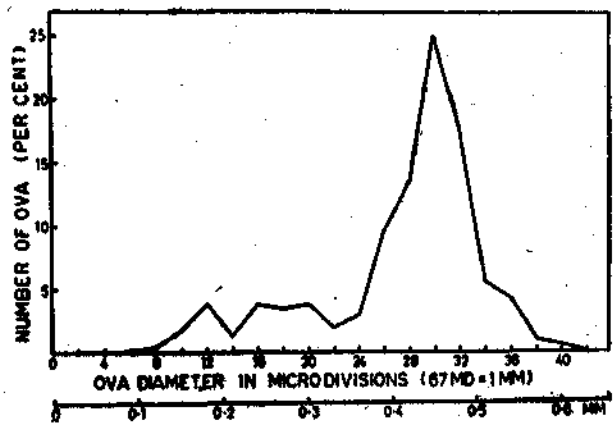

FIG. 2. Ova diameter frequency polygon of the maturing ovary (Stage IV) of *Epinephelus tauvina* (Forskal)

TABLE 1. *Fecundity counts on the ovary of* E. tauvina *(Stage IV)*

Section	Number of ova	Number of ova of advanced mode	% of estimated number of ova of advanced mode
Anterior right	44020	29935	68
Anterior left	47600	30940	65
Middle right	41345	31835	77
Middle left	39745	31395	79
Posterior right	35065	29455	84
Posterior left	33500	29145	87

estimating fecundity and details of counts are given in Table 1. On the basis of this, the total ova for an ovary weighing 17 kgs was estimated as 341.8 millions, of which the mature ova of the advanced mode constituted 258.9 millions (76%).

Frequency of Spawning: The deposition of yolk in the ova is a clear indication of the commencement of the maturation process. The frequency distribution of the ova diameter indicates only one dominant mode of maturing ova, as the ovary matures to stage IV and other developing ova being much smaller (FIG. 2). It would appear that the ova of the most advanced mode in the maturing ovary may differentiate themselves and rapidly develop into Stage VI before they are shed. The secondary modes of immature ova are relatively more in the anterior region than in the middle and posterior regions of the ovary. It is not clear as to how soon these modes of immature ova may develop and be ready for spawning and whether they would be spawned during the same season itself.

A few residual or degenerate ova were also seen in the samples indicating that the fish had spawned recently. As it is, it would appear that the ova of the most advanced mode (FIG. 2) are spawned within a short period. The degree of development of the gonads of the specimens examined suggests that spawning may take place in November. However, the data are insufficient to indicate the duration of the spawning season. More information on the breeding habits of this species will be desirable.

The authors are greatly indebted to Dr. E. G. Silas for the guidance and encouragement offered in the preparation of this note.

MENON, M. D. AND K. M. JOSEPH, 1969. Development of Kalava (Rock Cod) Fishing off South west coast of India. *Seafood Export Journal*, 1969 1. (2):7-28.

SILAS, E. G., 1969. Exploratory Fishing by R. V. VARUNA', *Bull. Cent. mar. Fish. Res. Inst.* 12: 53-66.

WOOD, H. 1930. Scottish herring shoals. Pre-spawning and spawning movements. *Scotland. Fish, Bd. Sci. Invest.*, 1: 1-71.