

Fig. 8 on Pl. 15, resemble the parasites seen in the photomicrograph (Fig. 3) accompanying

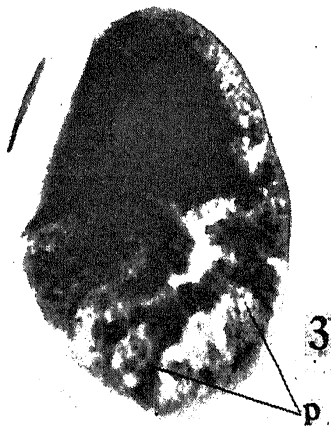


FIG. 3.—*Nyctotherus* sp. showing entamoebæ (p) × 333.33.

this paper. Walker's Fig. 5 on Pl. 15, seems to represent not enlarged "spores", but deeply stained entamoebæ invaded by certain micrococci and the so-called "remnant of the broken down sporocyst" enclosing these "spores" is, in all probability, an artefact formed by aggregation of bacteria and other extraneous matter.

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August 28, 1943.

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### SELACHIAN FAUNA OF BOMBAY WATERS

VERY little concentrated work has been done on the systematics of Indian Elasmobranchs since Dr. Day's time (1889), and complete records of their life-history hardly exist. An opportunity to add to the literature was afforded during investigation of the Selachian fauna occurring along the Bombay coast. Studies spread over a period of two years and a half have established the occurrence of 40 species of sharks, skates and rays as represented in the table below:—

Family—Orectolobidæ: Genus—*Chiloscyllium*, *C. griseum* Muller and Henle; *Ginglymostoma*, *G. ferrugineum* (Lesson); *Stegostoma*, *S. tigrinum* (Forster); *Rhineodon*, *R. typus* Smith.

Family—Odontaspidæ: Genus—*Odontaspis*, *O. tricuspidatus* (Day).

Family—Carcharhinidæ: Genus—*Scoliodon*, *S. sorrakowah* (Cuvier), *S. pallasorrah* (Cuvier), *S. walbeehmi* Bleeker, *S. species*, Sp. Nov.; *Hypoprion*, *H. macloti* (Muller and Henle); *Carcharinus*, *C. limbatus* (Muller and Henle), *C. melanopterus* (Quoy and Gaimard), *C. bleekeri* Duméril, *C. menisorrah* (Muller and Henle), *C. species*, Sp. Nov.;

*Galeocerdo*, *G. tigrinus* Muller and Henle; *Hemigaleus*, *H. balfouri* Day; *Eugaleus*, *E. species*, Sp. Nov.; *Galeorhinnus*, *G. musteleus* (Linné).

Family—Sphyrnidæ: Genus—*Sphyrna*, *S. blochii* (Cuvier), *S. zygaena* (Linné).

Family—Rhinobatidæ: Genus—*Rhynchobatus*, *R. djiddensis* (Forsk.)

Family—Pristidæ: Genus—*Pristis*, *P. cuspidatus* Latham, *P. perrotteti* Muller and Henle.

Family—Trygonidæ: Genus—*Trygon*, *T. uarnak* (Forsk.), *T. variegatus* Annandale, *T. alcockii* Annandale, *T. gerradii* Gray, *T. bleekeri* Blyth, *T. walga* Muller and Henle, *T. sephen* (Forsk.), *T. zugei* Muller and Henle; *Pteroplatea*, *P. pæcilura* (Shaw).

Family—Myliobatidæ: Genus—*Ætomylæus*, *A. maculatus* (Gray and Hardwicke); *Ætobatus*, *A. flagellum* (Schneider); *Rhinoptera*, *R. javanica* Muller and Henle.

Family—Mobulidæ: Genus—*Mobula*, *M. eregoodootenkee* (Cuvier), *M. mobular* (Bonaterre).

Family—Torpedinidæ: Genus—*Narcacion*, *N. species* Sp. Nov.; *Narcine*, *N. timlei* Bloch and Schneider.

A glance at the above list shows that four species are new and these forms as well as the species *Mobula mobular* are recorded for the first time from Indian waters. With the exception of five species, namely, *Ginglymostoma ferrugineum*, *Stegostoma tigrinum*, *Rhineodon typus*, *Odontaspis tricuspidatus* and *Narcacion* sp., the rest may be said to be fairly common along the Bombay coast, where they figure regularly in the catches of the fishermen.

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### SOME FACTORS ASSOCIATED WITH FLORAL ABNORMALITIES IN CALENDULA

IN some of the pots of *Calendula*, it was observed that even after the cessation of flowering and subsequent formation of seeds, small flower buds sprang up from the same receptacle which later showed normal flowering and seed setting. The number of such secondary capitula may be anything from 1 to 10, the largest up till now noticed. The occurrence is more common in the orange-yellow variety than the pure yellow one. Two kinds of such flowering were noticed. In one case, the secondary capitula came out from underneath the receptacle in a way resembling the very common occurrence in daisy (*Bellis perennis*) and in the second case, they came out from the top middle portions of the receptacle. The second type were more common.

Seeds from the original and the secondary capitula were collected separately and it was observed that the seeds from the original receptacle germinated freely, flowered and set seeds. The seeds from the secondary receptacles failed to germinate.

In ordinary flower-beds, the occurrence is usually 1 or 2 per 100 capitula. But recently some *Calendula* beds were noticed where the frequency counted at different periods appeared to be about 40 per 100. This observation led to the suspicion that soil conditions might have had something to do with supply of mineral matter to the soil and hence double flower formation. Analysis of the representative soil samples from such beds showed no remarkable difference in chemical composition from soils from ordinary beds. Only known difference was in watering, which was exceedingly irregular and scanty in beds where the frequency of abnormal flowering was high.

It is generally considered,<sup>1</sup> that abnormalities in flower do not occur, as we generally think, according to freaks of nature but due to definite effects of abnormal climatic conditions, or conditions of nourishment. It is also known<sup>2</sup> that lack of adequate moisture tends to develop reproductive portions to a greater extent and under the same climatic conditions, less moisture supply in one case means absorption of more mineral salts than in the other.



With this view in mind, an attempt was made to see whether secondary flower formation was associated with the absorption of more mineral matter than in plants bearing no abnormal flower.

Since it was seen that the same plants may have branches both containing abnormal flower formation and also the normal ones it was thought probable that the difference existed only between the branches and not in the original plants and consequently only the branches were cut off and used in analysis.

Three types of branches were studied:  
(1) The branches just before ordinary flower-

ing, (2) just after complete setting of seeds where there was no subsequent double flowering and (3) just after first seed setting and before the formation of complete secondary buds. Stalks, leaves and the receptacles in a single branch were taken separately. In the receptacle care was taken to remove florets and seeds, leaving the real receptacle. In cases of abnormal flowering, the secondary buds, if any, were removed. Before subjecting to analysis, the plants were washed with distilled water to remove any adhering dust particles. pH, moisture, nitrogen, ash, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were estimated.

pH values of the plant saps of the abnormal flowering branches did not show any remarkable deviation from the pH values of the other branches. In all the cases, the receptacle was more acid than the stalk or leaf juices.

The results of analysis of the different portions indicate fairly well, the greater absorption of K<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub> and mineral matter in general from the soil by the abnormal branch. It may be, therefore, fair to assume that this absorption of extra mineral matter is responsible for further growth. The mineral matter content of the abnormal flowering branch was not at all exhausted as was the case with the normal one. Even after the first flowering and seed setting it maintained the same potentialities as a branch before first flowering. The detailed results are given below:—

Moisture %

	just before flowering	just after formation of seeds	abnormal flowering
stalk	90.4	85.7	82.0
leaves	80.3	79.1	63.4
receptacle	80.5	74.1	75.0

Nitrogen %

stalk	2.64	1.32	1.39
leaves	4.14	3.48	2.43
receptacle	3.62	2.33	1.95

Ash %

stalk	28.01	12.53	21.69
leaves	32.63	16.29	34.73
receptacle	16.95	9.87	24.55

P<sub>2</sub>O<sub>5</sub> %

stalk	1.09	0.72	0.68
leaves	0.90	0.74	0.76
receptacle	1.31	1.01	1.27

K<sub>2</sub>O %

stalk	6.83	2.41	7.61
leaves	4.85	4.07	5.47
receptacle	4.35	3.26	5.62

It appears possible that the double flowering may be associated with irregular water supply where some plants are made to absorb extra amount of mineral matter under drought conditions, when the concentration of plant food materials is much more than when the soil is normally moist.

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September 29, 1943.

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1. Wordsdell, W. C., *The Principles of Plant Teratology*, 1916, 2, 18-30. 2. Smith, J. W., *Agricultural Meteorology*, 1920, p. 84.

### ABNORMAL CIRCULATION IN THE COMMON INDIAN FROG *RANA* *TIGRINA* DAUD.

ABNORMALITIES in the circulatory system of Anura are numerous. Those in the common European frog *Rana temporaria* have been reported by Crawshay (1906), Collinge (1915), Flattely (1926), Lloyd (1928), Grove and Newell (1934) and O'Donoghue (1932, 1933, 1935). A number of Indian workers (Ahuja, 1921; Bhaduri, 1929 a and b; Khatib Husain, 1938; Mathur and Sharma, 1938) have described abnormalities in the vascular system in *Rana tigrina*.

I have found the following abnormalities in a female specimen of *Rana tigrina*:—

I. *Venous abnormalities*.—(1) A persistent right posterior cardinal vein joining the innominate vein on the right side and the absence of the post-caval vein. (2) The presence of two dorso-lumbar veins on each side joining the renal portal veins.

II. *Arterial abnormality*.—An additional arterial branch arising from the Carotid arch.

*Venous Abnormalities*.—The absence of the post-caval and the persistence of the right posterior cardinal.

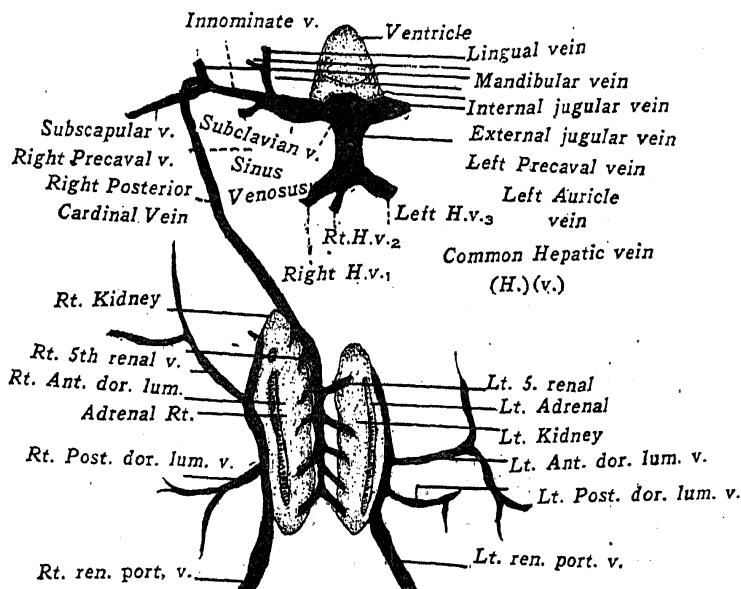


FIG. 1

×.5

Rt. Ant. dor. lum., Anterior dorso-lumbar vein; Rt., Right; Lt., Left; Rt. ren. port. v., Right renal portal vein; Rt. Post. dor. lum. v., Right posterior dorso-lumbar vein; Lt. ren. port. v., Left renal portal vein.

Fig. 1 illustrates the venous abnormalities. The post-caval is replaced by the persistent right posterior cardinal. The kidneys are dissimilar in size and the renal veins of the right side are more in number than those on the left side correlated with the larger size of the right kidney. The presence of two dorso-lumbar veins is also seen. So far as the veins from the liver are concerned, two hepatic veins arise from the right lobe of the liver while only one arises from the left. All these fuse to form a single hepatic vein which opens directly into the sinus venosus since the post-caval is absent.

*Arterial Abnormality*.—This is interesting since arterial abnormalities occur far less frequently than venous ones. The left Carotid arch gives origin to an abnormal artery before the point of origin of the lingual artery. It gives off two branches, one of which joins the lingual artery while the other supplies certain muscles (Fig. 2).

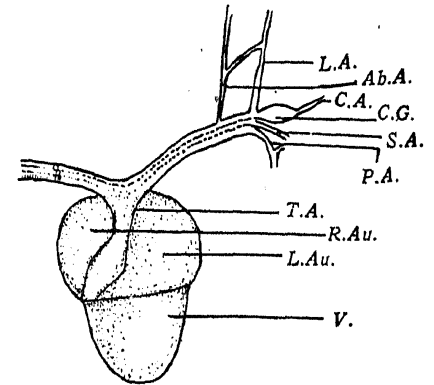


FIG. 2

×.75

Ab.A., Abnormal artery; C.A., Carotid artery; C.G., Carotid Gland; L.A., Lingual artery; L.Au., Left Auricle; P.A., Pulmocutaneous arch; S.A., Systemic arch; T.A., Truncus arteriosus; R.Au., Right auricle; V., ventricle.

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September 7, 1943.

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### A NEW VARIETY OF *DROSERA INDICA* LINN. FROM KOLHAPUR (S.M.C.)

In an intensive study of the flora of Kolhapur (Deccan) three types of the insectivorous plant, *Drosera* are met with. Two of these are the commoner species, *Drosera indica* Linn. and *Drosera Burmanni* Vahl., already described. Cook<sup>1</sup> mentions a few localities from the