OBSERVATIONS ON THE ABNORMALITIES IN THE COMMON INDIAN FROG, *RANA TIGRINA* DAUD.

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Introduction.

The frog is used throughout the world for class dissections, and many cases of abnormalities in its anatomy have been recorded on various occasions. Thus Howes (1888) described a case of the persistence of the left azygos vein in a female frog, while Parker (1889) gave an account of the occasional persistence of the left posterior cardinal vein in the same species and indicated the homologies of the veins with those of Dipnoi. Subsequently, this condition was noted with variations in details by Woodland (1910), O'Donoghue (1911 and 1912) and Collinge (1915), some of whom also tried to explain the significance of such variations. Lloyd (1921) gave an account of the occasional persistence of the right posterior cardinal vein in the adult *Rana temporaria* and of the abnormal genital organs in a female specimen. Later (1928) the same author recorded certain abnormalities in the vascular system of *Rana temporaria*. All these cases, however, concern the common European frog.

*Rana tigrina* is the common bull frog fairly abundant in these provinces, and is largely used for dissections in our classes. Some abnormalities in its anatomy have already been described. Crawshay (1906), while recording variations in the arterial system of Anura, made brief references to it. Nicholls (1915) described in two papers the variations found in its urostyle and anatomy of *Rana tigrina*. Bhattacharya and Das (1920) described a persistent oviduct in a male specimen, and Ahuja (1921) reported on the presence of a new vein and artery in *R. tigrina*. Bhaduri (1929) gave references to certain vascular abnormalities in the same species while recently, Mahendra (1936) has given a detailed account of a case of polymely in this species.

The present observations were made on a large number of specimens dissected in our junior classes. The abnormalities described here have not, as far as we are aware, been recorded so far. It is true that the variations to which the vascular system is liable lessens the importance, often ascribed to such abnormalities, but we hope that the present paper may not be without value as a contribution to the further study of the subject on a wider basis than is indicated here.
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I.

Presence of Two Dorso-Lumbar Veins.

Material and Observations.—Out of the sixteen specimens dissected, one specimen possessed two dorso-lumbar veins instead of one (Text-Fig. 1). Similar multiplicity of these veins has been mentioned by Ecker and Haslam (1889) and Gaupp (1899) for R. esculenta. The specimen was an adult female of an average size. Further detailed investigation of the occurrence of this abnormality in a large number of specimens shows that whenever this abnormality occurs, it is found on one side only. There was not a single specimen in which we could find the presence of the two dorso-lumbars on either side.

The occurrence of the two dorso-lumbars has nothing to do with sex or size of the animal, as out of the three specimens showing this feature, two were males and one female. One of these three specimens was fairly large, while the other two were of an average size.

Discussion.—The first (i.e., the anterior) dorso-lumbar vein joins the renal portal vein approximately between the anterior and the posterior ends of the kidney. It is formed by the confluence of several minute branches coming from the vertebral column, and a larger venule from the muscles and the body wall of this region. The second (i.e., the posterior) is formed by the union of two venules, the anterior of which receives blood from the muscles of the back and from the vertebral column, and the posterior receives it only from the body wall. It is interesting to note that the two dorso-lumbar

Text-Fig. 1.

The right renal portal vein of the abnormal specimen, showing the origin of the double dorso-lumbar veins.

Ant. dor. lum., Anterior dorso-lumbar vein; Musc. dor. B. W., vein from the muscles of dorsal body wall; Musc. back., vein from the muscles of the back; Pel., vein from the pelvic region; Post. dor. lum., posterior dorsolumbar vein; Rt. kd., right kidney; Rt. ren. port., right renal portal vein; Vert., vein from the vertebral column.
veins anastomose with each other. The renal portal vein, just before meeting the kidney, receives a small venule from the pelvic region also.

II. Presence of Abnormal Spleen.

While trying an injection mass upon a specimen of the common Indian frog for dissection, we came across a rather peculiar abnormality in the structure of the spleen. This frog possessed a spleen divided into two separate lobes, one being smaller than the other. The bigger lobe has the size of a normal spleen, i.e., 0.3 inches. A large number of preserved specimens were then examined and out of 50 specimens, only one showed this peculiar abnormality. In this case, however, one lobe was much smaller than the other. Out of the two specimens showing this abnormality, one was male and the other female. In the male specimen the two lobes were partially joined with each other, but in the female they were entirely separate.

Blood Circulation.—The arrangement of the blood vessels in the two lobes of the spleen was distinct and separate.

Arterial.—In a normal frog the spleen receives aerated blood through the splenic artery, which originates from the mesenteric artery. In the abnormal male (Text-Fig. 2), the splenic artery is the same, but here it bifurcates into two branches, each supplying one lobe of the spleen. In the female

![Text-Fig. 2.](image)

Abnormal spleen and its arterial blood supply (male specimen).

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abnormal specimen (Text-Fig. 3), the branch of the splenic artery supplying the bigger lobe of the spleen again divides into two smaller arteries in the substance of the spleen.

Text-Fig. 3.
Abnormal spleen and its arterial supply (female). Lettering as in Text-Fig. 2.

Venous.—In the normal frog a vein, running anteriorly from the rectum, passes just close to the spleen, and after collecting blood from it, joins the vessels from the intestines and the stomach to form the hepatic portal vein.

In the abnormal male specimen (Text-Fig. 4) however the arrangement is different. The capillaries in the larger lobe of the spleen combine to form

Text-Fig. 4.
Venous supply of the abnormal spleen (male specimen).

Hp. pl. v., hepatic portal vein; Int. v., intestinal vein; Rect. v., rectal vein; Spl., spleen; Spl. v., splenic vein; St., stomach.
two small veins in the substance of the lobe. These two branches join as soon as they emerge from the lobe and the vein thus formed ultimately joins the rectal vein. The smaller lobe of the spleen, however, has a separate vein which runs forward and joins the rectal vein independently.

In the abnormal female specimen (Text-Fig. 5), the case is altogether different. The splenic lobes are inter-connected by means of a small blood vessel. Unlike the abnormal female, the smaller lobe does not send any direct branch to the rectal vein. On the other hand, two separate veins emerge from the bigger lobe. One of these, the inner one, runs up and joins the rectal vein. The other or the outer vessel runs more or less parallel to the inner branch and ultimately joins the intestinal vein. It is interesting to note that side by side with this abnormality, the female specimen showed the presence of the two dorso-lumbars in connection with the right renal portal vein.

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