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Anatomical Structure of Shark Fish Digestive (*Carcharhinus sorrah*)

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Abstract. This study aims to determine the anatomical structure of sharks. Sharks are members of the subclass elasmobranchii. Sharks (*Carcharhinus sorrah*) are shaped like terpedoit. This research was conducted using macroscopic and microscopic observations on the digestive organs of sharks (*Carcharhinus sorrah*). Macroscopic observation is done by looking at shapes, structures, and analyzing photos of organs. Microscopic observation was carried out by making organ preparations using paraffin method, using hematoxylin-eosin staining then observed using a microscope. Digestive organs of sharks (*Carcharhinus sorrah*) were observed, namely, stomach, intestine and liver.

Keywords: Anatomy, *Carcharhinus sorrah*, Sharks

INTRODUCTION

Indonesia is a maritime country with most of its territory in the form of oceans, this geographical condition is very beneficial because there are so many biodiversity that can be studied, especially fish species that live in the sea. Some fish species have real bones and some have cartilage (Elasmobranchii) (White et al., 2006 in Syakuracman, 2014). Cartilaginous fish in Indonesian waters totaled 221 species (Sadili et al., 2015). Cartilaginous fish are fish that have cartilage structures throughout their lives (Castro & Huber, 1997). Cartilaginous fish (Elasmobranchii) have a larger size than hard-billed fish (Candramila, 2006). Elasmobranchii's body is not covered by scales like hard-boned fish in general but is covered by fine durian which has the same composition as teeth. Elasmobranchii has a strong jaw and is armed with sharp teeth that serve to ambush its prey. Members of the Elasmobranchii subclass are sharks. Sharks have a high diversity in Indonesia. Sharks found in Indonesian waters amount to 117 species and are found up to 150 meters deep. As many as 51% of shark species in Indonesia are found in continental exposure areas (Sadili et al., 2015). Sharks eat a variety of organisms ranging from small fish to large fish, crabs, turtles, squid, and all food debris from the ship. Sharks can eat their own kind (cannibalism) (Nontji, 1987).

The digestive organs of fish are sequentially the mouth, pharynx, esophagus, stomach, intestine, and liver, anus. The process of digesting food in fish occurs when food is swallowed and then enters the stomach through the pharynx and esophagus (Castro & Huber, 1997). The fish hull has a size that is not too large but the fish hull has a thick and muscular wall. The fish's stomach is coated with mucus which helps in the process of digestion of food and protects the stomach wall. The fish's gastric layer is also strengthened by connective tissue and lumen (Saksena, 1999).

Foods that have been processed in the stomach then enter the intestine. The intestine is the longest organ in the digestive system of the fish and has a very elastic structure (Saksena, 1999). Fish intestines have different shapes and sizes, carnivorous fish have short and straight intestines (Castro & Huber 1997). Another organ that is no less important in the digestive process is the liver. The liver is an organ that secretes food ingredients for the digestive process. The liver is generally brownish red, composed of liver cells (hepatocytes) (Fujaya, 2004). The liver is the largest digestive organ in the fish's body. Liver size can reach 20% of fish body weight (Castro & Huber, 1997).

MATERIALS AND METHODS

The tools used in this study were surgical instruments, glass beakers, microtomes, slide warmers, paraffin ovens (Heraeus), binocular microscopes (Nikon YS 100 models), DSLR cameras (Canon), object glass, cover glass, calendar (paper), tweezers, and tissue. The ingredients used in this study were sharks (*Carcharhinus sorrah*), Bouin solution, alcohol 30%, 40%, 50%, 60%, 70%, 80%, 90%, 96%, and absolute, toluene, xylol , hematoxylin-eosin, and entellan. This study uses sharks (*Carcharhinus sorrah*) obtained from the south coast of Yogyakarta.

RESULTS AND DISCUSSION

Based on research conducted, the morphology of sharks observed has a large, long, and slim body shape. The total length of sharks is 65 cm and weighs 1.7 kg. The body of the shark in the dorsal part has gray darkness, while the lateral part of the shark is white.

Figure 1. Dorsal section morphology of the shark.

Based on observations made, sharks have gills located on the lateral side, namely on the left and right sides of the back, the gill slits in the shark are 5 pieces, large intestine, rectum, anus.

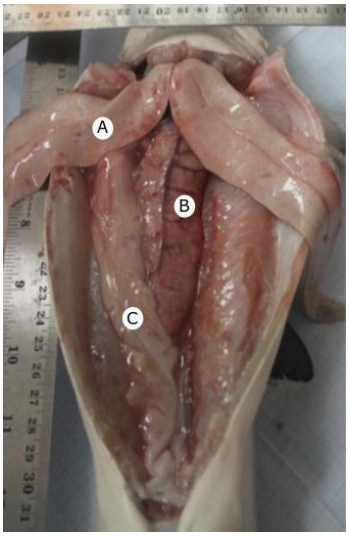

Figure 2. Anatomy of shark digestive organs (*Carcharhinus sorrah*) (A) Liver, (B) Stomach, (C) Intestine.

Sharks have features of a flattened head, a long, rounded snout. The ventral part of the base of the snout is a pair of nasal passages. The mouth is located in the leading edge of the bottom. A pair of large circular eyes located on the lateral part of the head.

Based on observations made, sharks have gills located on the lateral side, namely on the left and right side of the back, the gill gaps in sharks are 5 pieces; large intestine, rectum, anus. The digestive organs of the shark (*Carcharhinus sorrah*) covering the intestine and liver stomach were observed in a macroanatomy and photographed using a camera.

Gastric Anatomy

The stomach of the shark (*Carcharhinus sorrah*) is in the upper left body cavity. The stomach of the shark (*Carcharhinus sorrah*) when seen from the ventral part is not visible because the gastric organs are covered by the liver.

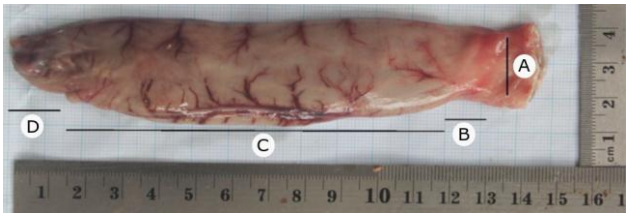

Figure 3. Anatomy of shark gastric organ: (A) Cardiac, (B) Fundus, (C) Body of the Stomach, (D) Pilorus.

Anatomy of the Intestinal Organs

The gut of the shark (*Carcharhinus sorrah*) when viewed from the ventral side, the intestine is almost invisible because most of its organs are covered by the liver. The intestine is the longest organ of the digestive tract of sharks. The central shark intestine is shaped like an elongated hollow tube, the total length of the intestine is 34.4 cm. The intestine has a soft and supple texture.

The outer wall structure of the *Carcharhinus sorrah* small intestine is smooth and slippery. The small intestine of the shark (*Carcharhinus sorrah*) is characterized by narrowing of the cavity after the pylorus, then the boundary of the small intestine is marked by an enlarged cavity as a transition between the small intestine and large intestine. The small intestine *Carcharhinus sorrah* has a reddish color while the large intestine has a reddish white color. The inner part of the *Carcharhinus sorrah* intestine is almost evenly spotted bowel (fili).

Figure 4. Anatomy of the Intestinal Organ (A) of a shark (Carcharhinus sorrah).

Anatomy of the Liver

The shark liver (*Carcharhinus sorrah*) are located at the anterior end of the body cavity. Shark's liver is located on the side of the abdomen, in the peritoneal cavity and covers the viscera. Shark's liver when seen from the ventral part, it is clearly seen all parts of the liver.

The observation of the liver anatomy of *Carcharhinus sorrah* shows that the liver is pink, soft, supple and slippery. The liver are elongated and flat on the sides. The liver is the largest organ in the shark's body. The total weight of the heart is 55.6 grams. The heart consists of two lobes. Liver anatomy in sharks appears to be smaller right lobe while the left lobe is larger. The length of the right lobe is 18.3 cm.

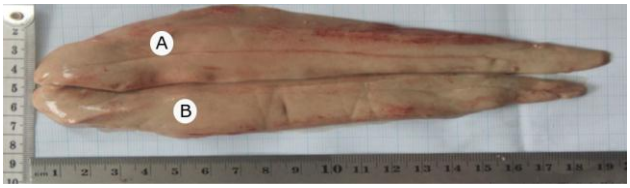

Figure 5. Anatomy of the Shark Liver: (A) Left lobe, (B) Right lobe.

CONCLUSIONS

The anatomy of shark gastric organs is slippery textured. The stomach is in the form of "J", colored reddish white, and has a flexible texture. The shark has a long and slender intestine, the intestine of the fish is a spiral valve. The shark spiral valve is divided into two parts. The liver anatomy of the species consists of two lobes, a larger left lobe. The shark's liver is elongated.

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