POLITEKNIK MALAYSIA

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KOLEJ KOMUNITI MALAYSIA

DO YOU REALLY KNOW ABOUT FISH?

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DO YOU REALLY KNOW ABOUT FISH?

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DO YOU REALLY KNOW ABOUT FISH?

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PREFACE

The highest gratitude is extended to the Almighty for our permission and opportunity to complete this e-Book: Do You Really Know About Fish.

This e-Book is published as reference material for students and lecturers, especially those involved in the field of aquaculture.

No words can be uttered to express our gratitude to all those involved in the making of this book especially the family, colleagues, and the secretariat who tirelessly give guidance and trust.

Hopefully, this e-Book will benefit the reader no matter where it is accessed.

THANK YOU

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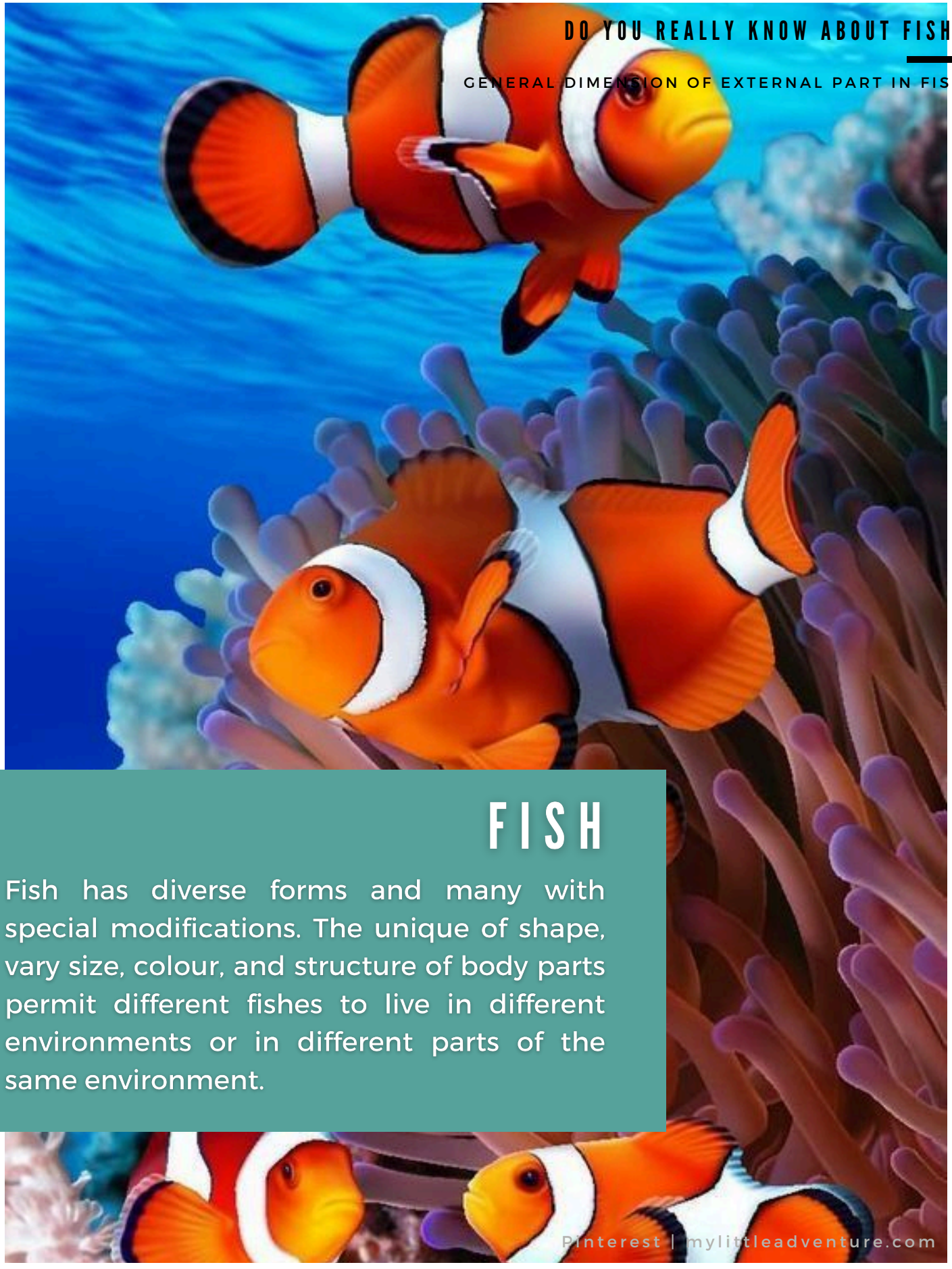


FISH

Fish has diverse forms and many with special modifications. The unique of shape, vary size, colour, and structure of body parts permit different fishes to live in different environments or in different parts of the same environment.

Pinterest | mylittleadventure.com

General dimension is anatomical positions that are used to give an idea of where on the body a feature can be located. In simple way to comprehend this is just like using a map of determining north, south, east and west direction or orientation. Table below 1.1 defines common anatomy terms, Figure 1.1 shows the anatomical position of Tilapia fish, Oreochromis species while Figure 1.2 shows the orientation on three different animals.

Table 1.1 Common anatomy terms.

Anterior	front end / head end (used to say something is closer to the head)
Posterior	back end / tail end (used to say something is closer to the tail)
Dorsal	upper surface
Ventral	lower (belly) or bottom surface
Lateral	side of the body
Median	centre / middle of body

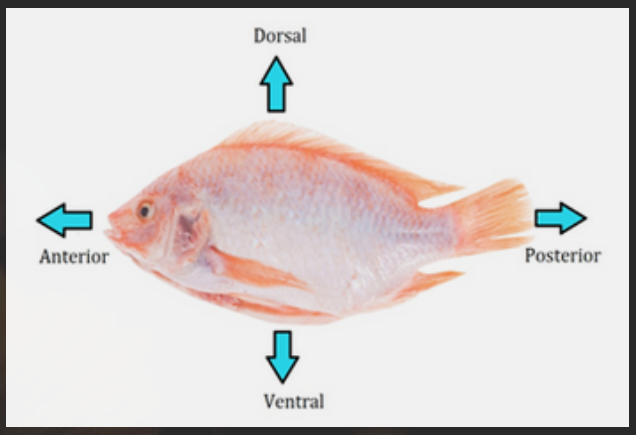


Figure 1.1 Anatomical position of Tilapia fish

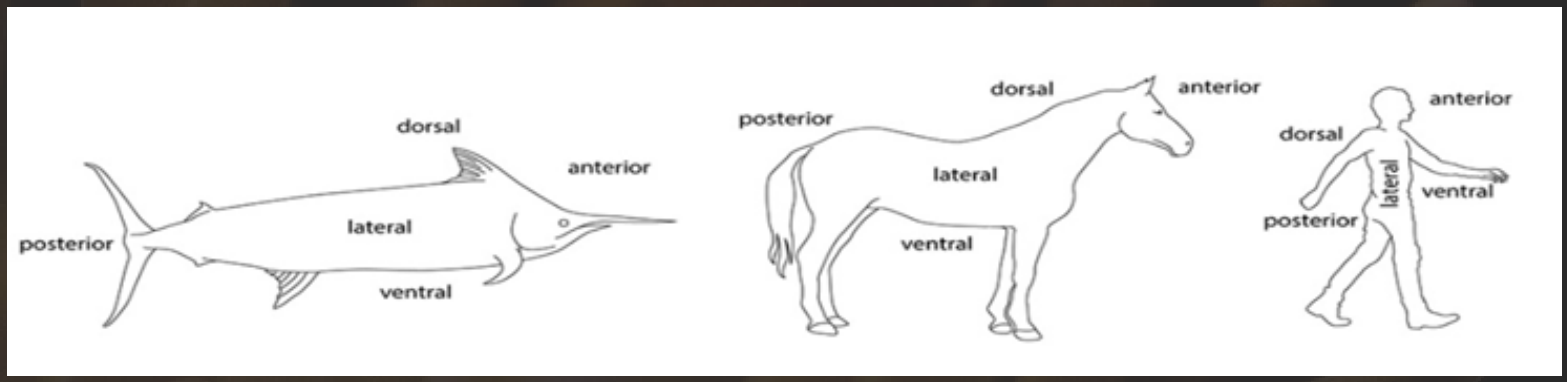
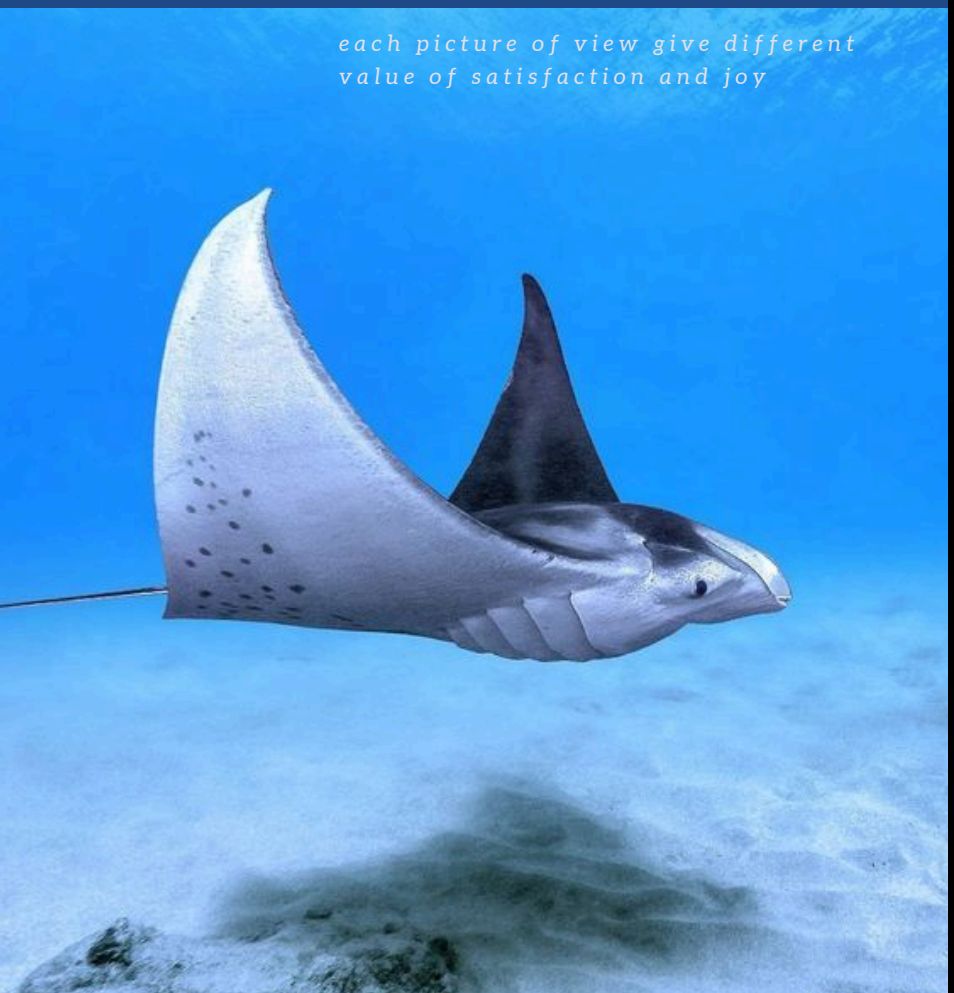


Figure 1.2 Common dimension terms applied to a billfish, a horse and a human.

Source: www.silverafood.com | 12 July 2021 | Byron Inouye, https://manoa.hawaii.edu | 12 July 2021 | Pinterest | photo by i pereira

The Attractive View of Fish Species

each picture of view give different value of satisfaction and joy



FISH EXTERNAL ANATOMY

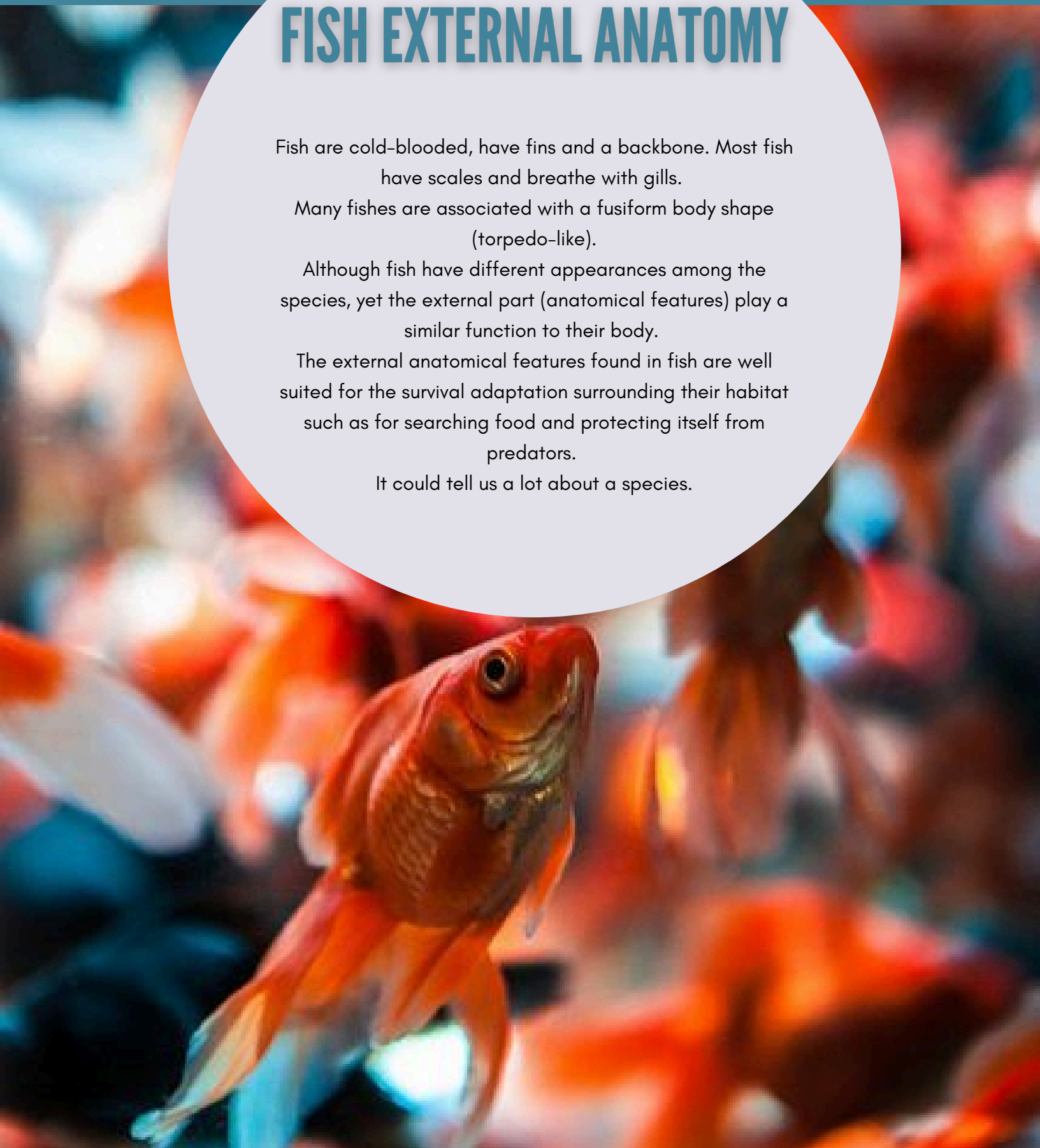
Fish are cold-blooded, have fins and a backbone. Most fish have scales and breathe with gills.

Many fishes are associated with a fusiform body shape (torpedo-like).

Although fish have different appearances among the species, yet the external part (anatomical features) play a similar function to their body.

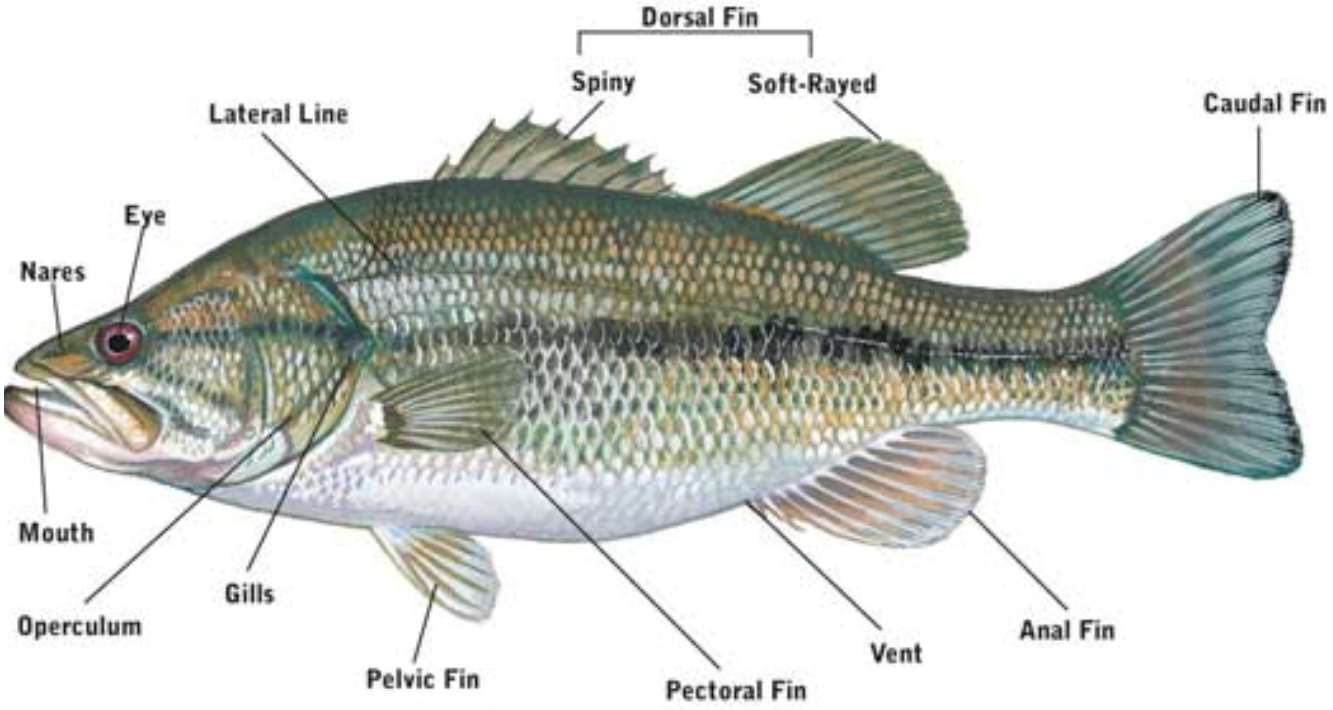
The external anatomical features found in fish are well suited for the survival adaptation surrounding their habitat such as for searching food and protecting itself from predators.

It could tell us a lot about a species.

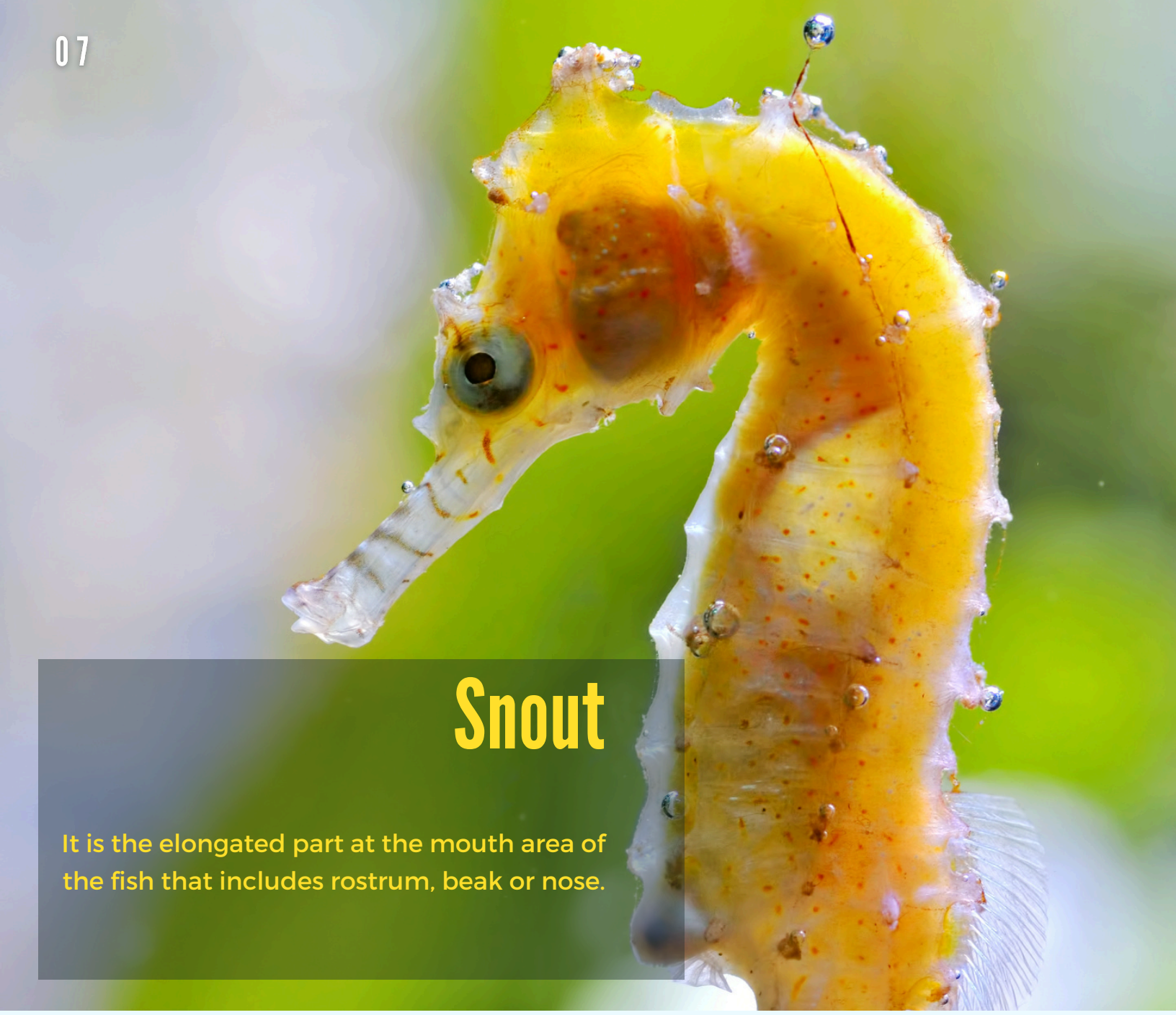


DO YOU REALLY KNOW ABOUT FISH?

GENERAL DIMENSION OF EXTERNAL PART IN FISH



External morphology of a fish



Snout

It is the elongated part at the mouth area of the fish that includes rostrum, beak or nose.

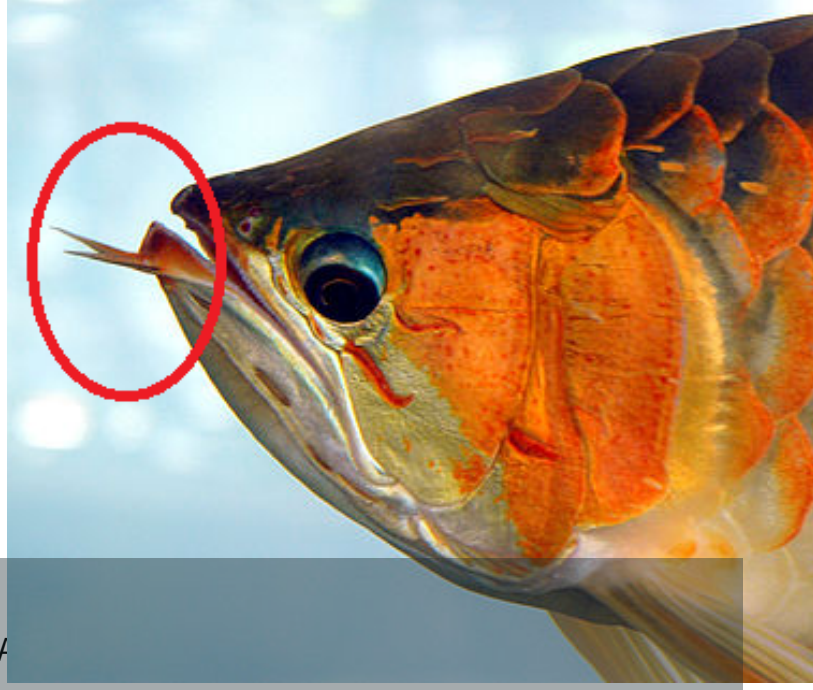
Nostril

The nostril are located on the snout near to the fish mouth. The nostril of the bony fish are most dorsally while the shark and skates are ventrally. Paired nostrils or nares in fish are quite sensitive, it is function to detect odors in water. The species of eel and catfish have particularly well developed senses of smell. It is not for breathing purpose because it do not communicate to the fish mouth.

www.anglingtimes.co.uk (Accessed on 1 August 2021)

Gill Cover

The gills are the breathing organ that fish use to obtain oxygen from the water . Gill cover or operculum is a flexible bony plate that covers and protects the sensitive gills. Water enters through the mouth, passes over the gills and exits through the operculum.

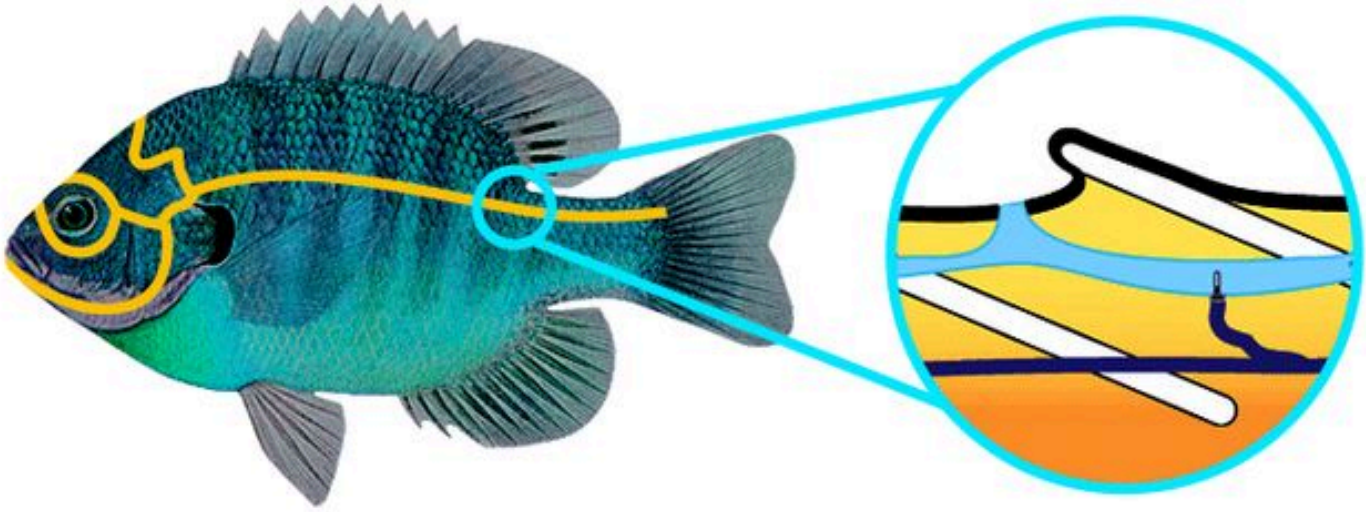


Barbel

As stated from leisurepro.com, barbels are a whisker like organ found near the mouth of certain fish. These organs are sensory organs that help the fish locate food in murky waters, acting as taste buds or nostrils. Most fish possessing barbells are bottom dwelling fish such as catfish, carp, goatfish and some sharks, that primarily hunt, or scavenge for food in murkier waters, such as sea beds, or lakes. Barbels may be vary located on the head of a fish.

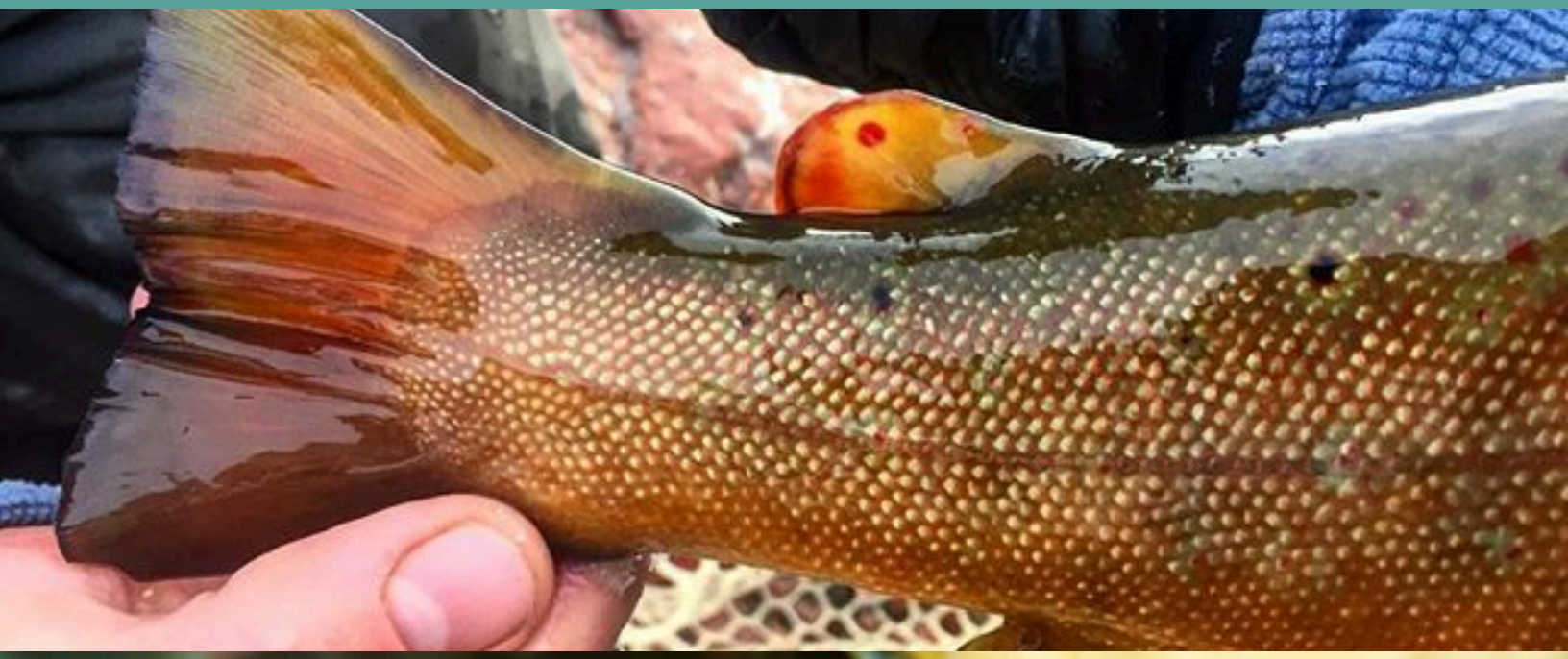
Lateral Line

Lateral line is a series of sensory cells usually situated at the side along the length of the body. It is a mechanosensory organ functions in receiving low frequency vibrations that can sense movement on the water. It consist of neuromast (a sensory cell with a hir-like process capable of detecting motion or vibrations in the water.



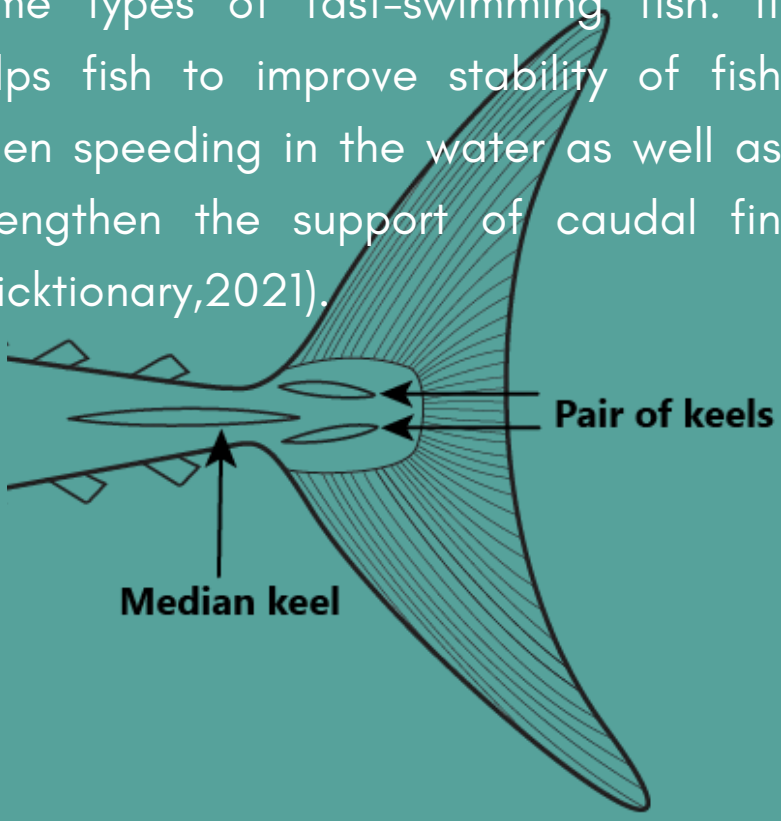
ADIPOSE FIN

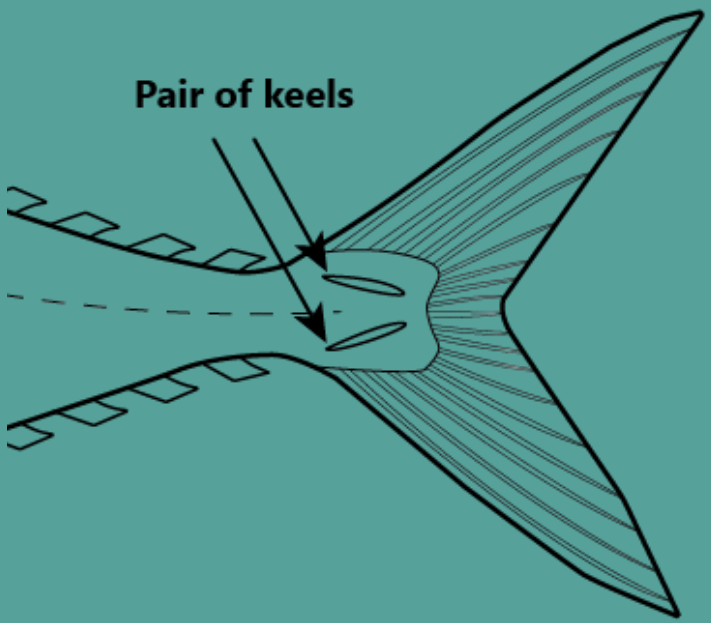
Adipose fin is a small fleshy fin found posterior to the dorsal fin and anterior of the caudal fin. It is only found on few fish (trout, salmon, catfish). It was named so as thought to hold fat, or adipose tissue (Sandeep Raghuvanshi, 2015).

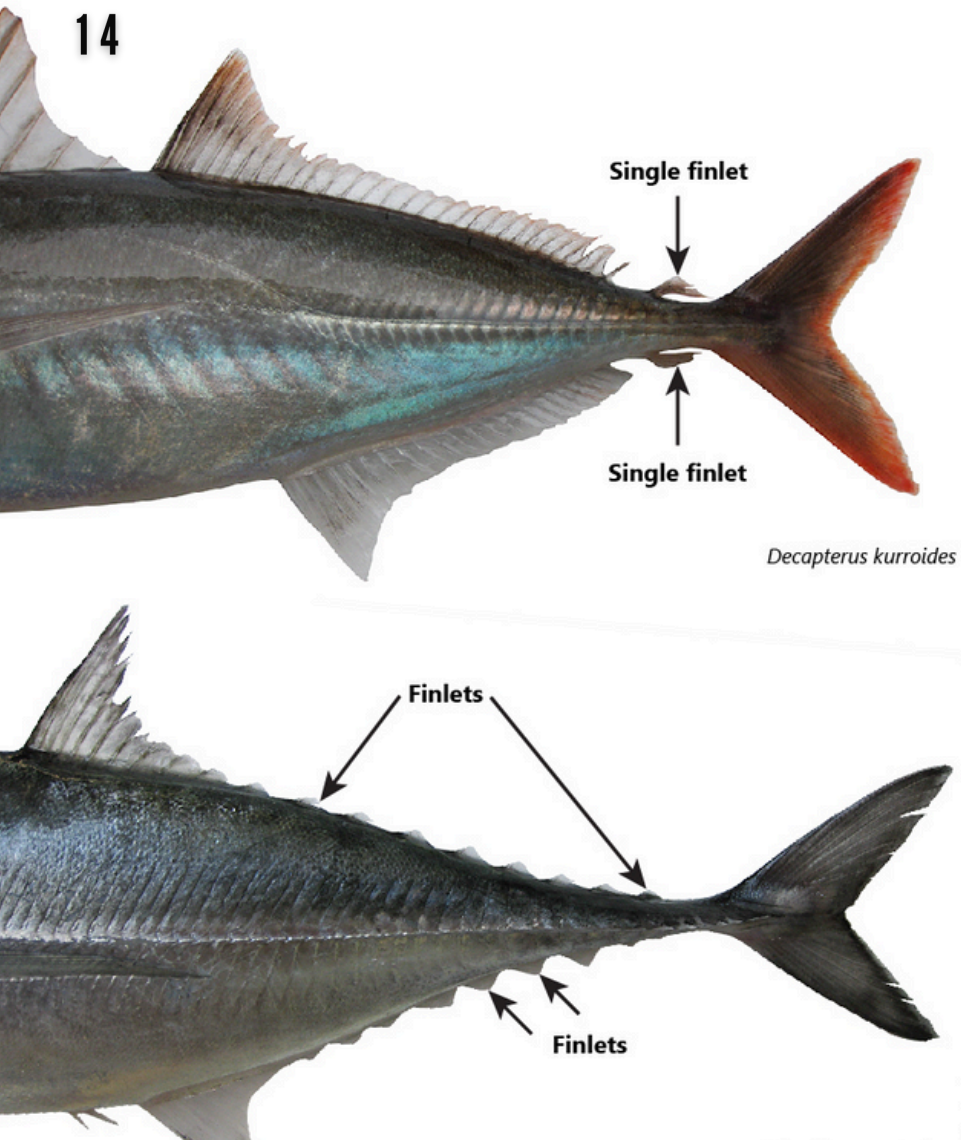


KEEL

It is a lateral ridge located at anterior to each side of peduncal caudal fin. for some types of fast-swimming fish. It helps fish to improve stability of fish when speeding in the water as well as strengthen the support of caudal fin (Wicktionary,2021).







FINLET

Finlet is a small non retractable fins that located on dorsal and ventral side of peduncal caudal fin in some fishes such as tuna (FAO,2019). The main function of finlets is to help fish speeding by cutting water.

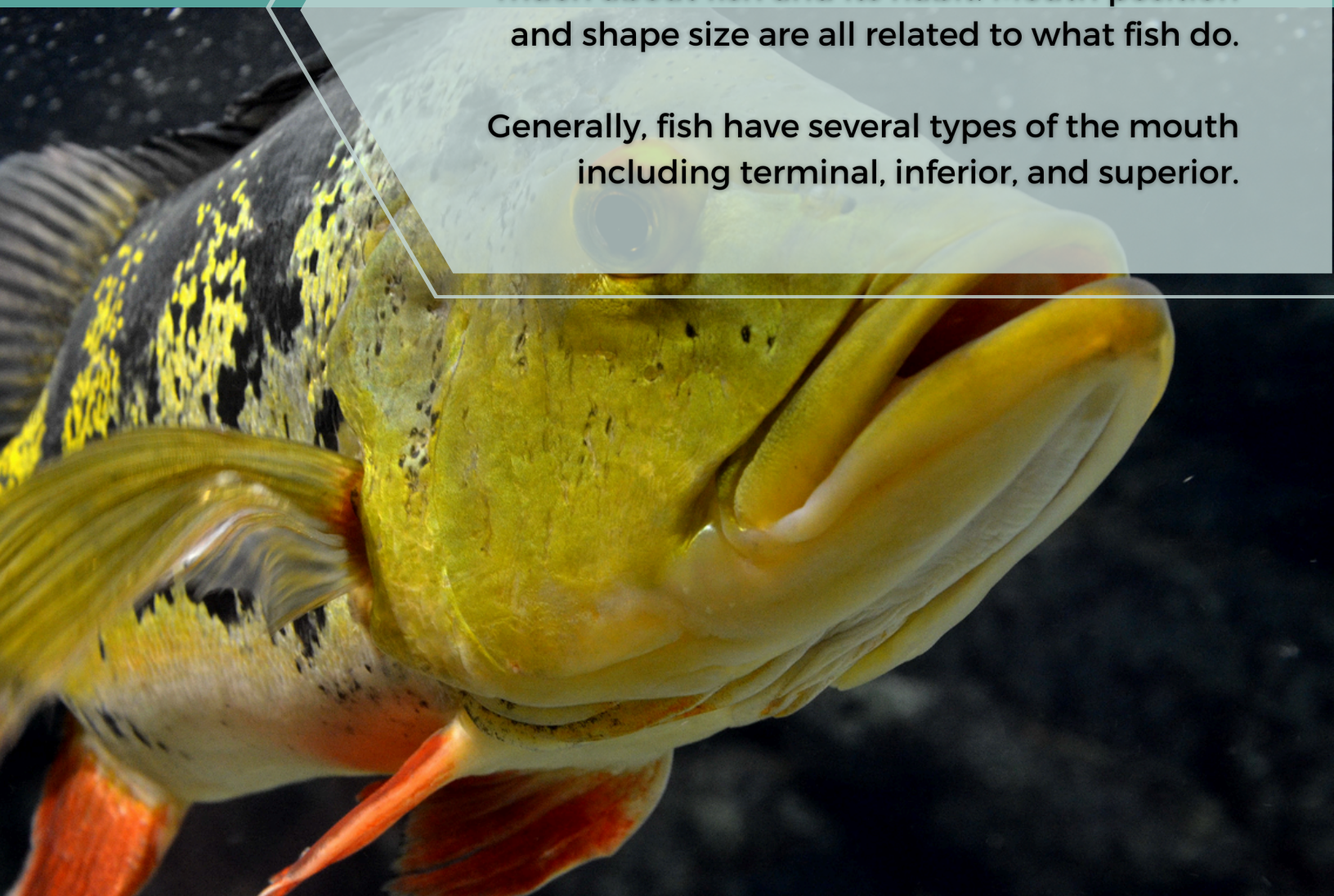
FISH MOUTH TYPES

Have you ever wondered what the types of mouth that fish have?

The mouth is one of the most important parts of the body for survival where food intake occurs.

Studying fish mouths is crucial in revealing much about fish and its habit. Mouth position and shape size are all related to what fish do.

Generally, fish have several types of the mouth including terminal, inferior, and superior.

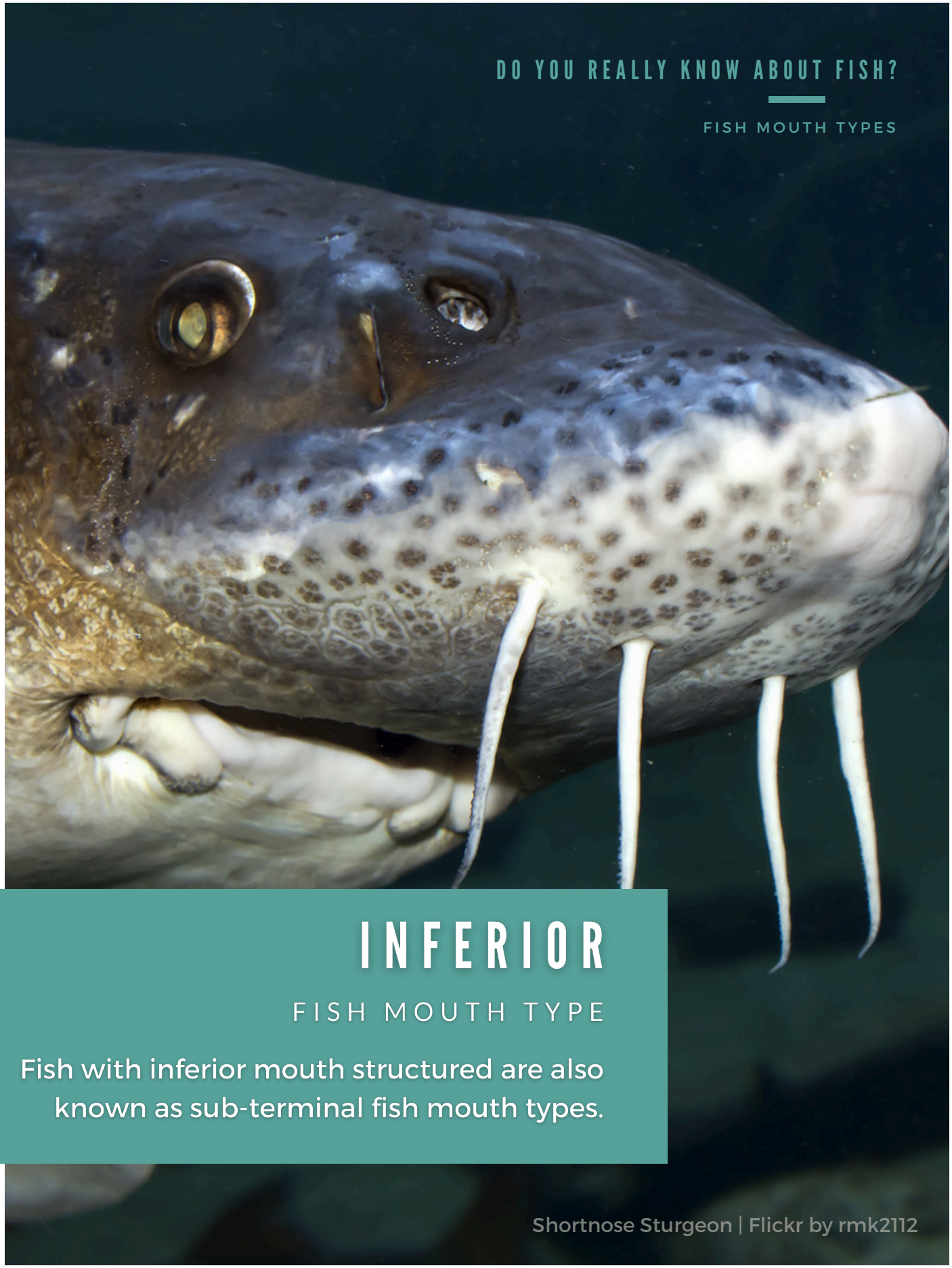


FISH MOUTH TYPES

Most fish are categorized as terminal mouth type, where the mouth is located at the end of snout with both jaws the same length.

The terminal mouth fish species are generally pelagic water feeders. They are also known as omnivorous fishes when eating anything that is available [4]. Their diet primarily consists of other fish along with some squids, the occasional crustacean as well as algae and aquatic plants.

Tunas, mackerels, tetras, and barbs are examples of fish species with terminal mouth types.



INFERIOR

FISH MOUTH TYPE

Fish with inferior mouth structured are also known as sub-terminal fish mouth types.

Shortnose Sturgeon | Flickr by rmk2112

INFERIOR mouth

structure is located at the ventral part of the head where the lower jaw is shorter than the upper jaw.

Inferior fish mouths normally bottom feeders. They eat foods on the bottom of the body or on the seafloor. Their diets most of the time are benthic organisms such as crustaceans or shellfish [3].

Stingray | Flickr by Jesse Estes

Hammer Head Shark | Flickr by Tony Lindberg

FISH MOUTH TYPES

SUPERIOR

Superior mouth structure is facing upwards or slightly upturned. The lower jaw is longer than the upper jaw and functions much like a scoop. Normally, the superior fish mouth species eat food at or near the surface.

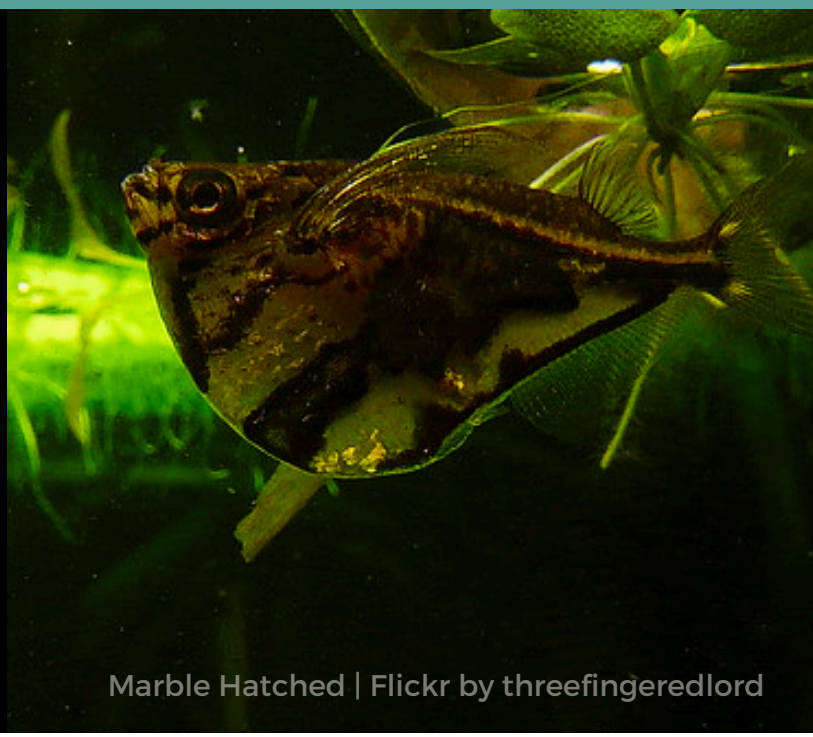
Arowana | Pinterest by Rose Iewis

Tarpon | Flickr by Arie Eliens

SUPERIOR

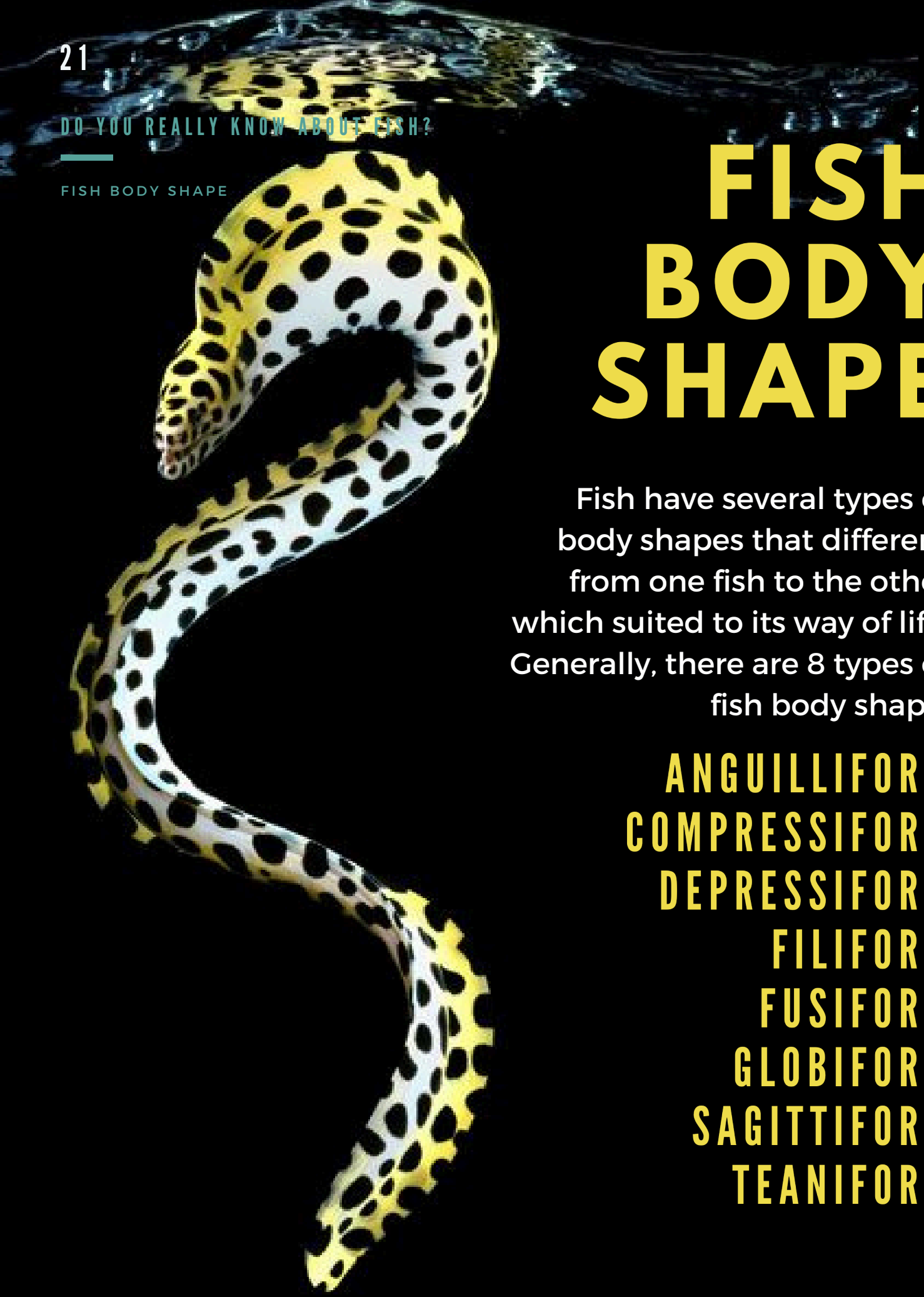
Usually, surface oriented fish lie-in-wait for prey to appear above them, then strike suddenly from below [1]. Their diet normally includes insects but some may feed other fish or other prey items that reside on or near the surface. Tarpons, Betta fishes, and Arowanas are examples of superior fish mouth types.

Betta Fish | Flickr by da nokkaew



Marble Hatched | Flickr by threefingeredlord

FISH BODY SHAPE



FISH BODY SHAPE

Fish have several types of body shapes that different from one fish to the other which suited to its way of life. Generally, there are 8 types of fish body shape.

ANGUILLIFORM
COMPRESSIFORM
DEPRESSIFORM
FILIFORM
FUSIFORM
GLOBIFORM
SAGITTIFORM
TEANIFORM

ANGUILLIFORM

The body shape that is long and skinny that looks like a snake which enable fish to move into narrow openings and it is resist forces of current. Examples: Eel (*Monopterus albus*) and Lamprey (*Lampetra eppendix*).

Green Moray Eel | Pinterest by James Dies

COMPRESSIFORM

Discus Fish | Pinterest by Neluka Malla

Longfin Batfish | Pinterest by Ona Lisa

Compressiform body shape is fish laterally compressed which allows for quick burst of speed, quick turns and enable fish to move along crevies.

Examples: Discus (*Symphysodon aequifasciatus*),
Tilapia (*Oreochromis niloticus*)

DEPRESSIFORM

Body shape is horizontally compressed which enable fish to stay at the bottom. Examples: Stingray,Rajidae, Ogcocephalidae.

Gulf Flounder | Pinterest by ginger boyd

FILIFORM

Body shape that is skinny and elongated with thread like shape.

These fishes normally slow swimmers, slither through the water like a snake, live in soft mud, sand or under rocks. Examples: Snipe ell, Pipefishes.

Pipe Fish | Pinterest by Suzy Cameron

FUSIFORM

Torpedo like shape body with streamlined pointed ends which low frictional resistance and enable fish to move fast. Generally most fish have a fusiform body. Examples: Tuna, Mackerel

Bluefin Tuna | Pinterest by Kemil Tara

GLOBIFORM

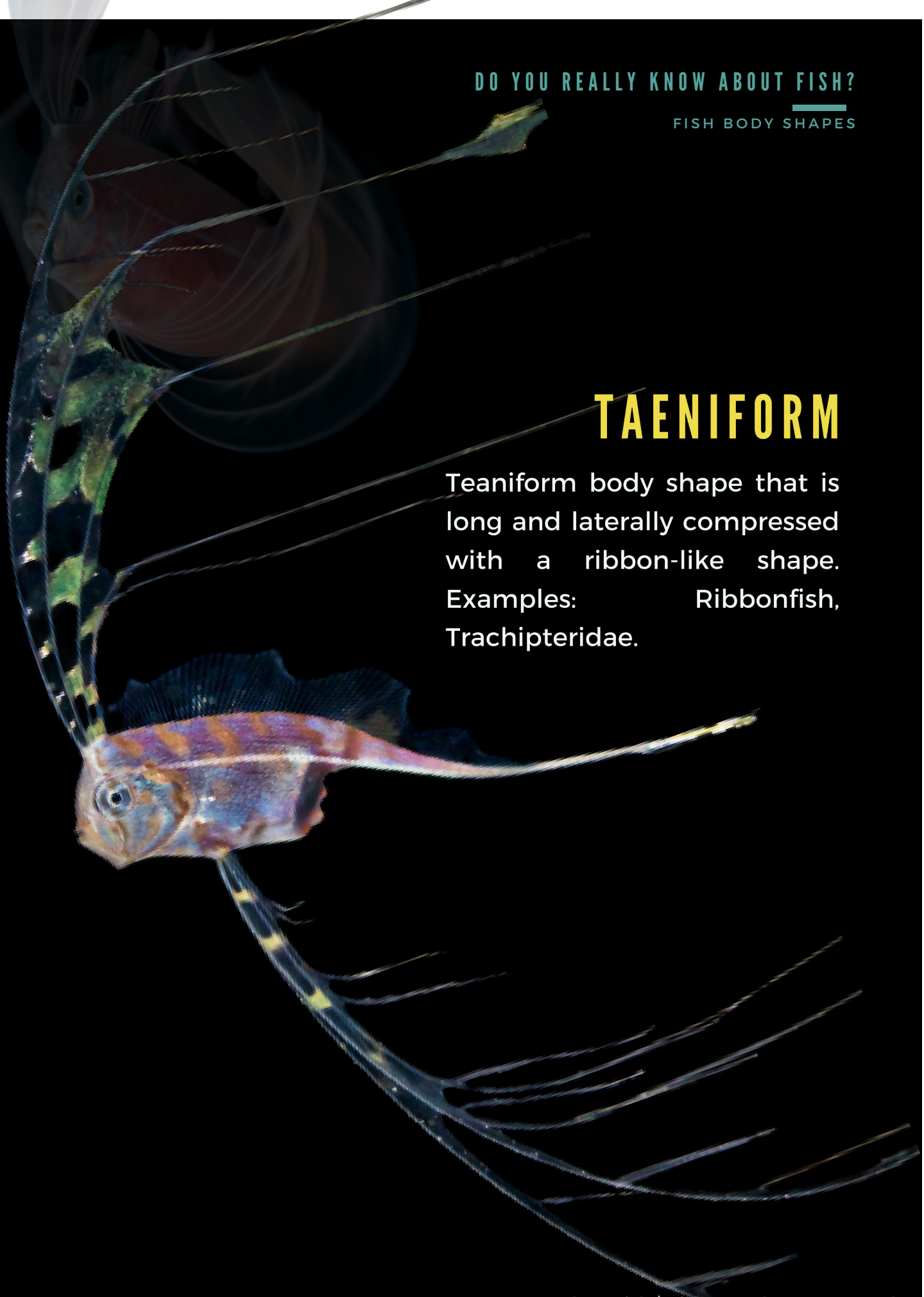
Globiform fish are round like a globe in shape and typically slow swimmers in the ocean. Example: Puffer, Tetraodontidae, Pacific Spiny Lumpsucker.

Puffer Fish | Pinterest by Yvonne Thompson

SAGITTIFORM

Sagittiform is an elongated tubular body layout that is arrow-like in shape. They are known as predator with predator which depend on an ability to strike prey quickly from a hiding place. Examples: Pike Fish, Gar, Esocidae.

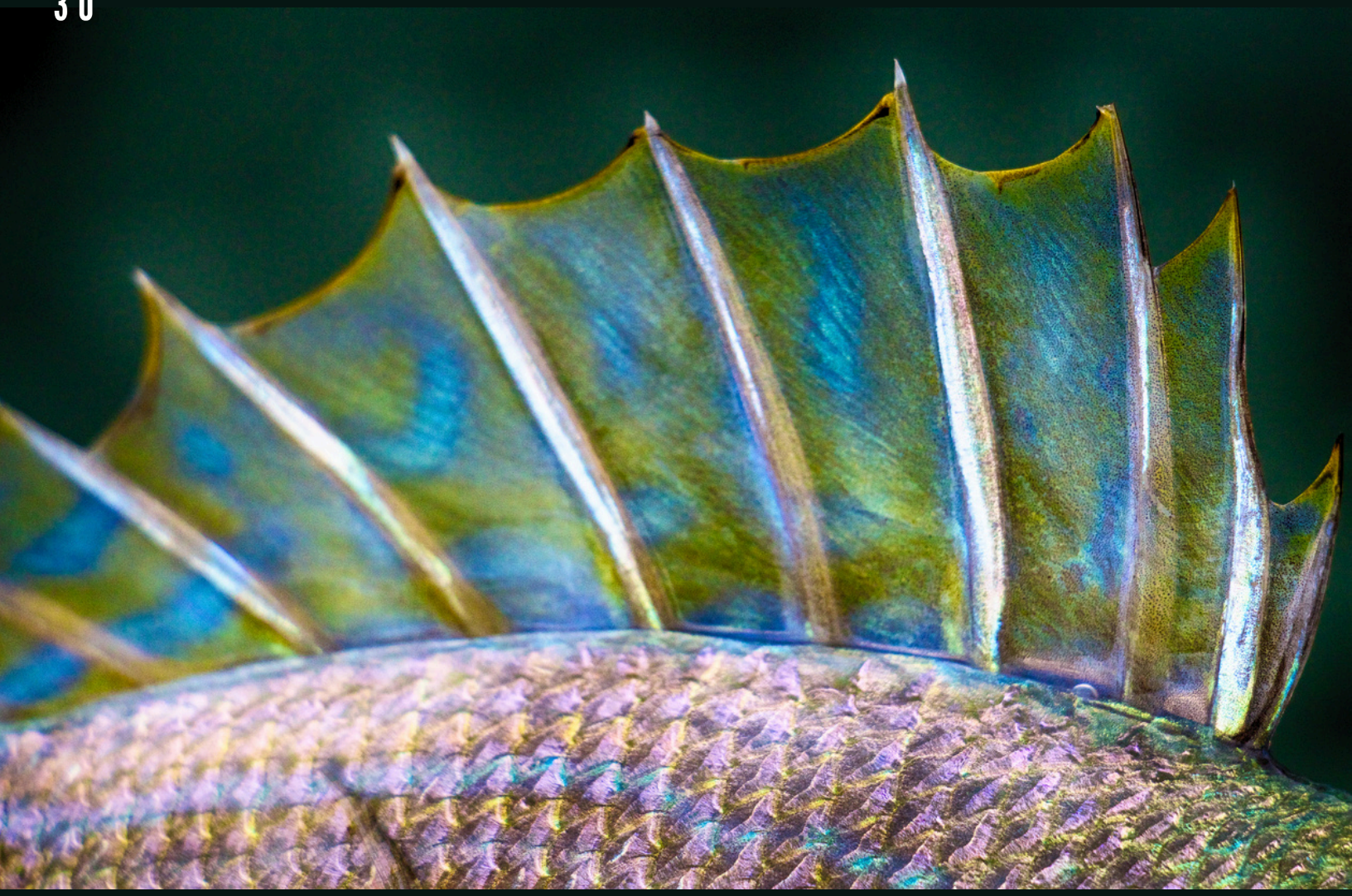
Cuban Gar | Pinterest by kiryuuu



TAENIFORM

Teaniform body shape that is long and laterally compressed with a ribbon-like shape. Examples: Ribbonfish, Trachipteridae.

Wahoo Fish | Pinterest by Sean Farrel



FIN OF FISHES

Fins are important in every fish. Generally, fins are flap-like structure that is involved in fish movement that consist of rays. There are two types of fins, which is median and paired. Median fins or unpaired fins (Dorsal fin, Caudal fin and Anal fin) function in stabilization and thrust (caudal fin) in movement. Paired fins (pectoral fin and pelvic fin) function in maneuvering (changing direction), aggressive behavior and braking.

MEDIAN FINS

Median fins or unpaired fins (Dorsal fin, Caudal fin and Anal fin) function in stabilization and thrust (caudal fin) in movement.

PAIRED FINS

Paired fins (pectoral fin and pelvic fin) function in maneuvering (changing direction), aggressive behavior and braking.

Dorsal fin located on the top or back of the fish which help the fish to stop or quick turn and also avoid the fish from rolling. Some fishes have spiny and soft dorsal fins combined togethter.

DORSAL FIN

CAUDAL FIN

Caudal fin is generally called as tail. It is located at the most posterior region of the body which helps in acceleration movement. The shape of the caudal fin indicates the style of motion for a fish. Generally, there are five types of caudal fin; rounded, truncate, emerginate, forked, and lunate.

TYPES OF CAUDAL FIN

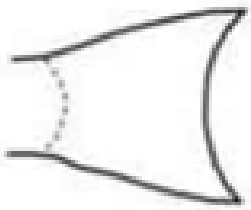
ROUNDED

It is used for slow swimming, accelerating, and maneuvering. Examples: Catfish, Turbot, and Leman-Sole.

TYPES OF CAUDAL FIN

EMERGINATE

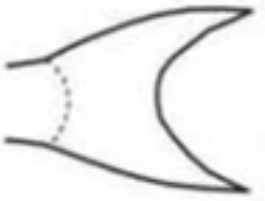
It is used for quick acceleration and offers high maneuverability. Examples: Trout, Carp, and Perch.



TYPES OF CAUDAL FIN

LUNATE

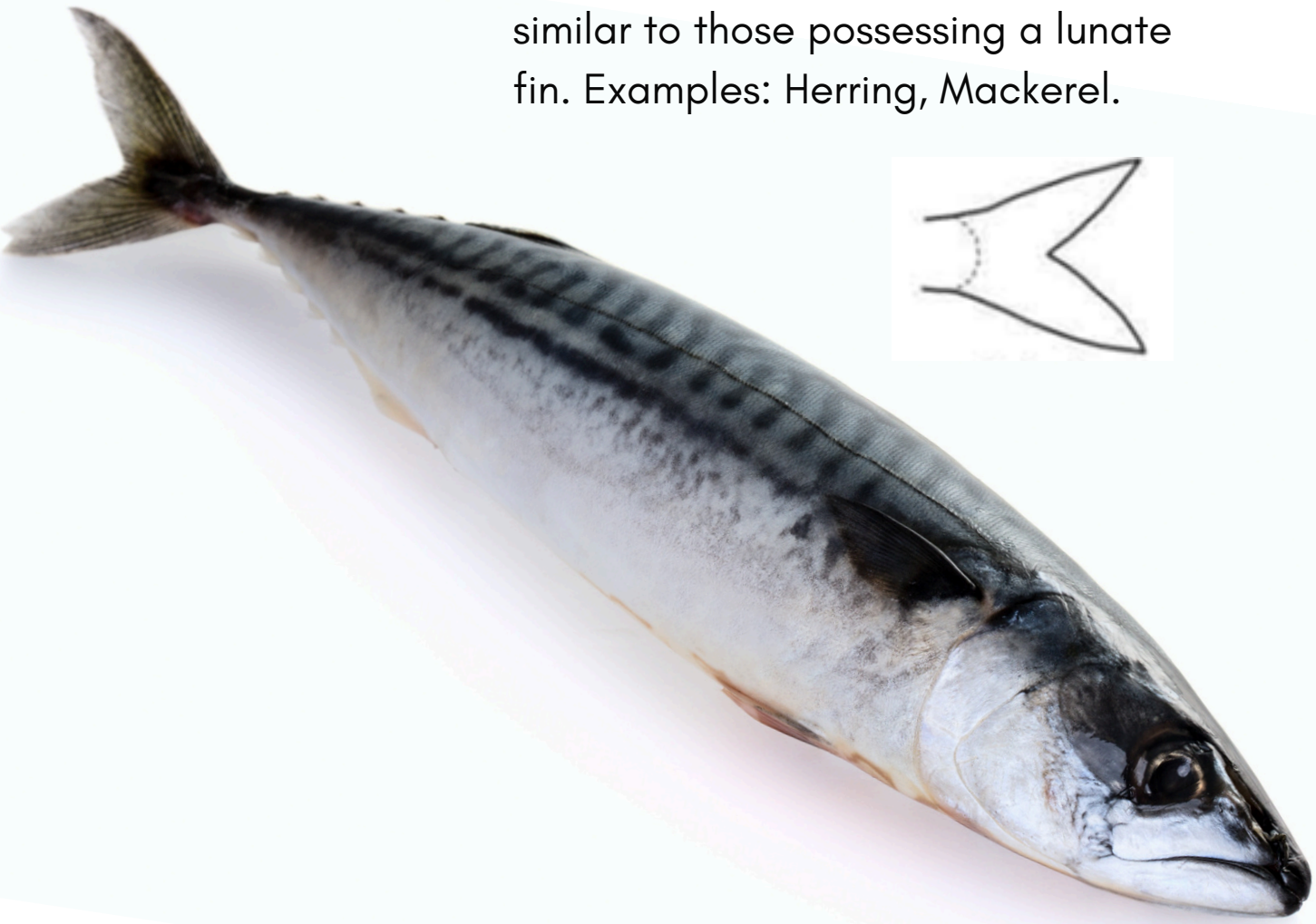
It is thin, hard and less drag to water allows the fish to speed in open water. Examples: Tuna, Mahi-mahi.



TYPES OF CAUDAL FIN

FORKED

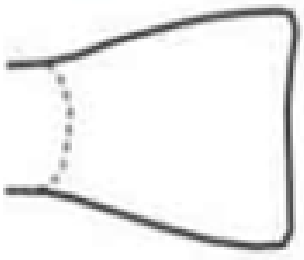
It is great swimmer at high speeds similar to those possessing a lunate fin. Examples: Herring, Mackerel.



TYPES OF CAUDAL FIN

TRUNCATE

It is generally found in many benthic fishes. It have large amount of surface area that can generate large amount of drag. Examples: Grouper.



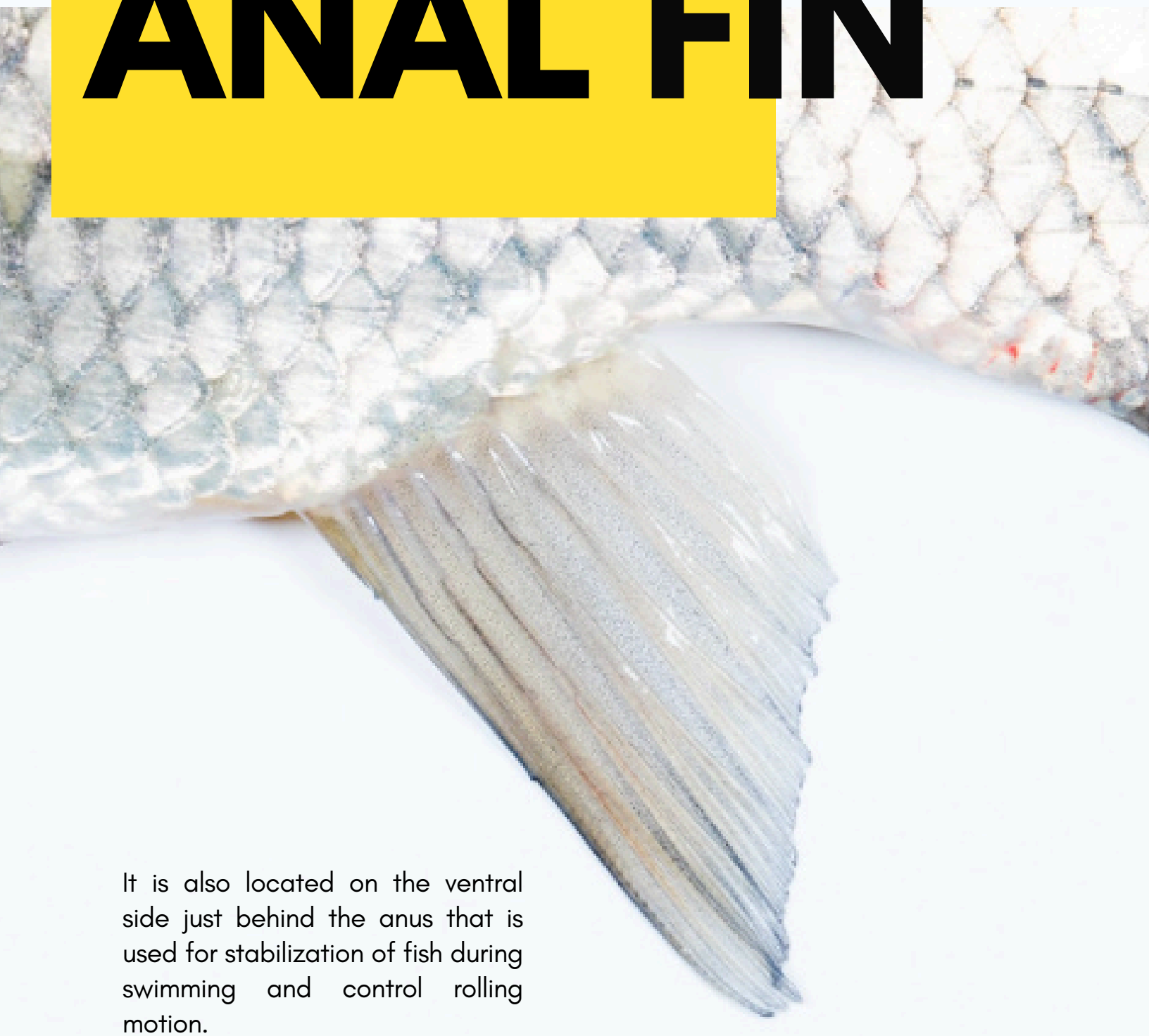
PECTORAL FIN

Pectoral fins are located on both sides of the body usually behind the operculum which supports during swimming also helps the fish to turn left and right.

Pelvic fin located on the ventral (bottom) part of the body which helps fish in swimming as aerofoil, brake, propulsor, and rudder, for ground walking and hovering. Some are spined for protection, contain gases, and be used for floatation, sensory perception, camouflage, a holdfast organ and reproduction.

PELVIC FIN

ANAL FIN



It is also located on the ventral side just behind the anus that is used for stabilization of fish during swimming and control rolling motion.

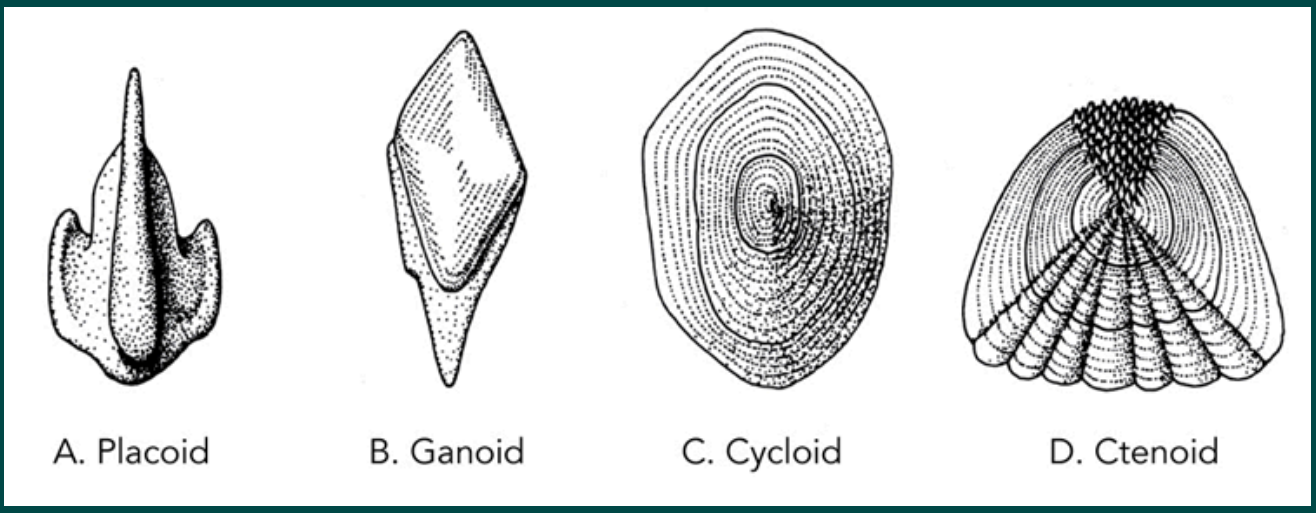
SCALE

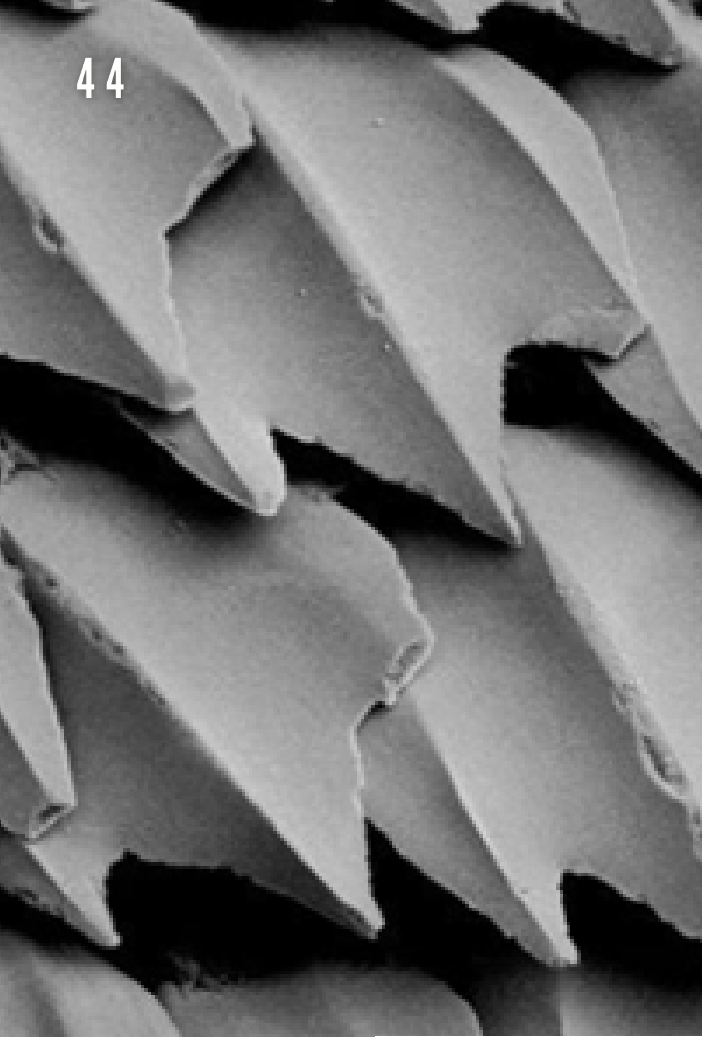
OF FISHES

Fish scales are bony structure that are located outside the fish. The main functions of the scales are as an external protection to the fish, give colors, support the body structure of the fish, assist in fish movement and use in age determination by squamatologist.

Fish scales evolve differently in cartilaginous and bony fish. In some fish, scales are modified becoming hard spines, exoskeleton and bony plates. Some fish does not have scales like catfish. Generally, there are FOUR types of scales:

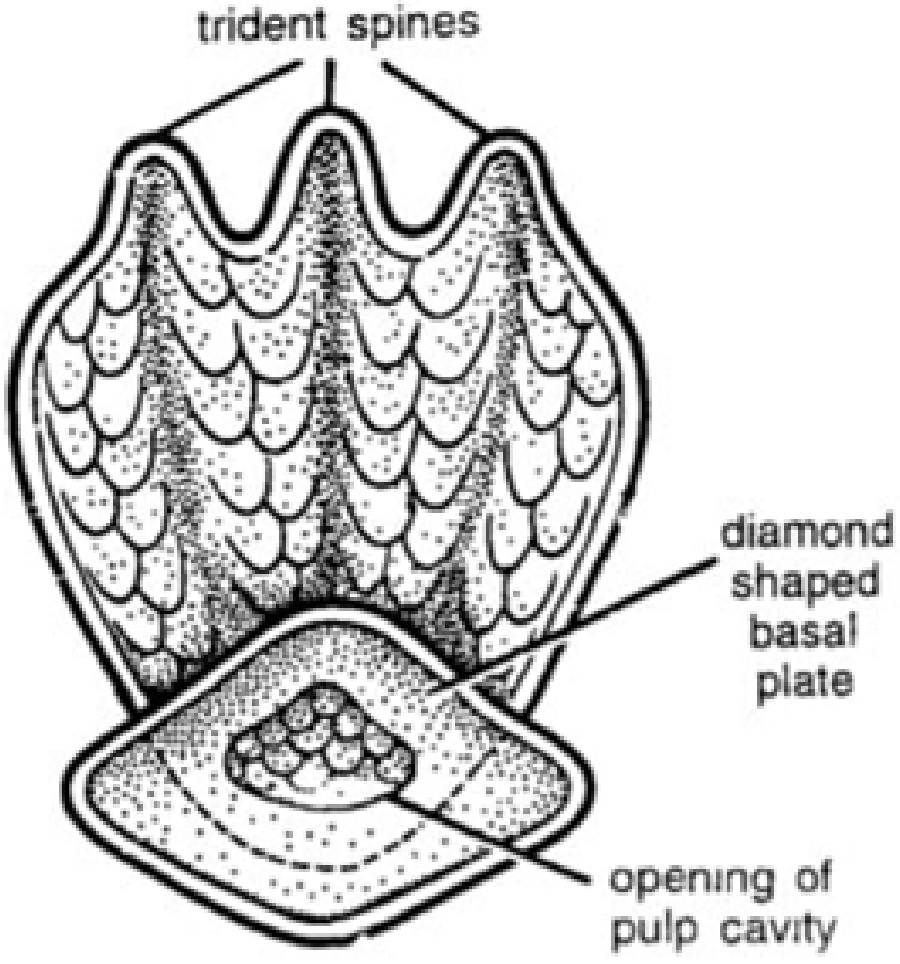
A. Placoid
B. Ganoid
C. Cycloid
D. Ctenoid

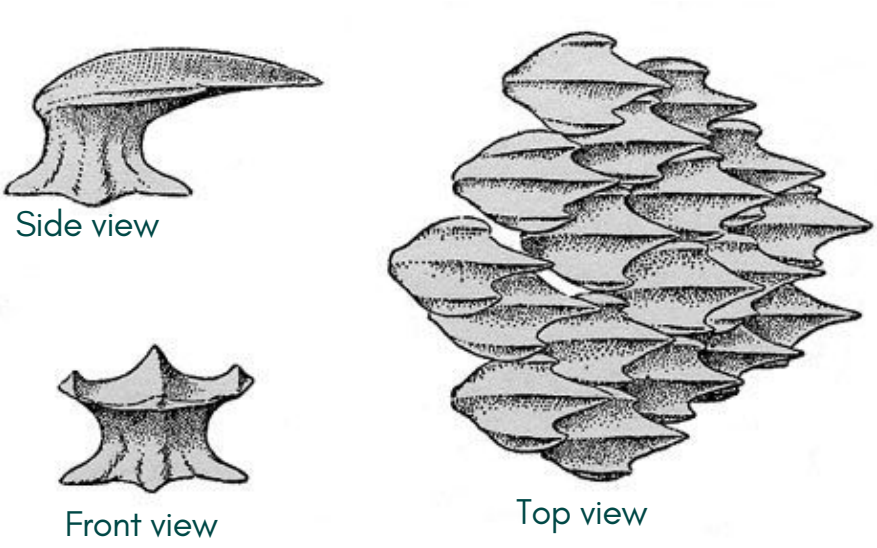




PLACOID SCALES

Placoid scales commonly found in cartilaginous fishes. It has a structure similar to a tooth (enamel) that consist of basal plate located at the base of the scale. It has a pulp cavity and dentin.



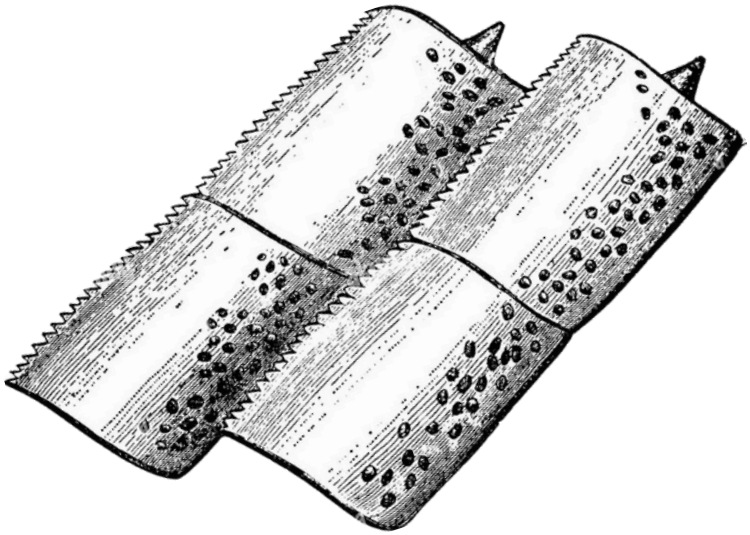


PLACOID SCALE

The outer part of the scales are covered with enamel. The spine in rays is a modified placoid scale. Examples: Sharks and rays.

GANOID SCALE

Ganoid scales are not arranged in layers or partly layered. They are diamond shape (rhomboid). The anterior structure overlaps with the other scale. Its structure is hard an not flexible.



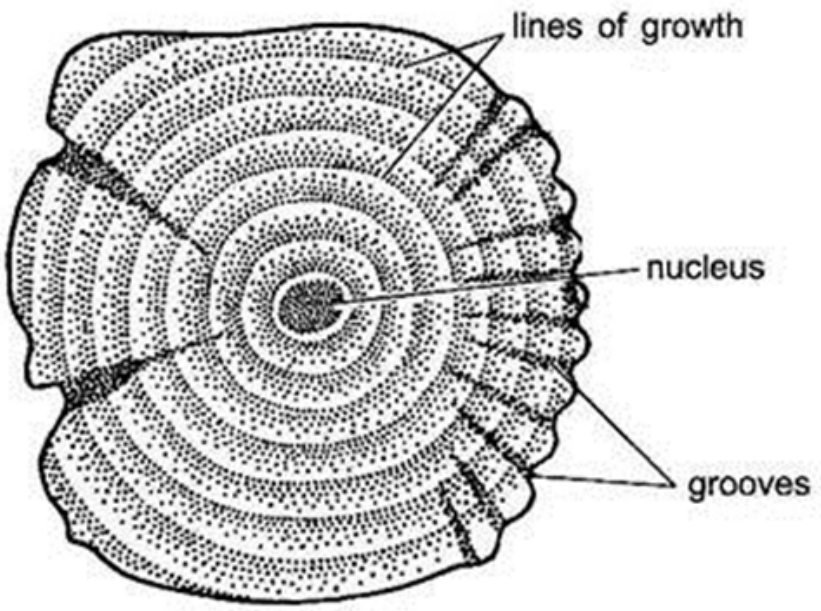
The outer layer is a bony structure called Ganoine (a component similar to enamel). The middle layer consist of dentine. The bottom layer consist of cosmine layer. It can be found in Lepisosteidae amd Amiidae. Examples: Gars, Birchirs, Sturgeons

CYCLOID & CTENOID

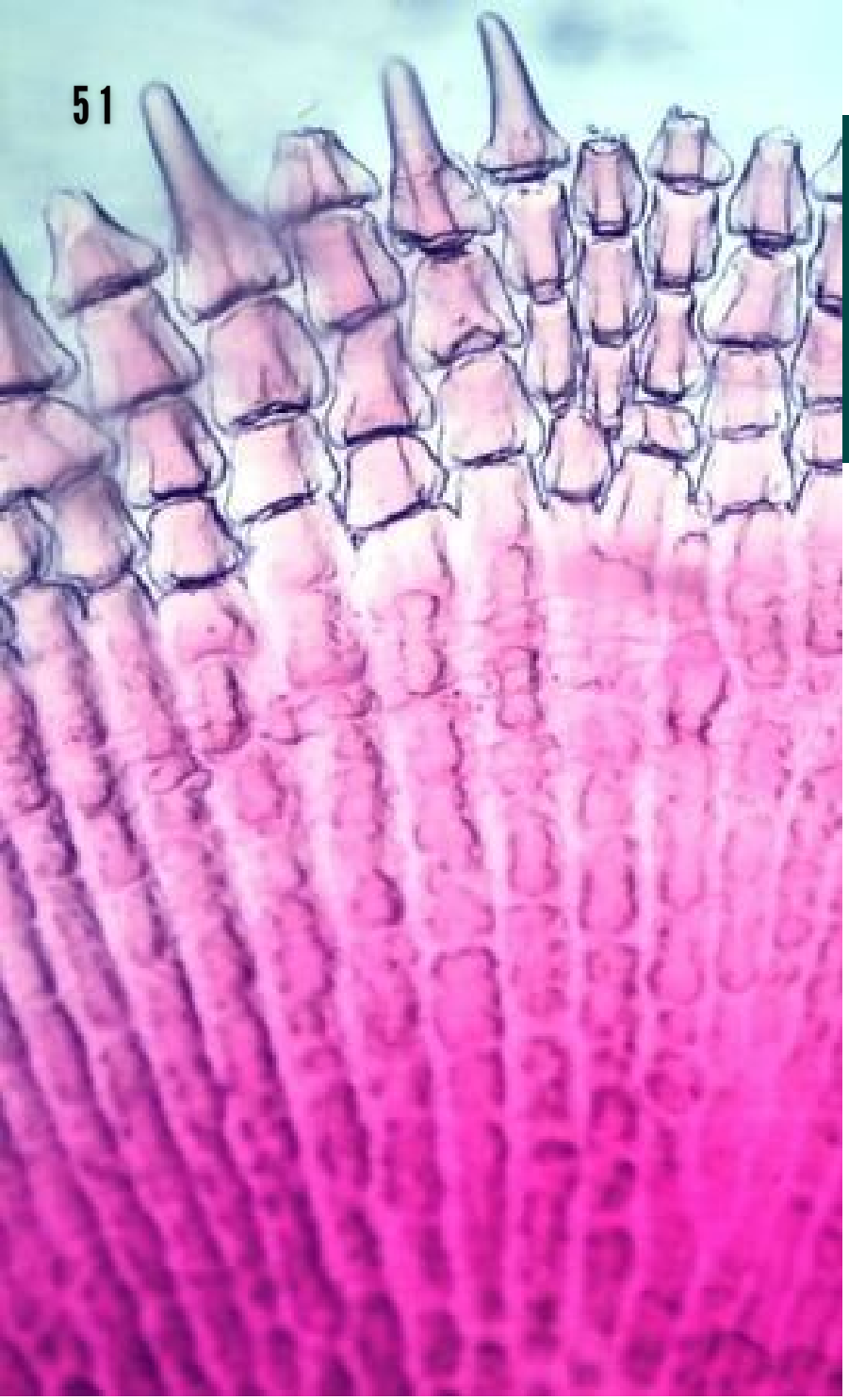
These scales are thin, and piercing. It does not have enameloid and dentinal layer. This type of scales is found in most living bony fish (Osteichthyes). They are overlapping which allow for greater flexibility in movement than other types of scales such as ganoid scales.

CYCLOID SCALE

Cycloid scales are rounded/oval shape, flat and thin. Flexible bony structure that covered by epidermis layer which contain mucus gland.



Normally, cycloid scale presence of circuli (growth ridges) and enamel layer. It is mostly found in Teleostei. Examples: Tilapia, Arowana.

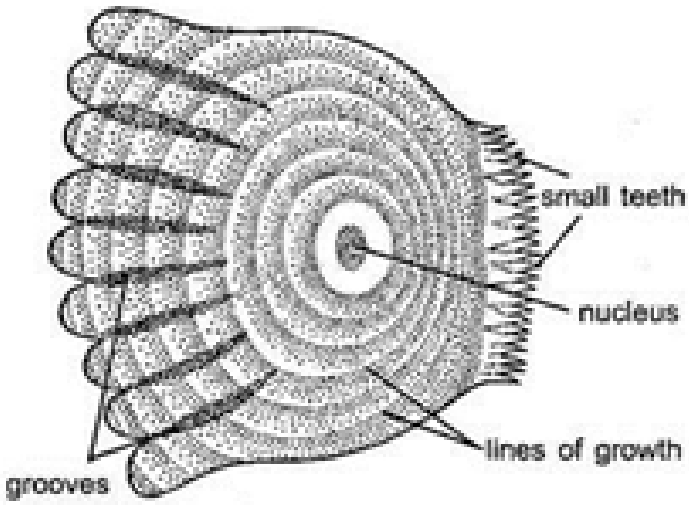


CTENOID SCALE

Ctenoid scales have a similar structure with cycloid scale but with a presence of a set of fine teeth along the posterior edge. Sometimes, both cycloid and ctenoid scales are called elasmoid scales.

Ctenoid scale consist of 2 main layers:

1. Outer layer (calcified layer-hard structured)
2. Inner layer (Fibrous layer-collagen type)



Ctenoid scales contain a structure called Ctenii (series of small spine that looks like a comb) that protrudes at the posterior end of the scale to increase swimming efficiency and makes the skin feels rough.

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Our Team

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