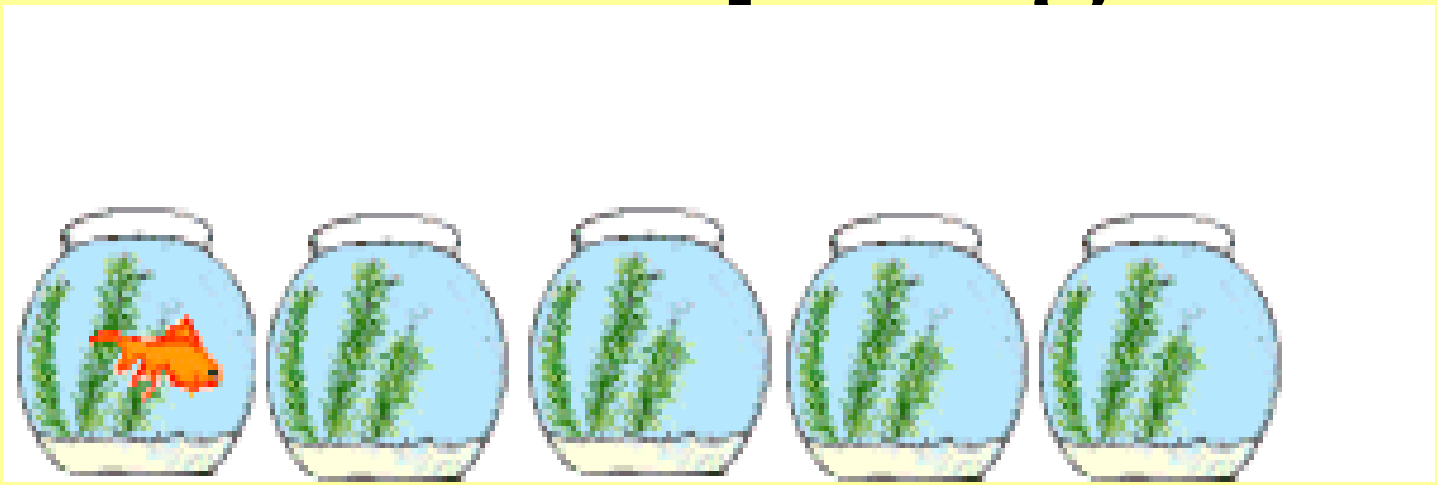
Fish flip ‘n go



By Kelly Riedell/Brookings Biology

Portion of the brain that controls muscle coordination and balance

cerebellum

When water flows over the gills in one direction and the blood in the fish's head moves in the opposite direction, more oxygen is absorbed.
This is called Countercurrent flow

Organism with a backbone vertebrate

Organism whose blastopore becomes its mouth protostome

Thin walled sac in the abdominal cavity containing gases that control buoyancy in a fish Swim bladder

Arrangement in which water moving over the gills moves in the opposite direction as blood moving through the gills so more gas is exchanged Counter current flow

This part of the heart is the

atrium

Young fish are called **fry**

Name 3 of the characteristics of VERTEBRATES

1. **Bone/cartilage covering nerve cord**
2. **Bone covering brain (cranium)**
3. **Endoskeleton of bone or cartilage**
4. **Closed circulatory system**
5. **Ventral heart/Dorsal nerve cord**

Maintaining the correct balance of water and ions in the body osmoregulation

Covering made of bone that protects the brain; also called skull cranium

Nerve cord surrounded by bone or cartilage; also called a Spinal cord Vertebral column

This part of the brain receives and processes info from the visual, auditory, & lateral line systems.

Optic tectum

Perch belong in the CLASS Osteichthyes

Part of the brain that controls the autonomic internal organs and relays sensory info from body Medulla oblongata

The concentration of nervous and sensory organs in the anterior end of an animal cephalization

Small fingerlike extensions inside the intestine that increase surface area for greater absorption of nutrients villi

The protective covering over the gills is the operculum

Type of circulatory system found in fish

closed

The 2 organs in fish that help to regulate water and ion balance are

Kidneys & gills

This gas filled pocket at the top of the coelom controls buoyancy

Swim bladder

This dark strip of tissue that runs along the ceiling of the body cavity under the swim bladder is part of the excretory system.

kidneys

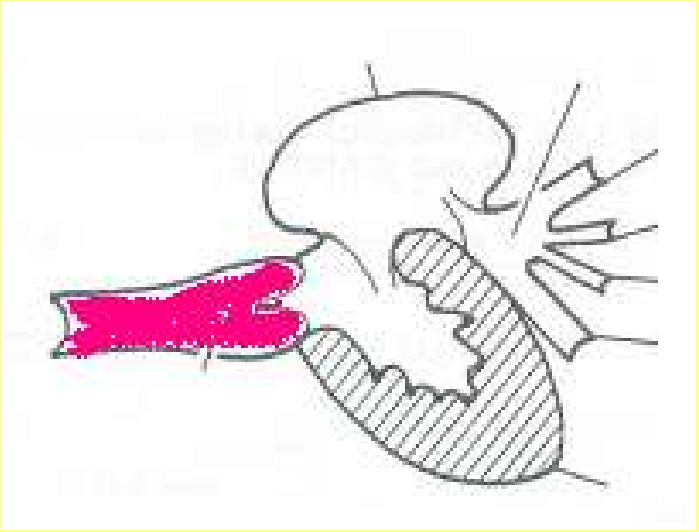
Respiratory organ in fish

gills

Start at the sinus venosus and trace the path of blood through the loop as it moves through the body.

This part of the heart is the

Conus arteriosus



Blood leaving the heart goes to the

gills

MATCH THE BRAIN PART WITH ITS FUNCTION

"higher thinking" like memory, learning, problem solving, reasoning ___cerebrum___

Controls autonomic body organs ___Medulla oblongata___
& relays sensory info from body

Processes info from visual, auditory, and lateral line Systems ___Optic tectum___

Muscle coordination & balance ___cerebellum___

___Olfactory lobes___
Processes info about smell

MATCH THE MOLECULE WITH ITS FUNCTION

Helps break down fats bile

Helps break down proteins trypsin

Causes cells to take up glucose from blood insulin

Causes cells to release glucose into blood glucagon

Energy molecule for storing glucose in cells glycogen

MATCH THE ORGAN WITH ITS FUNCTION

Makes insulin & glucagon pancreas

Produces acid & some digestive enzymes to begin the breakdown of food

stomach

Place where bile and trypsin are used

intestine

MATCH THE ORGAN WITH ITS FUNCTION

Pouches for digesting plants Pyloric caeca

Makes trypsin for digesting proteins pancreas

Absorbs nutrients Intestine

Makes bile liver

Stores bile Gall bladder

Makes sperm testes

Makes eggs ovary

Produces, stores, and recycles red blood cells

spleen

MATCH THE ORGAN WITH ITS FUNCTION

Controls buoyancy Swim bladder

Main pumping chamber of the heart ventricle

Collects blood entering the heart Sinus venosus

Smoothes blood leaving heart Conus arteriosus

Protects brain cranium

Provides protection and reduces water resistance scales

Stores urine Urinary bladder

Maintains the balance of ions & water (osmoregulation) gills **&** kidneys

Unlike worms and crayfish,

fish have a _____ heart and a _____ spinal cord.

ventral

dorsal

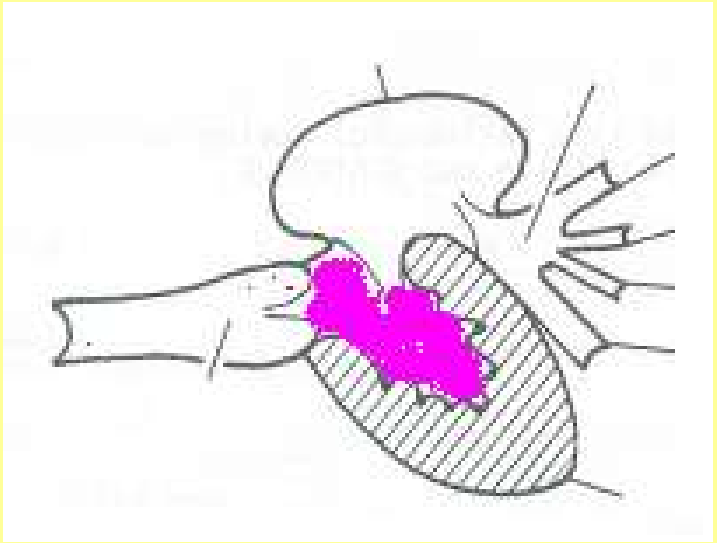
dorsal ventral

Number of main chambers in a fish heart. **Two:**

1 atrium; 1 ventricle

This part of the heart is the

ventricle



Digestive organ where nutrients are absorbed

Intestine

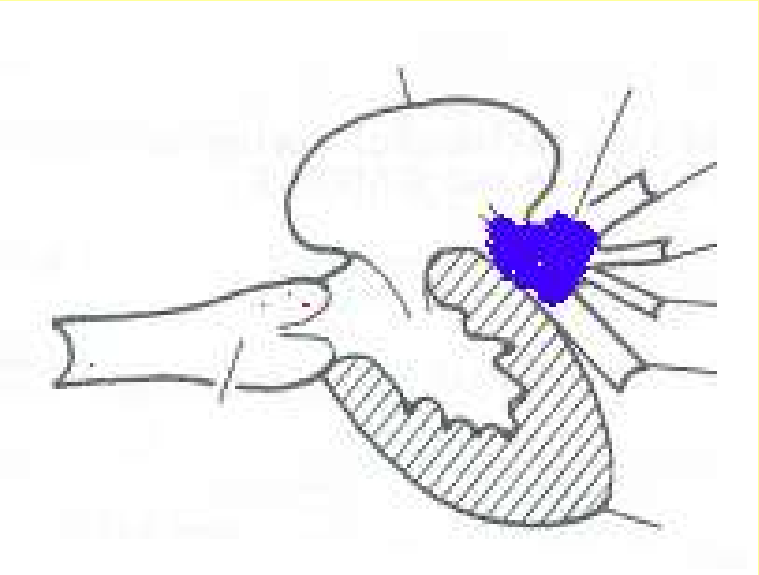
Excretory organ in fish

Kidneys & gills

When blood leaves the fish's heart it goes next to the _____gills_____

This part of the heart is the

Sinus venosus



Blood entering this space is coming from the Body organs

Sense organ located along the sides of the fish's body that senses water pressure and vibration

Lateral line system

Organ that makes trypsin, glucagon, and insulin

pancreas

Part of the brain that integrates info from the other parts and is involved with "higher thinking"

cerebrum

The function of the pyloric caeca is to

Contain bacteria to digest plants

This organ stores bile made by the liver **Gall bladder**

Type of symmetry seen in fish

bilateral

Perch belong to the

KINGDOM ANIMALIA

PHYLUM CHORDATA

SUBPHYLUM VERTEBRATA

CLASS OSTEICHTHYES

Organ where urine is stored

Urinary bladder

Name the 4 characteristics of animals that are CHORDATES

Notochord
Dorsal nerve cord
Pharyngeal pouches
Post anal tail

The word olfactory deals with what sense? smell

This part of the brain controls body organs you don't have to think about (autonomic)

Medulla oblongata

The blastopore in a fish embryo becomes the anus

So fish are called deuterostomes

protostomes **deuterostomes**

T or F

At one time you had a tail.

True (as an embryo)

You are a chordate.

Type of integumentary covering in fish

scales

Organ that makes eggs

ovary

Water enters the mouth **in a fish, moves over the** gills**, and exits through the slit behind the** operculum

The reproductive/egg laying behavior in fish is called

spawning

Fertilization in most species of bony fish takes place externally

internally **externally**

Type of skeleton found in vertebrates

endoskeleton

endoskeleton exoskeleton

Muscular "pumping" chamber of the heart

ventricle

Type of body cavity found in fish

no coelom **pseudocoelom** **eucoelom**

eucoelom

Another name for the skull bone

cranium

Fish are Vertebrate deuterostomes

invertebrate protostomes

invertebrate deuterostomes

vertebrate deuterostomes

Fish have a 2 chamber heart and a 1 loop circulatory system.

Organ that makes sperm

testes

The form of nitrogen waste excreted by the gills and diluted to make urine in a fish is _____ ammonia _____

This carries food from the pharynx to the stomach esophagus

Bile is a digestive enzyme that breaks down fats

Blood vessels carrying blood away from the heart are called

arteries

T OR F

A fish has arteries but NO VEINS.

FALSE; fish have a closed circulatory system with both Arteries AND veins

Bile is made by the liver

stored in the Gall bladder

and used in the intestine

to help break down fats.

Blood vessels that carry blood back to the heart are called Veins

The small thin walled blood vessels where gases and nitrogen waste are exchanged are called

capillaries

Blood leaving the sinus venosus goes to the atrium

Blood leaving the conus arteriosus goes to the

gills

Fish excrete their nitrogen waste mainly in the form of ammonia

uric acid **urea** **ammonia**

Joining of an egg & sperm inside the female's body _____Internal fertilization

Kind of development in which offspring hatch as larva and must undergo metamorphosis to become adults _____Indirect development

Kind of circulatory system in which blood is NOT contained in vessels and flows loose inside the coelom _____open

Row of sensory structures that runs along the body of a fish which can sense vibration and water pressure _____Lateral line system

Explain how villi in a fish are like the typhlosole in a worm.

Both are inside the intestine to increase surface area for better nutrient absorbtion

Fish have a __1__ loop circulatory system.

1 23

The first portion of the intestine where the pyloric caeca are located is called the

duodenum

The organ that makes bile is the

liver

Organism without a backbone invertebrate

Organism whose blastopore becomes its anus deuterostome

Fish with long flexible spines in its fins like a perch Ray-finned fish

Hard plate on each side of a fish's head that opens at the rear and protects the gills operculum

Fish are vertebrates

vertebrates invertebrates

Fish are Eucoelomates “true coelom”

Acoelomates pseudocoelomates eucoelomates

Joining of an egg & sperm outside the female's body External fertilization

Kind of development in which offspring are born/hatch looking like their parents only smaller Direct development

Kind of circulatory system in which blood is contained inside vessels closed

Organism that has a notochord, pharyngeal pouches, a post anal tail, and a dorsal nerve cord Chordate

The fingerlike extensions inside the intestine that increase surface area are called villi

Urine and eggs/sperm exit the fish's body through the urogenital **pore near the anus.**

Explain how a freshwater fish maintains its osmotic(ion/water) balance.

Gets rid of excess water as urine
and actively pumps lost ions back in through gills

Explain how a marine fish maintains its osmotic (ion/water) balance.

Drinks sea water to replace lost water.
Conserves water by making concentrated urine.
Removes excess ions by excreting them out through the gills.

First section of intestine where the pyloric caeca are found duodenum

The energy molecule made from glucose that is stored in the liver glycogen

This substance is made by the pancreas and causes cells to release glucose into the bloodstream. glucagon

(Be careful! It sounds like the answer above. Don't get these 2 confused!)

This fish lives in an environment that causes it to constantly lose water and gain ions.

What kind of fish is it?

marine **fresh-water**

Marine; their hypertonic environment causes this to happen

Body system that produces hormones to control other body systems

endocrine

Name a function controlled by the endocrine system in fish

Sexual development

heart rate

metabolism (glucose levels)

Name the 3 substances made by the pancreas.

Trypsin, insulin, glucagon

Blood leaving the ventricle enters the conus arteriosus

Why are lobe-finned fish important?

Scientists believe extinct lobe-finned fish were the ancestors of amphibians and other land vertebrates

Blood traveling through a fish's heart is low oxygen blood.

(It hasn't gone to gills yet)

low oxygen high oxygen both low & high oxygen

Tell what each organ does

Gills Exchange oxygen/carbon dioxide
Regulate balance of ions in blood
Excrete nitrogen waste (ammonia)

Gall bladder Store bile

Swim Bladder Control buoyancy

Liver Make bile
Store glycogen
Process nitrogen waste for kidneys
Store vitamins

This fish lives in an environment that causes it to constantly lose ions and gain water.

What kind of fish is it?

marine **fresh-water**

Freshwater;

Their hypotonic environment causes this to happen

Small out pockets at the anterior end of the digestive tract that become gills in a fish and the throat, inner ears, and tonsils in humans

Pharyngeal pouches

Tail that sticks out past the posterior opening of the digestive tract

Post anal tail

Outside body covering in an animal

integument

This kind of body organ works automatically without thinking about it

autonomic

Tell what each organ does

Urinary bladder Store urine made by kidneys

Pyloric caeca Contain bacteria to digest plants

Swim Bladder Control buoyancy

Pancreas Make trypsin to digest proteins

Make insulin & glucagon to control blood sugar

The Conus arteriosus has valves to prevent blood from flowing backwards into the ventricle.

Fish are oviparous.
What does this mean?

They reproduce by laying eggs.

This fish lives in freshwater.

What must it do to stay alive?

Actively pump ions in through gills and make lots of urine.
Drink water constantly.
Make concentrated urine with little water.
None of the above.
All of the above.

Pump ions into its body through its gills and make lots of urine

They also:

drink LITTLE water

make very DILUTE urine with lots of water

to get rid of the excess water entering.

The concentration of nervous tissue and sensory organs in the anterior end of an animal _____ cephalization

In animals the body plan where the left and right sides are mirror images of each other _____ Bilateral symmetry

This part smooths the flow of blood leaving the ventricle _____ Conus arteriosus

These small thin walled blood vessels connect arteries and veins and are the place where gases, wastes, & nutrients are exchanged _____ capillaries

Blood vessels that carry blood away from the heart ___arteries___

An arrangement in which the water flowing over the gills moves in the opposite direction as the blood inside ___Countercurrent flow___

Area in a fish's brain that receives and processes info from visual, auditory, and lateral line systems ___Optic tectum___

Posterior part of the brain that controls balance and muscle coordination ___cerebellum___

Blood vessels that carry blood back to the heart ___veins___

Nerve cord surrounded by bone or Cartilage; also called a spinal cord ___Vertebral column___

Posterior part of the brain that integrates Info from the other brain parts and where Higher brain functions like memory, learning, Reasoning, and problem solving occur ___cerebrum___

Collecting chamber that receives blood returning to the heart from the body Before it enters the atrium ___Sinus venosus___

MATCH THE ORGAN WITH ITS BODY SYSTEM

Pyloric caeca digestive

cranium skeletal

Conus arteriosus circulatory

testes reproductive

Gall bladder digestive

Urinary bladder excretory

spleen circulatory

Gills Respiratory & excretory

MATCH THE ORGAN WITH ITS BODY SYSTEM

capillaries circulatory

Medulla oblongata nervous

scales integumentary

ovary reproductive

Urogenital pore Excretory & reproductive

Optic tectum nervous

villi digestive

kidney excretory

Explain how a swim bladder is different from a urinary bladder.

Swim bladder stores fluid and gases from the blood and controls buoyancy

Urinary bladder stores urine made by the kidneys Waiting to leave body

Which two organs excrete nitrogen waste in a fish?

Gills & kidneys

This fish lives in freshwater.

What must it do to stay alive?

Pump ions out of body through its gills.
Drink a lot of water.
Make concentrated urine with little water.
None of the above.
All of the above.

All of the above.

Which organs help it do this?

Kidneys & gills

Which 2 body systems share the urogenital pore as an exit

Reproductive & excretory

Name the parts of the brain in order starting at the spinal cord and moving forward

Spinal cord
Medulla oblongata
cerebellum
optic tectum
cerebrum
Olfactory lobes

Tell three ways a fish is SIMILAR to an earthworm

Both have/are:

- eucoelomates
- cephalization
- external fertilization
- direct development/ No larva
- 2 part stomach (crop/gizzard : cardiac/pyloric)
- have heart to pump blood
- closed single loop circulatory system
- sexual reproduction
- bilateral symmetry
- 2 opening/ one way digestive system
- intestine absorbs nutrients

Tell 3 ways a fish is LIKE a clam

- Eucoelomates
- Have a heart to pump blood
- Bilateral symmetry
- have gills for respiration
- Sexual reproduction
- Separate sexes
- External fertilization (marine clams)
- Makes bile to break down fats
- Kidneys as excretory organs
- 2 opening/one way digestive system

Tell two ways fish and starfish are ALIKE:

Both deuterostomes
Have separate sexes
Both are eucoelomates
2 part stomach (cardiac & pyloric)
external fertilization
can do sexual reproduction

Tell two ways FISH & EARTHWORMS are different

FISH	EARTHWORMS
Separate sexes	hermaphrodites
kidneys for excretory	Nephridia for excretory
Gills to exchange gases	exchange gases thru skin
Complex brain	cerebral ganglia
Bones around nerve cord	no bones
Dorsal nerve cord	ventral nerve cord
2 chamber heart	aortic arches
Ventral heart	dorsal heart
Vertebrates	invertebrates

Tell two ways FISH & STARFISH are different

FISHSTARFISH

Only sexual reproductionsexual & asexual
Direct development/no larvabipinnaria larva
stomach stays insidecardiac stomach everts to eat
Cephalizationno cephalization
Complex brainno cerebral ganglia
/dorsal nerve cord nerve ring/radial nerves
kidneys for excretoryno actual excretory organ
nitrogen waste- thru skin gills
Gills to exchange gasesexchange gases thru skin gills
Heart to pump bloodno heart
Close circulationopen circulation

Tell two ways FISH & CLAMS are different

FISHCLAMS

Direct developmentIndirect/ trochophore larva

2 part stomach1 part stomach

Cephalizationno cephalization

Complex brain3 pair ganglia

/2 pr nerve cords

Dorsal nerve cordnerve cords below heart

ventral heart dorsal heart