UPSC

NCERT Summary

Gist of Biology – 8

THE ANIMAL KINGDOM

Invertebrates

Of the million or more animal species in the world, more than 98% are invertebrates. Invertebrates don't have an internal skeleton made of bone. Many invertebrates have a fluidfilled, hydrostatic skeleton, like the jelly fish or worm. Others have a hard outer shell, like insects and crustaceans. There are many types of invertebrates. The most common invertebrates include the protozoa, annelids, echinoderms, mollusks and arthropods. Arthropods include insects, crustaceans and arachnids.

(i) Protozoa

Protozoa are simple, single-celled animals. They are the smallest of all animals. Most protozoa are microscopic in size, and can only be seen under a microscope. However, they do breathe, move and reproduce like multicelled animals. There are several types of protozoa. The amoebas are clear, shapeless cells. Flagellates have a body shape looking like a hair. Although we can't see them, protozoa do a lot for us. Protozoa play a useful role in the food chain as a source of food for fish and other animals. Some protozoa are helpful to humans by eating dangerous bacteria. Unfortunately, other protozoa are parasites and can be harmful to humans by transmitting disease.

Protozoa eat tiny algae and bacteria. Some protozoa absorb food through their cell membrane. Others surround and engulf their food or have openings to collect food. They digest their food in stomach-like compartments called vacuoles. Protozoa take in oxygen and give off carbon dioxide through the cell membrane. Protozoa reproduces by splitting in half.

(ii) Worms and Leeches

There are about 9,000 species of Annelids known today, including worms and leeches. They can be found almost anywhere in the world. Annelids have existed on Earth for over 120 million years.

Annelids have bodies that are divided into segments. They have very well-developed internal organs. One common characteristic of annelids is that they don't have any limbs. Some annelids may have long bristles. Others have shorter bristles and seem smooth, like the earthworm.

There are many types of worms. Commonly known worms include earthworms, roundworms and flatworms. Most worms are small, measuring fractions of an inch to several inches long. Other worms, such as the ribbon worm, can grow up to 100 feet in length. Some worms are considered parasites, in that they live inside the human body.

(iii) Mollusks

Mollusks were among the first inhabitants of the Earth. Fossils of mollusks have been found in rocks and date back over 500 million years. Mollusk fossils are usually well preserved because of their hard shell. Most mollusks have a soft, skin-like organ covered with a hard outside shell. Some mollusks live on land, such as the snail and slug. Other mollusks live in water, such as the oyster, mussel, clam, squid and octopus.

Land living mollusks, like the snail, move slowly on a flat sole called a foot. Ocean living mollusks move or swim by jet propulsion. They propel themselves by ejecting water from their body. For example, the squid ejects water from a cavity within its body, and the scallop ejects water to move by clamping its shell closed. Other ocean living mollusks, like the oyster, attach themselves to rocks or other surfaces, and can't move. They feed by filtering small food particles from water that flows through them.

Snail and Slug

The snail family consists of marine snails and land snails all over the world. Land snails live in many habitats from gardens and woodlands, to deserts and mountains. Marine snails are native to all the worlds oceans and seas, and many freshwater rivers and lakes. Along with slug, snails make up the gastropod class of the mollusk phylum. Snails have an external shell, large enough to withdraw their body into it. Gastropods without a shell are known as slugs.

Octopus

There are about 300 different species of octopus native to many of the world's oceans, especially coral reefs. The octopus doesn't have an internal or external skeleton, allowing it to squeeze into very small places. The octopus has eight arms or tentacles, that it uses for crawling, exploring things and catching prey. The octopus' arms have suckers capable of grasping and holding objects, such as their

prey. The octopus has a hard beak in the center of its arms that it uses to tear apart its prey for eating. Like the squid, the octopus can suck water into its mantle and expel it out in a fast, strong jet. This jet propulsion provides fast, forward movement. Also like the squid, the octopus can eject a thick cloud of ink to help it escape from predators.

(iv) Squid

There are about 300 species of squid. They are native to most of the world's oceans. The squid has a distinct head, eight arms and two tentacles. The mouth of the squid has a sharp horny beak used to kill and tear its prey into small pieces. The main body of the squid is enclosed in the mantle, which has a swimming fin along each side. However, the swimming fin is not the squid's main way of moving through the water. The squid can suck water into the mantle and expel it out in a fast, strong jet. This jet propulsion provides fast, forward movement. Although most squid are less than 2 feet in length, the giant squid can grow up to 43 feet in length.

(v) Cuttlefish

Despite their name, the cuttlefish is not a fish, but a mollusk. The cuttlefish is native to all of the oceans of the world, but are more common in shallow coastal temperate and tropical waters. The cuttlefish has an internal shell or bone, called the cuttlebone, that helps them to be buoyant. Attached to this body structure is the head with eight arms and two feeding tentacles. The cuttlefish can easily camouflage itself by changing its skin color and pattern to blend in with its background. This helps the cuttlefish to hide from predators, and the sneak up on its prey. Like the squid and octopus, the cuttlefish can eject ink in an effort to escape from predators. This ink, called sepia, was once used as a dye to create ink used by artists.

(vi) Nautilus

The nautilus is native to deep ocean waters. It has a multi-chambered shell. Each chamber is sealed and contains gas which provides the nautilus with buoyancy to float. Like the octopus, squid and cuttlefish, the nautilus uses jet propulsion to move forward. It sucks in water, then expels it in a fast, strong stream to propel itself forward. The nautilus has as many as 90 small tentacles that it uses to catch food, such as shrimp, fish or small crustaceans. It then uses its powerful beak to crush the food. The nautilus is considered a living fossil because its form has remained unchanged for over 400 million years.

(vii) Echinoderms: Starfish, Sea Urchin And Family

Echinoderms are marine animals that live in the ocean. Common echinoderms include the sea star, sea urchin, sand dollar and sea cucumber. Most echinoderms have arms or spines that radiate from the center of their body. The central body contains their organs, and their mouth for feeding.

Sea stars, commonly known as the starfish, have 5 or more arms attached to their body.

On the bottom of the Starfish are small tube feet to help with movement and feeding. The starfish's mouth is underneath, and is capable of eating other sea life such as clams and mussels. Another type of echinoderm is the sea urchin. Sea urchins have many spines connected to their body. These spines help to protect them from predators.

(a) Starfish

The starfish or sea star is native to all of the world's oceans. There are about 1,800 different species of starfish with the greatest variety living in the tropical Indo-Pacific region. Most starfish have five arms, although some have fewer or more arms. Like other enchinoderms, starfish have small tube feet on their underneath body to help with movement and feeding. The starfish's mouth is underneath, and it has two stomachs in the mouth. The stomach sack can come out through the mouth to engulf and digest food, such as clams and mussels.

(b) Crustaceans

Crustaceans are a type of Arthropod. The name may not sound familiar, but you probably know them. You may even have eaten one.

Crustaceans live mostly in the ocean or other waters. Most commonly known crustaceans are the crab, lobster and barnacle. Crustaceans have a hard, external shell which protects their body. Crustaceans have a head and abdomen. The head has antennae which are part of their sensory system. The abdomen includes the heart, digestive system and reproductive system.

The abdomen also has appendages, such as legs, for crawling and swimming. Many crustaceans also have claws that help with crawling and eating.

(viii) CRAB

There are about 10,000 different species of crab. The crab is native to all of the world's oceans. There are also freshwater crabs, and even some crabs that live on land. Crabs have a large, hard shell. Extending from the front of its shell are the eyes, mouth and two pairs of antennae. The crab has 5 pairs of legs extending from the

side of its shell. The first pair of legs have claws or pincers used to catch and hold food. The other pairs of legs are used for walking. Most crabs don't swim, they use their legs to walk. However, some crabs such as the Blue Crab can use their legs as paddles to swim.

(a) Lobster

Lobsters are native to most oceans of the world. The lobster habitat is rocky, sandy or muddy ocean bottom and they are generally found hiding in crevices or in burrows under rocks. Lobsters have five pairs of legs, the first pair of legs are claws used to catch and hold food. Lobsters have a large exoskeleton. As lobsters grow, the must molt to shed their old exoskeleton as they grow a larger new shell.

(b) Shrimp

Shrimp are native to many of the world's oceans and lakes. They are generally found in shallow water. Their habitat includes both fresh and salt water. Although most shrimp are small, some can grow up to 9 inches in length. The shrimp has a very simple body consisting of the head and thorax, and a muscular abdomin for swimming. They have 8 pairs of legs, 5 for swimming and 3 for feeding. They also have 2 pairs of antennae use for taste and smell to find food. As a crustacean, the shrimp has a thin, almost transparent, exoskeleton. The shrimp is a popular food. In addition to commercial fishing for shrimp, shrimp are also grown in shrimp farms. Shrimp are also commonly found in aquariums.

(ix) Arachinds: Spiders, Ticks And Scorpions

Arachnids are a type of arthropod. You know many of them as spiders. Common arachnids are spiders, scorpions, ticks and mites.

Like other arthropods, the arachnids have a hard exoskeleton and jointed appendages for walking. Most arachnids have 4 pairs of legs. In some, the first pair of legs may be used for holding their prey and feeding. Unlike other arthropods, arachnids do not have antennae.

Spiders are easily recognized with their 8 legs. All legs are used for walking. The first pair of legs is also used for holding prey and feeding. The second pair of legs may also be used for holding and killing their prey. Most spiders have 8 eyes. Spiders have fangs that are used to inject poison to paralyze or kill their prey. Many spiders can produce silk threads to spin webs for catching prey, and for building an egg sack to hold and protect their eggs.

Scorpions are large arachnids, some reaching over 8 inches in length. They have 4 pairs of legs, and a pair of pincers for catching and holding their prey. Scorpions also have a sharp stinger at the end of their tail that is used to paralyze or kill insects and

small animals. Mites and ticks are small arachnids that are parasites living on the blood and tissue fluid of other animals. They can occasionally transmit disease. The abdomen also has appendages, such as legs, for crawling and swimming. Many crustaceans also have claws that help with crawling and eating.

(a) Scorpion

Scorpions are native to many parts of the world. There are about 1,400 different species of scorpion. They prefer warm or hot climates, but can even be found in cold, snowy areas. Their habitat includes deserts, grasslands and savannahs, forests, intertidal zones, mountains and caves. Scorpions are best known for their long, segmented tail with its venom-injecting barb. The scorpion will use its venomous stinger to capture prey and defend against predators. Scorpions have four pairs of legs and a pair of pincer-like pedipalps. These pincers can also be used to catch prey and defend against predators. Scorpions are nocturnal animals. They prefer to find shelter during the day in underground holes or under rocks where it is cool. They come out at night to hunt and feed. Most scorpions may also prey on small lizards, snakes and mice.

(b) Spider

Spiders are found world-wide on every continent except for Antarctica. There are approximately 40,000 different species of spiders. Spiders vary in size from quite small to relatively large. The Goliath Bird eater can grow up to 10 inches measuring its leg span. Most people can easily recognize a spider by its eight legs. One spider, the Daddy Long Legs, is even named after its eight long legs.

Another recognizable feature related to the spider is its web. Spiders have spinneret glands they use to build webs. These webs provide shelter and help catch food. Spiders also have fangs. Many spiders can inject a venomous liquid through their fangs. This venom is capable of paralyzing or killing predators or prey. Some venom, such as from the Brown Recluse or Black Widow, can even be dangerous or deadly to humans. Although some people are scared of spiders, most spiders will only bite humans in self-defense. Fear of spiders is called arachnophobia. Most spiders have four pairs of eyes. This provides them with very good vision. Some spiders, such as the Tarantula, can be very hairy. While many people are scared of the tarantula, this spider is generally quite harmless. Some people even keep a tarantula as a pet.

(c) Tarantula

The tarantula is a large, hairy spider found in tropical to temperate regions of the southwestern United States, Mexico, Central America, South America, southern

Europe, Asia, Africa and Australia. Tarantulas can go up to 4 inches in body size, and have a leg span of up to 12 inches.

Like other arachnids, the tarantula has eight legs, arranged in four pairs. It also has another pair of appendages used for feeling and gripping prey. The tarantula has two fangs used to inject venom into its prey, or in defense against predators. Tarantulas prefer to hunt at night. They will lay a web, but not to catch their prey. They lay strands of web on the ground to act as a trip wire. When an insect, frog, toad or mouse steps on the strand, alerting the tarantula, it will pounce on the unsuspecting victim.

Although many people find the tarantula scary, it is generally harmless to humans. They will not bite unless provoked, and if bitten the pain is usually similar to that of a bee sting. Some tarantulas have even become a popular pet.

(d) Spider Web

Spiders can produce silken thread using spinneret glands on their abdomen. This thread is very strong. It is stronger than a similar size thread of steel. Spiders use this silken thread for many things. A spider will spin a web to protect the entrance of their home from birds or wasps. A web is also used to catch insects or other food. The thread is sticky, and once an insect touches the web, it gets caught. Vibration of the web tells the spider an insect has flown or crawled into the web. The spider will then wrap its prey in silken thread so it can't escape. The thread is also be used to attach an egg sack to the web. This protects the eggs until the young are born. Sometimes a web is used as a path between places where it is difficult to crawl. There are many different shaped spider webs. Some spiders spin a circular web, or orb web. Other webs look like funnels or tubes. Some webs look like a sheet.

(x) Insects

Insects are the largest group of arthropods. There are over 800,000 different types of insects. Insects are very adaptable, living almost everywhere in the world. Common insects include the fly, beetle, butterfly, moth, dragonfly, bee, wasp and praying mantis.

Insects have an exoskeleton that covers their entire body. An insect's body consists of 3 parts: the head, thorax and abdomen. The insect's head has a pair of antennae, and a pair of compound eyes. Compound eyes are different from human eyes which have a single lens for each eye. Compound eyes have many lenses for each eye. For example, the fly has about 4,000 lenses in a single eye. This provides them with very good eyesight.

The thorax contains the legs for walking, swimming, jumping or digging. The thorax may also have wings for flying. The abdomen contains many body organs, such as the heart, respiratory system, digestive system and reproductive system. The

insect's hard, exoskeleton makes it difficult for the insect to grow and get larger. This is because the exoskeleton can't grow and get larger. Many insects must molt in order to grow. Molting is the process where an insect sheds it outer skeleton. It wriggles out of this old skin, and a new, larger exoskeleton develops. Invertebrates were the first animals to evolve. The first invertebrates evolved from single-celled, food eating microorganisms. Invertebrates are often most noted for what they lack: a backbone and a bony skeleton. Invertebrates account for 97 percent of all known species. The simplest invertebrates, in fact the simplest animals, are sponges. Most invertebrates change form as they grow, going through a process known as metamorphosis. Some species of invertebrates form large colonies. Invertebrates will eat almost anything that was or is alive. Many of the world's parasites are invertebrates.

Vertebrates

Animals with an internal skeleton made of bone are called vertebrates. Vertebrates include fish, amphibians, reptiles, birds, mammals, primates, rodents and marsupials. Although vertebrates represent only a very small percentage of all animals, their size and mobility often allow them to dominate their environment.

(i) Fish

Almost three-forths of the world's surface is covered in water. This water is home to over 20,000 different species of fish. The earliest fossils of fish date back over 400 million years. There are a wide variety of fish — from the goby which is less than one half an inch long, to the whale shark which can be over 60 feet long. Most fish breathe through gills. Gills perform the gas exchange between the water and the fish's blood. They allow the fish to breathe oxygen in the water.

Fishes are vertebrates that have a skeleton made of either bone or cartilage. About 95% of fishes have skeletons made of bone. These bony fishes have a swim bladder, a gas-filled sac, that they can inflate or deflate allowing them to float in the water even when not swimming. Fishes with a cartilage skeleton tend to be heavier than water and sink. They must swim to keep afloat. Cartilaginous (cartilage) fish include the ray and the shark.

Most fish swim using a tail fin. Muscles in the tail fin move it from side to side, forcing water backward, and propeling the fish forward. Other fins help the fish change direction and stop. Pectoral fins on their side help them swim up and down. Dorsal and anal fins on the top and bottom keep the fish upright. Pelvic fins on the underside help steer left and right. Many fish eat plants, while others such as the shark, eat other fish.

Flying Fish

There are about 50 species of flying fish. They are found in all major oceans of the world, particularly in the warm tropical and subtropical waters of the Atlantic, Pacific, and Indian oceans. As their name implies, these fish can fly. They can't fly as well as a bird, but they can take short flights through the air. Most flying fish use their large pectoral fins as wings. The fish can take short gliding flights above the surface of the water in order to escape from predators

(a) Paddlefish

There are two different species of paddlefish: the Chinese paddlefish and the American paddlefish. The Chinese paddlefish lives in the Yangtze River in China. The American paddlefish lives in the Mississippi, Missouri, Des Moines, Yellowstone, Ohio and Oklahoma Rivers in the United States. The most recognizable feature of the paddlefish is its large mouth and long snout or bill. The spatula-like snout can be half the length of its body. This is why the paddlefish is sometimes called the spoon fish.

Facts About Fish

Fish are divided into three basic groups which include cartilaginous fish, bony fish, and lobe-finned fish. Fish were the first animals to evolve backbones. The ray-finned fish are the largest group of fish. Fish move by creating a wave motion that moves the length of its body. Fish are cold-blooded (ectothermic) animals. Many species of cichlids brood their eggs in their mouth. After the eggs hatch the parent continues to use their mouth to provide shelter for their young. Cartilaginous fish include the sea's largest and most skilled marine predators. These include sharks, skates, rays, and chimeras. These fish have skeletons made from cartilage, not bone. The cartilaginous skeletons are more flexible than bone. The lateral line system on some fish detects variations in water pressure. This helps fish detect prey and avoid predators.