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**Venous System of *Uromastix hardwickii***

 The venous system of *Uromastix* is most primitive. The blood from the lungs is returned to the left auricle by two pulmonary veins. The blood from the other parts of the body is returned by three large veins.

 The two precavals (right and left) return the blood from the anterior side, while the postcaval vein return the blood from the posterior side and enter into the bilobed sinus venosus which joins the right auricle.

**Thus, the venous system of *Uromastix* has the following main veins:**

a. Precaval veins

b. Postcaval vein

c. Hepatic portal vein

d. Renal portal vein

e. Pulmonary vein

**a. Precaval Veins:**

 There are two precaval veins, the right and the left, which drain the blood from the anterior body region—head, neck, shoulders, forearms and thoracic wall.

**Each precaval is formed by the union of four veins:**

(i) Common jugular,

(ii) Subclavian,

(iii) Intercostal and

(iv) laryngo-tracheal.

(i)**Common Jugular Vein:**

 The common jugular vein is formed by the union of external and internal jugular veins at the level of the tympanum. The external jugular vein receives blood from the upper jaw by a maxillary vein and from the lower jaw by a mandibular vein. The internal jugular receives blood from the brain by a cerebral vein and from the orbital region by an orbital vein.

 The common jugular runs back into the neck where it receives blood from the auditory region of the head by a temporal vein. A little behind the junction of common jugular vein and temporal vein, there is a large sinus (expansion) called jugular sinus.

**(ii) Subclavian Vein:**

 The large subclavian vein runs inwards from the forelimb and joins the posterior end of jugular sinus.

**The subclavian vein receives blood from the arm through three small veins:**

(a) Scapular from the shoulder region,

(b) Brachial from the arm, and

(c) Axillary from the arm-pit and thorax.



Fig. 1. Venous System of *Uromastix hardwickii*

**(iii) Intercostal Vein:**

 The intercostal vein collects blood from the skin and muscles of the chest and runs forwards to meet the precaval vein internal to subclavian. By the union of common jugular, temporal, subclavian and intercostal, a large precaval vein is formed that opens into the sinus venosus.

**(iv) Laryngo-Tracheal Vein:**

 The laryngo-tracheal vein is a very slender vessel. It receives a very fine lingual vein from the tongue and a laryngeal vein from the larynx and trachea. It then passes backwards alongside of the trachea and joins the precaval close to its entry into the sinus venosus.

 The two laryngo-tracheal veins are symmetrical running parallel to the trachea and are interconnected by four or five transverse tracheal loops. Bhatia (1929) described that the left laryngo-tracheal vein does not unite with the left precaval.

**b. Postcaval Vein:**

 The postcaval vein opens into the right posterior angle of the sinus venosus. It collects blood from the posterior region of the body, i.e., kidneys, gonads and liver. It arises from the region of kidneys. Blood from the kidneys is collected through capillaries in a thin-walled renal sinus lying in the middle region of the kidneys.

 A pair of efferent renal veins commences from the renal sinus and pass forwards along the sides of the vertebral column up to the gonads, being separated from one another by a pad of connective tissue. The right efferent renal vein is thicker than the left. Both the efferent renal veins receive blood from dorsal bodywall through a few small veins in the way.

 Just behind the gonad, the left efferent renal vein sharply bends medially and joins the right efferent renal vein to form the commissural vein. A small genital vein from the gonads and a fine supra-renal vein from the supra-renal gland on each side pours into the commissural vein or the efferent renal vein of that side.

 Only the right efferent renal vein proceeds as the postcaval vein, which passes through the right lobe of the liver and opens into the sinus venosus. The postcaval vein during its course also receives two or more hepatic veins from the liver and a small vertebral vein from the backbone.A small oesophageal vein from the oesophagus joins the postcaval after its emergence from the liver.

 **Pulmonary Vein:**

There is a single pulmonary vein formed by the union of several veins from both the lungs. It runs along the ventro-lateral border of the trachea and passes dorsally to the sinus venosus before opening into the left auricle close to the inter-auricular septum. It is the only vein which carries oxygenated blood.

**d. Hepatic Portal Vein:**

 Hepatic portal vein is a large vein which collects the blood from the alimentary canal by a number of fine branches and carries it to the liver. It is formed by the union of numerous veins from the different regions of the alimentary tract such as the anterior and posterior gastric veins from the stomach, lienogastric vein from the spleen and a part of the stomach, duodenal vein from the duodenum, anterior intestinal from the ileum and posterior intestinal from the caecum, colon, and rectum.

 The hepatic portal vein and all its tributaries run in the mesentery. Anteriorly, the hepatic portal vein receives a branch of the anterior abdominal vein called the porto-abdominal vein and enters the middle of the left lobe of the liver where it capillarises. Blood from the liver as is collected by the hepatic veins and poured into the postcaval. The hepatic portal system is formed by the hepatic portal vein and porto-abdominal vein.

**e. Renal Portal and Anterior Abdominal Veins:**

 The caudal vein starts from the tip of the tail and runs in the haemal canal of the caudal vertebrae receiving on its way several paired branches from the tail muscles. The caudal vein after reaching the kidneys divides into a pair of diverging renal portal or afferent renal veins.

 The afferent renal veins pass over the ventral surface of the kidneys partly buried in their substance. They receive cloacal and rectal veins from the cloaca and rectum respectively. The renal portal vein of each side continues forward into the kidney, its side and ramifies into capillaries.

 Blood from each hindlimb is collected by the internal (sciatic) and external iliac (femoral) veins. These two unite after entering the abdominal cavity to form a common iliac vein which is connected to the renal portal vein by a transverse connection (iliac-afferent union) near the middle of the kidney. Each common iliac vein extends forwards as the pelvic or lateral vein along the dorsal surface of the large yellow fat body.

 The pelvic vein receives in the way fine adipose veins from the fat body, ischial vein and epigastric vein from the dorsal bodywall, vesicular vein from the urinary bladder and parietal veins from the posterior muscles. A fine median pubic vein joins both the pelvic veins. The two pelvic veins converge in front of the kidneys and unite in the mid-ventral line to form the anterior abdominal vein. The anterior abdominal vein is formed by the imperfect union of two pelvic veins.

 In *Uromastix*, the anterior abdominal vein is double at places indicating a primitive feature of fishes where two lateral abdominal veins have not fused along their entire course. Anteriorly the two components of the anterior abdominal vein remain separate, one of the anterior abdominal vein joins with the hepatic portal vein and enters the left lobe of the liver as porto-abdominal vein, while another enters the left lobe of liver directly.

**3. Blood:**

 *Uromastix* (reptiles) are cold-blooded or poikilothermous, like fishes and amphibians. Red cells are nucleated and survive for much longer than those of mammals. The total haemoglobin concentrations and oxygen carrying power of the blood are only half those of mammals. The white cells of reptiles include the same types as in other vertebrates.

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