

External Structures of Scoliodon (With Diagram) | Zoology

In this article we will discuss about the external structures of scoliodon. This will also help you to draw the structure and diagram of scoliodon.

Scoliodon is an elongated spindle-shaped animal. It has a laterally compressed body. A fully developed specimen of this genus attains a length of about 60 cm. Body is divisible into head, trunk and tail. Head is dorsoventrally flattened and terminates anteriorly into a dorsoventrally compressed snout.

The dorsal side of Scoliodon is dark-grey while the underside is pale white. Tail is oval in cross-section and bears a heterocercal type of caudal fin, i.e., the posterior end of the vertebral column is bent upwards and lies in the dorsal or epichordal lobe. Mouth is a very wide crescentic aperture lying on the ventral side of the head near its anterior end.

It is bounded by upper and lower jaws; each is beset with one or two rows of sharply pointed and backwardly directed teeth (Fig. 1.28B) to catch the slippery prey. The teeth are replaced if these are broken. The teeth of Scoliodon are modified scales. The scales cover its body and extend inside the jaws to serve as teeth (Fig. 1.28C). The transition of the placoid scales into teeth is amply recorded in the jaw regions.

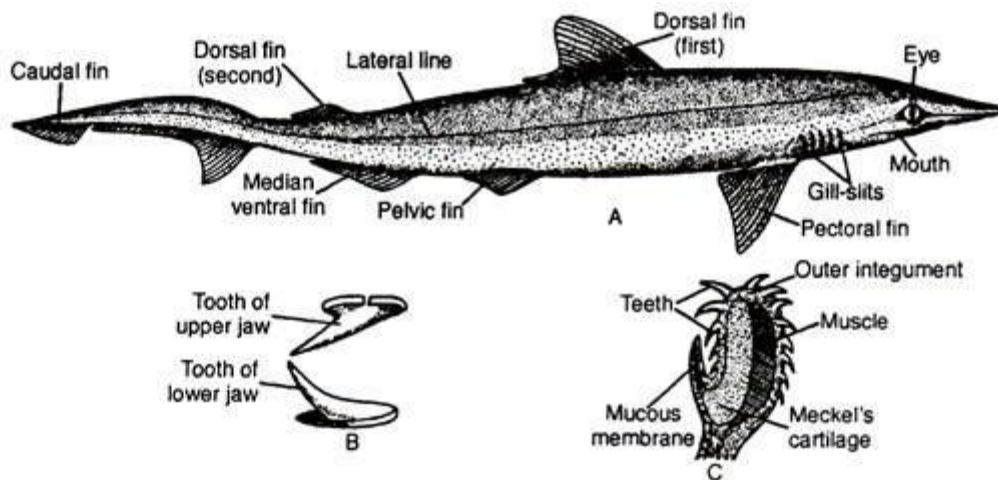


Fig. 1.28 : Structural organisation of *Scoliodon* : A. External features of a female specimen. B. Disposition of teeth in the lower and upper jaws. C. Sectional view of the lower jaw showing the gradual transformation of the placoid scales into teeth. Note that the teeth in *Scoliodon* are transformed scales

Two prominent circular eyes are present. Each eye is provided with movable upper and lower eyelids. The third eyelid or nictitating membrane can cover the whole eye in emergency. The pupil is a vertical slit-like aperture. The nostrils are placed one at each angle of the mouth.

These are exclusively olfactory in function and have no connection with the mouth cavity. Each nostril is partly covered by a small fold of skin. Posterior to the eyes there are five vertical slits on each side. They are called gill or branchial slits. The branchial slits lead into the gill pouches which in turn open into the pharyngeal cavity.

The cloaca opens to the exterior by a cloacal aperture which is located in between the two pelvic fins. The cloacal aperture is an elongated opening. The cloaca is a common chamber, into which anus, urinary and genital apertures open. On each side of the cloaca lies the abdominal pores.

The abdominal pores are paired structures and situated on elevated papillae to communicate the coelom to the outside. A faint lateral line is present. Beneath this line a canal is present. The canal opens to the exterior by minute pores at intervals. Many pores called ampullary pores are also present on the head.

Fins:

As in other fishes, Scoliodon bears unpaired and paired fins which are actually flap-like integumentary extensions of the body. These are flexible and are stiffened by cartilaginous rods or horny fin-rays. All the fins are directed backwards which is of positive advantage in swift forward movement in water.

Median unpaired fins:

The fins under this category include two dorsals, one caudal and one ventral fin. The dorsal fins are triangular in outline. The anterior dorsal is larger and situated at about the middle of the body. The posterior dorsal is comparatively small and occupies a median position between the first dorsal and the tip of tail.

The caudal fin has one ill-developed ventral lobe (hypochordal) which is divided into two parts. Two shallow depressions called caudal pits are regarded as the diagnostic features of the genus. These are present at the root of the tail, one at the dorsal and another on the ventral surface. The median ventral fin is located in the mid-ventral line and just anterior to the caudal fin.

Lateral paired fins:

Two pectoral and two pelvic fins constitute the lateral paired fins. The pectoral fins are large and are situated posterior to the gill clefts. The pelvic fins are much smaller. In females, these are

simple but in males each of them is connected with a copulatory organ called myxipterygium or clasper. Clasper is rod-like in appearance having a dorsal groove leading to a siphon at its base.

Skin:

The integument in Scoliodon (Fig. 1.29E) is composed of an outer epidermis and an inner dermis. The epidermis is composed of epithelial cells mixed with numerous unicellular mucous glands. In the young stage the epithelial cells are ciliated. But in an adult the cilia are lost.

The dermis is composed of three layers:

(i) Stratum laxum

(ii) Stratum compactum

(iii) Subcutaneous layer.

The stratum laxum is the outer layer and lacks fibres. The median layer is the stratum compactum which is fibrous in nature. The basal plate of the placoid scale is tied to this layer by fibres. The subcutaneous layer is variable in thickness and contains fine fibres arranged in a reticular fashion.

Digestive System of Scoliodon (With Diagram) | Zoology

The digestive system of scoliodon consists of the alimentary canal and the digestive glands. The alimentary canal starts with the mouth and terminates in the anus. The mouth leads into a spacious buccal cavity which is lined with mucous membrane.

The floor of the buccal cavity becomes folded to form a non-muscular and non-glandular tongue. The mucous membrane is very thick and rough due to the presence of dermal denticles or teeth. The teeth are very sharp and are obliquely placed. The teeth are homodont (i.e., the teeth are similar in shape) and possesses several sets of teeth functioning in succession.

The buccal cavity leads into pharynx. On either side of the pharynx there lie the internal openings of the spiracles and five branchial clefts. The mucous membrane of the pharyngeal wall contains numerous dermal denticles. The pharynx leads into a narrow oesophagus. The inner mucous membrane of the pharynx is raised to form longitudinal folds.

The oesophagus dilates posteriorly to form a large stomach. The stomach is highly muscular and is bent on itself to form a J-shaped configuration. The long limb of the stomach is continuous with the oesophagus and the shorter one passes into the intestine. The entrance of the oesophagus into the stomach is provided with a crescentic fold which serves as the valve.

The long anterior limb is called the cardiac stomach and the short posterior limb is designated as the pyloric stomach. A small outgrowth, often called 'blind sac', is present at the junction of the cardiac and pyloric limbs. The inner lining of the cardiac stomach is folded longitudinally like that of oesophagus (Fig. 1.33A).

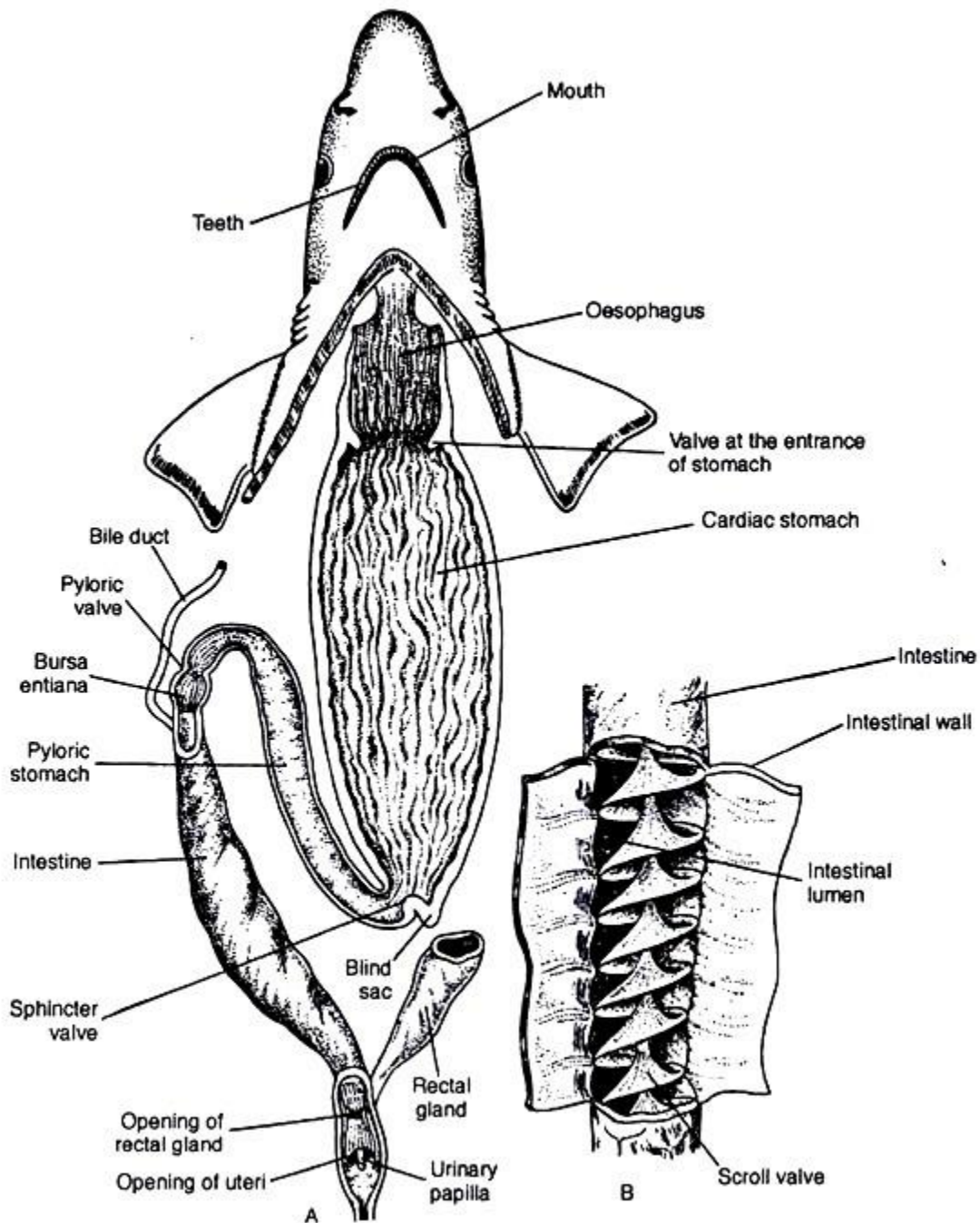


Fig. 1.33 : Digestive system of *Scoliodon* : A. Entire digestive tract. The oesophagus, stomach and rectum are dissected longitudinally to show the internal details. B. A portion of the intestine is cut open to show the scroll valve

The internal lining of the pyloric stomach is mostly smooth though slight foldings are observed at the distal end. The pyloric valve, at the end of the pylorus, guards the entrance of it into a thick-walled small chamber called the bursa entiana.

The bursa entiana is immediately followed by wide tubular intestine which becomes narrowed posteriorly as the rectum. The rectum opens into the cloaca. A tubular caecal or rectal or digitiform gland opens into the rectum.

The inner surface of the intestine becomes folded to form an anticlockwise spiral of approximately two and a half turns. This is called the scroll valve (Fig. 1.33B) which increases the absorptive surface of the intestine and also checks the rapid flow of digested food through the intestine.

The major digestive gland is the liver which is a massive yellowish gland and consists of two lobes. The lobes are united anteriorly. A thin-walled V-shaped gallbladder is present in the anterior part of the right lobe of liver. The bile duct receives few smaller ducts from the two lobes of the liver and opens into the anterior end of intestine, near the commencement of the scroll valve.

The pancreas is a pale compact irregular body and consists of a dorsal lobe situated parallel to the posterior part of cardiac stomach and a ventral lobe which remains closely attached to the pyloric stomach. The pancreatic juice is poured into the intestine by pancreatic duct situated opposite to the aperture of the bile duct.

The functional significance of rectal gland is not properly known. The rectal gland has a central cavity lined with cuboidal cells. It is highly vascular and composed of lymphoid tissue. It discharges a fluid into the lumen of the intestine but its actual role is not known.

The buccal cavity possesses no such glands that can be compared with the salivary glands of higher vertebrates. The spleen is located dorsal to the distal end of the body of the stomach. The spleen is functionally associated with the circulatory system, but remains morphologically connected with the alimentary canal.

External Features of Dogfish (Scoliodon): With Diagram | Chordata | Zoology

Shape, Size and Colour:

Dogfish (Scoliodon) has a long, laterally compressed spindle-shaped body tapering at both ends. The full grown specimen measures from 30 to 60 cm in length. The colour of the body is dark grey above and pale white beneath, while the portions of the caudal fin are more or less dark.

Body surface is rough due to backwardly directed spines of placoid scales embedded in the dermis.

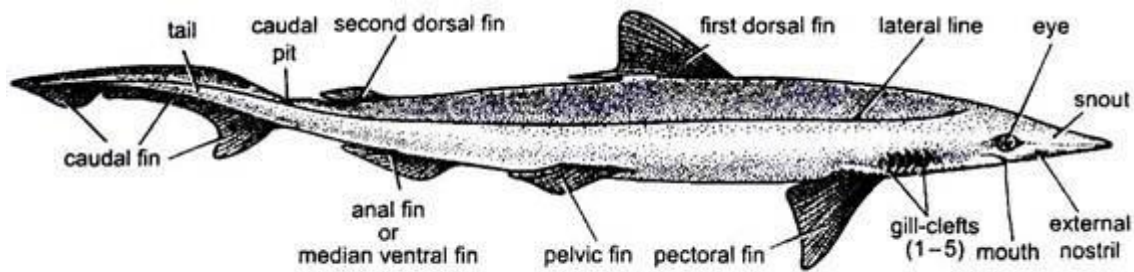


Fig. 14.1. *Scoliodon*. External features.

Division of Body:

The body is divisible into head, trunk and tail, though there are no distinct boundaries between these regions.

(i) Head:

The head is strongly compressed dorso-ventrally and is produced in front into a wedge-shaped snout or rostrum.

(ii) Trunk:

The trunk is almost elliptical in transverse section. Its thickest part lying in front of the middle of the body. The trunk gradually tapers behind into the tail.

(iii) Tail:

The tail is laterally compressed and is bent upwards at a small angle and fringed with a caudal fin. Such a tail is known as heterocercal tail.

Fins:

Dogfish (*Scoliodon*) is provided with two sets of fins which are flattened expansions of the skin supported by cartilaginous rods and horny fin rays- these are unpaired or median fins and paired lateral fins.

(i) Median Fins:

The median fins are two dorsal fins, a ventral or anal fin and a caudal fin. The first dorsal fin is large and triangular in shape and is situated a little in front of the middle of the body. It has a basal lobe. The second dorsal fin is also triangular in outline but is very small and is situated midway between the first dorsal and the tip of the tail. The caudal fin extends along the dorsal and ventral surfaces of the tail in the median line and forms a dorsal and ventral lobe.

The dorsal lobe is very much reduced and forms only a low ridge along the greater part of the upper surface but the ventral lobe is well developed and is divided into two parts, the anterior part being much larger and more extensive than the posterior. The ventral or anal fin is situated in the mid-ventral line about 5.0 cm in front of the caudal fin, more or less opposite the second dorsal. Each of the two dorsals and the ventral fin are produced behind into long and narrow fleshy processes called basal lobes.

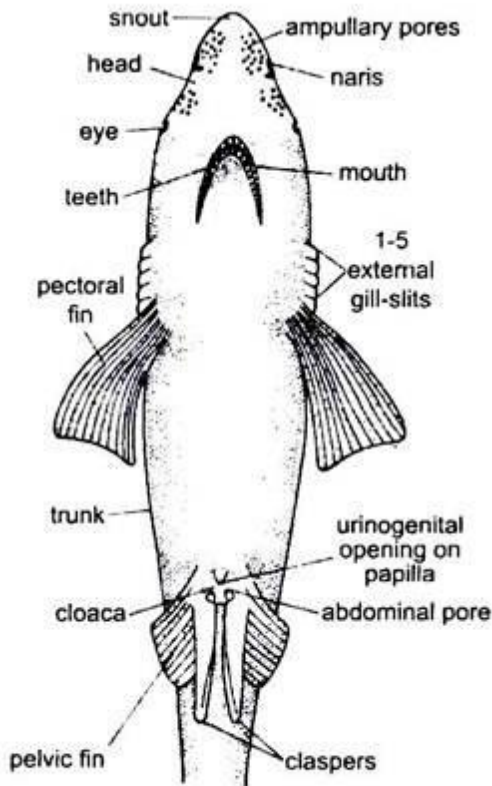


Fig. 14.2. Male Indian dogfish in ventral view.

(ii) Lateral Fins:

The lateral fins are paired pectoral and pelvic fins. The large pectoral fins originate from the ventro-lateral margins of the body immediately behind the gill-clefts. The pelvic fins are much smaller than the pectoral fins and arise close together from the ventral surface at the junction of the trunk and tail. In the male *Scoliodon*, the medial part of each pelvic fins is produced into a dorsally grooved, stiff rod-like clasper (intromittent organ) used during copulation. All the fins are directed backwards a feature which is advantageous in forward progression.

(iii) Eyes:

On each side of the head is a large circular eye. Each eye has two poorly-formed immovable eyelids and nictitating membrane located antero-ventrally. The pupil is narrow and vertical.

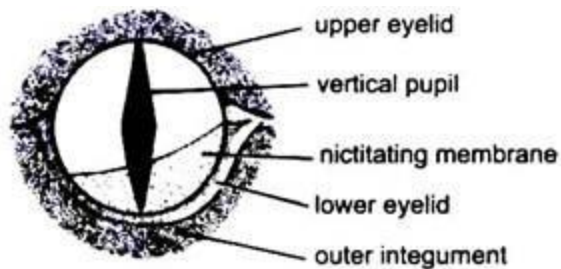


Fig. 14.3. *Scoliodon*. Right Eye.

Body Apertures:

The following important apertures are present on the body surface:

(i) Mouth:

On the ventral side of the head is a wide crescentic mouth. It is bounded by upper and lower jaws. Each jaw is armed with one or two rows of sharp backwardly directed teeth, having smooth not-serrated edges for holding and tearing the prey. In catching its prey the shark brings its jaws into play by raising the snout and thrusting the mouth forward.

(ii) Nostrils:

On the anterior side of the mouth are present two crescentic apertures the nostrils leading into olfactory sacs which do not open into the mouth cavity. A small fold of skin from the anterior edge partially covers each nostril. The nostrils are only olfactory and have no respiratory function.

(iii) Gill-Clefts:

Behind the eyes are situated a series of vertical slits, five on each side, called branchial or gill-clefts. These apertures lead into the gill-pouches and thence into pharynx. These are respiratory in function.

(iv) Cloacal Aperture:

The cloacal aperture is an elongated median opening at the root of the tail between two pelvic fins. It leads into the cloaca into which the intestine and urinary and genital ducts open. Anus lies anteriorly and in the cloaca and a cone-shaped papilla bearing urinary pore in female and urino-genital pore in male located behind the anus.

(v) Abdominal Pores:

There is a pair of openings situated on the elevated papillae on either side of the cloaca. These are the abdominal pores. Through these pores the coelom communicates with the exterior.

(vi) Caudal Pit:

At the root of the tail, just in front of the caudal fins, is a small dorsal and a ventral shallow depressions, the caudal pits. The caudal pits are the characteristic feature of the genus Dogfish (*Scoliodon*).

(vii) Lateral Line and Pores:

A faint line runs on either side of the body extending from the head to the posterior end of the tail, this is called the lateral line. It marks the position of an underlying canal which runs along each side of the body and contains special receptor organs. The lateral line canal extends anteriorly into the head where it branches into several canals; at intervals these canals open to the exterior through minute pores.

(viii) Ampullary Pores:

On the head and snout open several groups of minute ampullary pores of the receptors called ampullae of Lorenzini. When pressed they exude mucus.

Sexual Dimorphism:

In the male the inner margins of the pelvic fins bear a pair of rod-shaped copulatory organs called claspers or myxopterygia, they are modified parts of the pelvic fins. Each clasper is a stiff rod-like appendage having a groove on its dorsal surface which leads into a cavity, the siphon, beginning at the base of the clasper.

Skin:

The body is invested by an outer leathery covering called skin or integument. In Dogfish (*Scoliodon*), the skin or integument consists of two layers- an outer ectodermal epidermis and an inner mesodermal dermis.

1. Epidermis:

The epidermis is composed of many layers of epithelial cells amongst which are interspersed numerous unicellular mucous glands secreting mucus for lubricating the body surface. Innermost layer of cells rest on a basement membrane and called stratum germinativum.

2. Dermis:

The dermis comprises dense areolar connective tissue mixed with smooth muscle fibres, blood capillaries, pigment cells and nerves. Dermis or corium is divided into an outer layer having few loose fibres called the stratum laxum, and an inner layer having compact fibres called stratum compactum. Just below the epidermis are found pigment cells, the melanophores or chromatophores.

The dermis is firmly attached to the underlying muscles. In a fresh specimen the skin is slimy, but in preserved specimens the slimy mucus is generally removed and the skin becomes rough. This roughness of the skin is due to the presence of closely lying minute dermal denticles called placoid scales which are arranged in regular oblique rows and form the exoskeleton of the shark covering the entire surface of the body and even parts of the fins.

Functions of Skin:

In Dogfish (Scoliodon), the skin serves the following functions:

- (i) Like a wrapper, it protects internal organs against mechanical injuries,
- (ii) Secretion of slimy mucus makes body surface slippery and difficult to catch by predators, minimises friction in locomotion and resists entry of microorganisms into body.
- (iii) Its colouration imparts camouflage, as the fish blends with silvery surface of water when seen from below and with the dark bottom when seen from above, by predators,
- (iv) Skin receptors help in reacting to changes in the surrounding