

## **Venous System in fishes:**

The venous system is basically similar in all fishes but minor variations are very common. The hepatic portal system collects blood from the alimentary canal, spleen, swim-bladder (when present) and gonads and finally empties into the liver. From the liver, the blood is carried to the sinus venosus by hepatic veins.

## **Venous system in cartilaginous fishes ( Scoliodon):**

The existence of extensive blood sinuses is a characteristic feature of the venous system of Scoliodon.

**The venous system is extremely complicated and is described under the following heads:**

### **(A) Cardinal system:**

The blood from the anterior region of the body is returned to the heart by paired jugular and anterior cardinal sinuses. The blood from the posterior region is collected by a pair of posterior cardinal sinuses. The anterior and posterior cardinals unite on each side to form a transverse sinus called ductus Cuvieri.

### **Anterior cardinal system:**

This system of veins returns blood from the head region and consists of a pair of internal jugular veins. Each internal jugular vein is composed of the olfactory sinus, the orbital sinus, the post-orbital sinus and the anterior cardinal sinus.

The blood from the rostral region is drained by the anterior facial vein to the olfactory sinus and from there to the orbital sinus. The orbital sinus opens into the anterior cardinal sinus through the postorbital sinus. The anterior cardinal sinus enters the ductus Cuvieri.

### **Posterior cardinal system:**

The caudal vein collects blood from the tail region and proceeds forwards through the haemal canal. In the abdominal cavity, the caudal vein divides into left and right renal portal veins which break up into sinusoid capillaries in the kidneys.

Throughout its length, the renal portal vein receives small parietal veins. The renal veins collect blood from the kidneys and unite to form the posterior cardinal sinuses. Two posterior cardinal sinuses open into the ductus Cuvieri.

**(B) Hepatic portal system:**

A large number of small veins carrying blood from the alimentary canal and its associated glands unite to form the hepatic portal vein. The hepatic portal vein receives the lienogastric vein, and anterior and posterior gastric veins.

Actually the hepatic portal vein is formed by the confluence of the anterior and posterior intestinal veins. The hepatic portal vein breaks up into capillaries in the liver. From the liver, blood is collected by another set of capillaries which unite to form two large hepatic sinuses opening into the sinus venosus.

**Venous System of teleost fishes (Rohu):**

The venous system of Rohu consists of the systemic veins and the portal veins. These veins directly or indirectly convey the deoxygenated blood from the different parts of the body to the heart.

**Systemic venous system:**

The blood is carried to the sinus venosus by right and left ductus Cuvieri. Each ductus Cuvieri is formed by three principal veins: an anterior cardinal sinus, a jugular sinus and a posterior cardinal sinus.

The anterior cardinal sinus brings blood from the anterior part of the body and the posterior cardinal sinus brings blood from the posterior part of the body. Both the posterior cardinal veins receive segmental veins, renal veins, genital veins, etc.

In addition to the above mentioned three principal veins, the pectoral and pelvic veins form the pectoral and pelvic fins respectively and the slender hepatic vein opens into the ductus Cuvieri.

The blood from the tail region is conveyed by a caudal vein which just entering into the trunk bifurcates into two branches. The right posterior cardinal sinus passes through the substance of the right kidney and opens into the right ductus Cuvieri. The left posterior cardinal vein originates from the capillaries of the renal portal vein.

**Portal venous system:**

The portal venous system is composed of a special vein which originates in capillaries and end in capillaries and secondly the blood from these veins before going to the heart passes through some intermediate organs. When the intermediate organ is the kidney, such a system constitutes the renal portal system and when the organ is liver, the system is called the hepatic portal system.

**Renal portal system:**

The left branch of the caudal vein after entering into the left kidney breaks up into capillaries and forms the renal portal vein. These capillaries reunite and form the left posterior cardinal vein.

**Hepatic portal system:**

The capillaries from the alimentary canal and its associated structures unite to form a hepatic portal vein which enters into the substance of liver and breaks up into the capillaries. The capillaries reunite to form the hepatic vein which opens to the ductus Cuvieri.